

मध्य रेल



ई-निविदा क्रमांक – भुसावल-एल-डब्लू-टी-50-2026

कार्य का नाम

Name of work – Electrification work in connection with Redevelopment of Amravati Railway station.

टेण्डर जारी किया :

टेण्डर दिया गया :

वरिष्ठ मंडल विद्युत अभियंता (सामान्य), मध्य रेल, भुसावल	मेसर्स _____ _____ _____
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E-Tender No:-BSL-L-W-T-50-2026

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CENTRAL RAILWAY

E-TENDER NOTICE NO BSL-L-W-T-50-2026 (ELECT. GEN) OPEN TENDER

Senior Divisional Electrical Engineer (General Services) Central Railway, Bhusawal for & on behalf of President of India invites **E-TENDER** from reputed & experienced contractors on website www.ireps.gov.in for the following work –

SN	Tender No.	Description of work	Approx. Cost Rs.	Bid Security	Validity of offer	Completion period
1	BSL-L-W-T-50-2026	Electrification work in connection with Redevelopment of Amravati Railway station.	2,26,19,752	4,52,400	60 days	9 Months

Notes-(I) Tender Closing Date Time of aforesaid tender up to 15.00 Hrs. of **06/07/2026**.

(II) The prospective tenderers are requested to visit the website – www.ireps.gov.in for details of tenders & Corrigendum, if any.

(III) The tender notice is also displayed on **Notice Board** of Sr.DEE(G) Office, Bhusawal.

(IV) Tenderer may participate in above E- tender electronically through website www.ireps.gov.in only & submission of manual offers against e-tender are not allowed & if any manual offers submitted shall neither be opened nor considered.

(V) **Bid Security** :- The Bid Security shall be deposited either in cash through e-payment gateway or submitted as Bank Guarantee bond from a scheduled commercial bank of India or as mentioned in tender documents. The Bank Guarantee bond shall be as per **Annexure-VIA** and shall be valid for a period of 90 days beyond the bid validity period.

Exemptions:

- (i) Any firm recognized by Department of Industrial Policy and Promotion (DIPP) as ‘Startups’ shall be exempted from payment of Bid Security detailed above.
- (ii) Labour Cooperative Societies shall submit only 50% of above Bid Security detailed above.

Note:- Subject to exemptions provided above, the tender must be accompanied by a Bid Security as mentioned in tender document, failing which the tender shall be summarily rejected.

(VI) The contractor shall submit self-attested/digitally signed copy of valid Electrical Contractor License as per Clause No. 45 IE Rule 1956 along with the offer. The offer will be summarily rejected in absence of valid Electrical Contractor License.

(VII) Tenderer should submit their credential of work done along with the offer as per ‘Eligibility Criteria’, Definition of “similar nature of work” and Para 7.0 given in tender booklet. (for details please see tender booklet Page. No. 5 to 9)

- (VIII) **Special Condition** - Tenderer, in case of other than Company / Proprietary Firm, Annexure-V(A) shall be submitted by the each member of a Partnership Firm / Joint Venture (JV) / Hindu Undivided Family (HUF) / Limited Liability Partnership (LLP) etc. as the case may be. **Non submission of Annexure-V(A) by the bidder shall result in summarily rejection of his/their bid.** It shall be mandatorily incumbent upon the tenderer to identify state and submit the supporting documents duly self-attested/digitally signed by which they/he is qualifying the Qualifying Criteria mentioned in the Tender Document.

SENIOR DIVISIONAL ELECTRICAL ENGINEER.
(GENERAL SERVICES)
CENTRAL RAILWAY, BHUSAWAL
On behalf of President of India

PREAMBLE AND SCOPE OF WORK

E-Tender No:- BSL-L-W-T-50-2026

NAME OF WORK :- Electrification work in connection with Redevelopment of Amravati Railway station.

SCOPE OF WORK :-

The scope of work involves supply, erection, testing and commissioning of point wiring and concealed wiring with various switches, sockets, fans, submains, switchgears, LED lights/ fittings, Signages, earthing, Bus duct trunking system, lighting circuit board, octagonal pole, water cooler, Air Conditioning, electric water heater/geyser, Pumps and other necessary accessories, LT panel, LT XLPE cables along with their transportation, laying and other necessary accessories, dismantling etc in Bhusawal Divn:

1.0 APPROXIMATE COST OF THE WORK	:-Rs. 2,26,19,752
TIME AND DATE OF CLOSING	:-15.00 Hrs on 06/07/2026
COMPLETION PERIOD	:- 9 Months
VALIDITY OF OFFER	:-60 days.

2.0 FOREIGN EXCHANGE: No foreign exchange and/or import license shall be released/provided to the Contractor in connection with this contract.

3.0 “Tenderer should participate electronically in E- tender through website www.ireps.gov.in& submission of manual offers against e-tender are not allowed & if any manual offers submitted shall neither be opened nor considered.”

4.0 GENERAL

- i) Water / electricity / transport shall be arranged by the Contractor at his own cost. The Purchaser shall not provide the same under any circumstances. The site for depot / workshop can be provided to the Contractor on his request.
- ii) The Contractor shall arrange at his own cost, all tools & plants, facilities required for erection, testing and commissioning of all the equipment in compliance with the respective specifications.
- iii) The schedule of rates and quantities enclosed should be read in conjunction with the explanatory notes given in the tender papers.
- iv) **Tenderer should submit their credential of work done as per Eligibility criteria of Tender and Similar Nature of Work**

5.0 Bid Security: The Bid Security shall be deposited either in cash through e-payment gateway or submitted as Bank Guarantee bond from a scheduled commercial bank of India or as mentioned in tender documents. The Bank Guarantee bond shall be as per **Annexure-VIA** and shall be valid for a period of 90 days beyond the bid validity period.

Exemptions :-

- (i) Any firm recognized by Department of Industrial Policy and Promotion (DIPP) as ‘Startups’ shall be exempted from payment of Bid Security detailed above.
- (ii) Labour Cooperative Societies shall submit only 50% of above Bid Security detailed above.

5.1 In case, submission of Bid Security in the form of Bank Guarantee, following shall be ensured:

- i. A scanned copy of the Bank Guarantee shall be uploaded on e-Procurement Portal (IREPS) while applying to the tender.
- ii. The original Bank Guarantee should be delivered in person to the official nominated as indicated in the tender document before closing date for submission of bids (i.e. excluding the last date of submission of bids)
- iii. Non submission of scanned copy of Bank Guarantee with the bid on e-tendering portal (IREPS) and/or non-submission of original Bank Guarantee within the specified period shall lead to summary rejection of bid.
- iv. The Tender Security shall remain valid for a period of 90 days beyond the validity period for the Tender.
- v. The details of the BG, physically submitted should match with the details available in the scanned copy and the data entered during bid submission time, failing which the bid will be rejected
- vi. The Bank Guarantee shall be placed in an envelope, which shall be sealed. The envelope shall clearly bear the identification “**Bid for the ***** Project**” and shall clearly indicate the name and address of the Bidder. In addition, the Bid Due Date should be indicated on the right hand top corner of the envelope.
- vii. The envelope shall be addressed to the officer and address as mentioned in the tender document.
- viii. If the envelope is not sealed and marked as instructed above, the Authority assumes no responsibility for the misplacement or premature opening of the contents of the Bid submitted and consequent losses, if any, suffered by the Bidder.
- ix. Bank guarantee shall be in the name of “Senior Divisional Finance Manager, Central Railway Bhusawal” on minimum Rs. 500 stamp only.
- x. Successful tenderer will deposit Rs. 200 legal vetting charges before execution of work.

Note :- (a) Subject to exemptions provided under para 5.0 above, the tender must be accompanied by a Bid Security as mentioned in tender document, failing which the tender shall be summarily rejected.

(b) The Tenderer(s) shall keep the offer open for a minimum period of 60 days (in case of two packet system of tendering 90days) from the date of closing of the Tender. It is understood that the tender documents have been issued to the Tenderer(s) and the Tenderer(s), is / are permitted to tender in consideration of the stipulation on his / their part that after submitting his / their tender subject to the period being extended further, if required by mutual agreement from time to time, he will not resile from his offer or modify the terms and conditions thereof in a manner not acceptable to _____ Railway. Should the tenderer fail to observe or comply with the foregoing stipulation, the amount deposited or Bank guarantee bond submitted as Bid Security for the due performance of the above stipulation, shall be forfeited to the Railway.

6.0 Eligibility Criteria (Refer clause 10 of Part-I of GCC April-2022):

6.1 Technical Eligibility Criteria:

The tenderer must have successfully completed or substantially completed any one of the following categories of work(s) during last 07 (seven) years, ending last day of month previous to the one in which tender is invited:

- (i) Three similar works each costing not less than the amount equal to 30% of advertised value of the tender, or

- (ii) Two similar works each costing not less than the amount equal to 40% of advertised value of the tender, or
- (iii) One similar work costing not less than the amount equal to 60% of advertised value of the tender.

6.2 DEFINITION OF SIMILAR NATURE OF WORK: -

Definition of Similar Nature of Works

Electrification / Rewiring of Service or Residential building / Yard / HT / LT substation work / HT / LT cable work / street lighting / platform or building lighting management / circulating area Lighting / Electrical overhead power supply work / Electrical pump work etc.

Note: (1) Work experience certificate from private individual shall not be considered. However, in addition to work experience certificates issued by any Govt. Organization, work experience certificate issued by Public listed company having average annual turnover of Rs 500 crore and above in last 3 financial years excluding the current financial year, listed on National Stock Exchange or Bombay Stock Exchange, incorporated/registered at least 5 years prior to the date of closing of tender, shall also be considered provided the work experience certificate has been issued by a person authorized by the Public listed company to issue such certificates.

In case tenderer submits work experience certificate issued by public listed company, the tenderer shall also submit along with work experience certificate, the relevant copy of work order, bill of quantities, bill wise details of payment received duly certified by Chartered Accountant, TDS certificates for all payments received and copy of final/last bill paid by company in support of above work experience certificate.

Note: (2) If a bidder has successfully completed a work as subcontractor and the work experience certificate has been issued for such work to subcontractor by a Govt. Organization or public listed company as defined in Note 1 above, the same shall be considered for the purpose of fulfillment of credentials.

6.3 Financial Eligibility Criteria: The tenderer must have minimum average annual contractual turnover of V/N or 'V' whichever is less; where

V= Advertised value of the tender in crores of Rupees

N= Number of years prescribed for completion of work for which bids have been invited.

The average annual contractual turnover shall be calculated as an average of "total contractual payments" in the previous three financial years, as per the audited balance sheet. However, in case balance sheet of the previous year is yet to be prepared/ audited, the audited balance sheet of the fourth previous year shall be considered for calculating average annual contractual turnover.

The tenderers shall submit requisite information as per **Annexure-VIB**, along with copies of Audited Balance Sheets duly certified by the Chartered Accountant/ Certificate from Chartered Accountant duly supported by Audited Balance Sheet.

6.4 No Technical and Financial credentials are required for tenders having advertised value up to Rs. 50 lakh.

6.5 Credentials if submitted in foreign currency shall be converted into Indian currency i.e., Indian Rupee as under:

The conversion rate of US Dollars into Rupees shall be the daily representative exchange rates published by the Reserve Bank of India or entity authorized by RBI to do so for the relevant date or immediately previous date for which rates have been published. Where, relevant date shall be as on

the last day of month previous to the one in which tender is invited. In case of any other currency, the same shall first be converted to US Dollars as on the last day of month previous to the one in which tender is invited, and the amount so derived in US Dollars shall be converted into Rupees at the aforesaid rate. The conversion rate of such currencies shall be the daily representative exchange rates published by the International Monetary Fund for the relevant date or immediately previous date for which rates have been published.

7.0 Tenderer Credentials:

Documents testifying tenderer previous experience and financial status should be produced along with the tender.

Tenderer(s) shall submit along with his / their tender:

- (i) Certificates and testimonials regarding contracting experience for the type of job for which tender is invited with list of works carried out in the past.
- (ii) Audited Balance Sheet duly certified by the Chartered Accountant regarding contractual payments received in the past.
- (iii) The list of personnel / organization on hand and proposed to be engaged for the tendered work. Similarly list of Plant & Machinery available on hand and proposed to be inducted and hired for the tendered work.
- (iv) Tenderer, in case of other than Company / Proprietary Firm, Annexure-V(A) shall be submitted by the each member of a Partnership Firm / Joint Venture (JV) / Hindu Undivided Family (HUF) / Limited Liability Partnership (LLP) etc. as the case may be. **Non submission of Annexure-V(A) by the bidder shall result in summarily rejection of his/their bid.** It shall be mandatorily incumbent upon the tenderer to identify state and submit the supporting documents duly self-attested/digitally signed by which they/he is qualifying the Qualifying Criteria mentioned in the Tender Document.
- (v) The Railway reserves the right to verify all statements, information and documents submitted by the bidder in his tender offer, and the bidder shall, when so required by the Railway, make available all such information, evidence and documents as may be necessary for such verification. Any such verification or lack of such verification, by the Railway shall not relieve the bidder of its obligations or liabilities hereunder nor will it affect any rights of the Railway there under.
- (vi) (a) **In case of any information submitted by tenderer is found to be false, forged or incorrect at any time during process for evaluation of tenders, it shall lead to forfeiture of the Bid Security and may also lead to any other action provided in the contract including banning of business for a period of upto two year.**

(b) **In case of any information submitted by tenderer is found to be false, forged or incorrect after the award of contract, it will lead to termination of the contract, along with forfeiture of Bid Security/Security Deposit and Performance guarantee and may also lead to any other action provided in the contract including banning of business for a period of upto two year.**

Note :-Non-compliance with any of the conditions set forth therein above is liable to result in the tender being rejected.

- 8.0** - Contractor shall ensure all precautions during digging work close to Rly signaling, telecom electrical cables etc. Penalties to be imposed for damages to any cable as per Railway board letter no. 2021/Tele/5(2)/3-Part(1)/(3425647) dtd 12.06.2023

9.0 GENERAL CONDITION OF CONTRACT:

Unless otherwise stated in the tender papers, contract shall be governed by “**Indian Railways Standard General Conditions of Contract, April 2022**”, along with the amendments, if any, issued by the Government of India, Ministry of Railways (Railway Board) from time to time. In case of any contradiction with the regulations laid down here under, GCC April 2022 with latest orders, modification and amendments will prevail, copy of which may be downloaded from the website:

https://indianrailways.gov.in/railwayboard/uploads/directorate/civil_engg/pdf/2022/GCC_April-2022_2022_CE-I_CT_GCC-2022_POLICY_27_04_22.pdf
and https://indianrailways.gov.in/railwayboard/view_section.jsp?id=0,1,304,366,526

For block working in Bhusawal Division, rules/procedure stipulated in PDSR (Power Distribution & Subsidiary Rules) and G&SR (General & Subsidiary Rules) as applicable for Bhusawal Division shall be followed. Successful tenderer shall ensure himself & his staff for getting acquaintance of these rules. The complete tender document should be read in conjunction with GCC April 2022 and all forthcoming amendments.

10.0 ADDRESSES:

Relevant addresses for specified purposes in connection with the tender are given below:

10.1 For Contract execution –

**Senior Divisional Electrical Engineer,
(General Service) Bhusawal,
DRM office Bldg., 1st floor,
Central Railway, Bhusawal-425201.**

CHAPTER-I

INSTRUCTIONS TO TENDERERS

&

SPECIAL CONDITIONS OF CONTRACT

CHAPTER-I

INSTRUCTIONS TO TENDERERS & SPECIAL CONDITIONS OF CONTRACT

The special conditions of contract shall supplement and to be read together with the General Conditions of Contract, April 2022 of the Indian Railway and the extant orders along with the amendments, if any, issued by the Government of India, Ministry of Railways (Railway Board) from time to time.

1.0 Care in submission of Tenders: -

Before submitting a tender, the tenderer will be deemed to have satisfied himself by actual inspection of the site and locality of the works, that all conditions liable to be encountered during the execution of the works are taken into account and that the rates he enters in the tender forms are adequate and all-inclusive to accord with the provisions in Clause-37 of the Standard General Conditions of Contract for the completion of works to the entire satisfaction of the Engineer.

2.0. Documents to be Submitted Along with Tender

(i) The tenderer shall clearly specify whether the tender is submitted on his own (Proprietary Firm) or on behalf of a Partnership Firm / Company / Joint Venture (JV) / Registered Society / Registered Trust / Hindu Undivided Family (HUF) / Limited Liability Partnership (LLP) etc. The tenderer(s) shall enclose the attested copies of the constitution of their concern, and copy of PAN Card along with their tender. Tender Documents in such cases are to be signed by such persons as may be legally competent to sign them on behalf of the firm, company, association, trust or society, as the case may be. **In case a tenderer is participating as Sole Proprietor in a tender, it is mandatory for him to submit an undertaking on suitable stamp paper to this effect clearly mentioning PAN number also along with tender document at the time of submission of tender.**

(ii) Following documents shall be submitted by the tenderer:

(a) Sole Proprietorship Firm:

(i) All documents in terms of Para 10 of the Tender Form (Second Sheet) of GCC April 2022

(b) HUF:

(i) A copy of notarized affidavit on Stamp Paper declaring that he who is submitting the tender on behalf of HUF is in the position of 'Karta' of Hindu Undivided Family (HUF) and he has the authority, power and consent given by other members to act on behalf of HUF.

(ii) All other documents in terms of Para 10 of the Tender Form (Second Sheet) of GCC April 2022

(c) Partnership Firm:

(i) All documents as mentioned in para 18 of the Tender Form (Second Sheet) of GCC April 2022

(d) **Joint Venture (JV):** All documents as mentioned in para 17 of the Tender Form (Second Sheet) of GCC April 2022

(e) **Company registered under Companies Act 2013:**

- (i) The copies of **MOA (Memorandum of Association) / AOA (Articles of Association)** of the company
- (ii) A copy of Certificate of Incorporation
- (iii) A copy of Authorization/Power of Attorney issued by the Company (backed by the resolution of Board of Directors) in favour of the individual to sign the tender on behalf of the company and create liability against the company.
- (iv) All other documents in terms Para 10 of the Tender Form (Second Sheet) of GCC April 2022

(f) **LLP (Limited Liability Partnership):**

- (i) A copy of LLP Agreement
- (ii) A copy of Certificate of Incorporation
- (iii) A copy of Power of Attorney/Authorization issued by the LLP in favour of the individual to sign the tender on behalf of the LLP and create liability against the LLP.
- (iv) An undertaking by all partners of the LLP that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of submission of bids, either in their individual capacity or in any firm/LLP or JV in which they were / are partners/members. Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the Standard General Conditions of Contract.
- (v) All other documents in terms of Para 10 of the Tender Form (Second Sheet) of GCC April 2022

(g) **Registered Society & Registered Trust:**

- (i) A copy of Certificate of Registration
- (ii) A copy of Memorandum of Association of Society/Trust Deed
- (iii) A copy of Power of Attorney in favour of the individual to sign the tender documents and create liability against the Society/Trust.
- (iv) A copy of Rules & Regulations of the Society
- (v) All other documents in terms of Para 10 of the Tender Form (Second Sheet) of GCC April 2022

(iii) If it is NOT mentioned in the submitted tender that tender is being submitted on behalf of a Sole Proprietorship firm / Partnership firm / Joint Venture / Registered Company etc., then the tender shall be treated as having been submitted by the individual who has signed the tender.

(iv) After opening of the tender, any document pertaining to the constitution of Sole Proprietorship Firm / Partnership Firm / Registered Company/ Registered Trust / Registered Society / HUF/LLP etc. shall be neither asked nor considered, if submitted. Further, no suo moto cognizance of any document available in public domain (i.e., on internet etc.) or in Railway's record/office files etc. will be taken for consideration of the tender, if no such mention is available in tender offer submitted.

(v) A tender from JV shall be considered only where permissible as per the tender conditions.

(vi) The Railway will not be bound by any change of power of attorney or in the composition of the firm made subsequent to the submission of tender. Railway may, however, recognize such power of attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the Contractor.

2.1 Note :- The tenderer whether sole proprietor / a company or a partnership firm / joint venture (JV) / registered society / registered trust / HUF / LLP etc if they want to act through agent or individual partner(s), should submit along with the tender, a copy of power of attorney duly stamped and authenticated by a Notary Public or by Magistrate in favour of the specific person whether he/they be partner(s) of the firm or any other person, specifically authorizing him/them to sign the tender, submit the tender and further to deal with the Tender/ Contract up to the stage of signing the agreement except in case where such specific person is authorized for above purposes through a provision made in the partnership deed / Memorandum of Understanding / Article of Association /Board resolution, failing which tender shall be summarily rejected.

A separate power of attorney duly stamped and authenticated by a Notary Public or by Magistrate in favour of the specific person whether he/they be partner(s) of the firm or any other person, shall be submitted after award of work, specifically authorizing him/them to deal with all other contractual activities subsequent to signing of agreement, if required.

Note: A Power of Attorney executed and issued overseas, the document will also have to be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney is being issued. However, the Power of Attorney provided by Bidders from countries that have signed the Hague Legislation Convention 1961 are not required to be legalized by the Indian Embassy if it carries a conforming Apostille certificate.

3.0. Employment/Partnership etc. of Retired Railway Employees:

(a) Should a tenderer

i) be a retired Engineer of the gazetted rank or any other gazetted officer working before his retirement, whether in the executive or administrative capacity or whether holding a pensionable post or not, in the Engineering or any other department of any of the railways owned and administered by the President of India for the time being, OR

ii) being partnership firm / joint venture (JV) / registered society / registered trust etc have as one of its partners / members a retired Engineer of the gazetted rank or any other gazetted officer working before his retirement, OR

iii) being an incorporated company have any such retired Engineer of the gazetted rank or any other gazetted officer working before his retirement as one of its directors

AND

in case where such Engineer or officer had not retired from government service at least 1 year prior to the date of submission of the tender

THEN

the tenderer will give full information as to the date of retirement of such Engineer or gazetted officer from the said service and as to whether permission for taking such contract, or if the Contractor be a partnership firm or an incorporated company, to become a partner or director as the case may be, has been obtained by the tenderer or the Engineer or officer, as the case may be from the President of India or any officer, duly authorized by him in this behalf, shall be clearly stated in writing at the time of submitting the tender.

- b) In case, upon successful award of contract, should a tenderer depute for execution of the works under or to deal matters related with this contract, any retired Engineer of gazette rank or retired gazetted officer working before his retirement in the Engineering or any other department of any of the railways owned and administered by the President of India for the time being, and now in his employment, then the tenderer will ensure that retired Engineer or retired gazetted officer had retired from government service at least 1 year prior to the date of his employment with tenderer and in case he had retired from service within a year then he possesses the requisite permission from the President of India or any officer, duly authorized by him in this behalf, to get associated with the tenderer.
- c) Should a tenderer or Contractor being an individual, have member(s) of his family or in the case of partnership firm/ company / joint venture (JV) / registered society / registered trust etc. one or more of his partner(s)/shareholder(s) or member(s) of the family of partner(s)/shareholder(s) having share of more than 1% in the tendering entity employed in gazetted capacity in the Engineering or any other department of the railway, then the tenderer at the time of submission of tender, will inform the authority inviting tenders the details of such persons.

Note: - If information as required as per 3.0. a), b), c) above has not been furnished, contract is liable to be dealt in accordance with provision of clause 62 of Standard General Condition of contract.

4.0. Participation of Partnership Firms in works tenders:

4.1 The Partnership Firms participating in the tender should be legally valid under the provisions of the Indian Partnership Act.

4.2 The partnership firm should have been in existence or should have been formed prior to submission of tender. Partnership firm should have either been registered with the Registrar or the partnership deed should have been notarized as per the Indian Partnership Act, prior to submission of tender.

4.3 Separate identity / name should be given to the partnership firm. The partnership firm should have PAN / TAN number in its own name and PAN / TAN number in the name of any of the constituent partners shall not be considered. The valid constituents of the firm shall be called partners.

4.4 Once the tender has been submitted, the constitution of the firm shall not normally be allowed to be modified / altered / terminated during the validity of the tender as well as the currency of the contract except when modification becomes inevitable due to succession laws etc., in which case prior permission should be taken from Railway and in any case the minimum eligibility criteria should not get vitiated. The re-constitution of firm in such cases should be followed by a notary certified Supplementary Deed. The approval for change of constitution of the firm, in any case, shall be at the sole discretion of the Railways and the tenderer shall have no claims what-so-ever. Any change in the constitution of Partnership firm after submission of tender shall be with the consent of all partners and with the signatures of all partners as that in the Partnership Deed. Failure to observe this requirement shall render the offer invalid and full Bid Security shall be forfeited.

If any Partner/s withdraws from the firm after submission of the tender and before the award of the contract, the offer shall be rejected and Bid Security of the tenderer will be forfeited. If any

new partner joins the firm after submission of tender but prior to award of contract, his / her credentials shall not qualify for consideration towards eligibility criteria either individually or in proportion to his share in the previous firm. In case the tenderer fails to inform Railway beforehand about any such changes / modification in the constitution which is inevitable due to succession laws etc. and the contract is awarded to such firm, then it will be considered a breach of the contract conditions liable for determination of the contract under Clause 62 of the Standard General Conditions of Contract.

4.5 A partner of the firm shall not be permitted to participate either in his individual capacity or as a partner of any other firm in the same tender.

4.6 The tender form shall be submitted only in the name of partnership firm. The Bid Security shall be submitted by partnership firm. The Bid Security submitted in the name of any individual partner or in the name of authorized partner (s) shall not be considered.

4.7 On issue of Letter of Acceptance (LOA) to the partnership firm, all the guarantees like Performance Guarantee, Guarantee for various Advances to the Contractor shall be submitted only in the name of the partnership firm and no splitting of guarantees among the partners shall be acceptable.

4.8 On issue of Letter of Acceptance (LOA), contract agreement with partnership firm shall be executed in the name of the firm only and not in the name of any individual partner.

4.9 In case the Letter of Acceptance (LOA) is issued to a partnership firm, the following undertakings shall be furnished by all the partners through a notarized affidavit, before signing of contract agreement.

(a) Joint and several liabilities:

The partners of the firm to which the Letter of Acceptance (LOA) is issued, shall be jointly and severally liable to the Railway for execution of the contract in accordance with General and Special Conditions of the Contract. The partners shall also be liable jointly and severally for the loss, damages caused to the Railway during the course of execution of the contract or due to non-execution of the contract or part thereof.

(b) Duration of the partnership deed and partnership firm agreement:

The partnership deed/partnership firm agreement shall normally not be modified/altered/terminated during the currency of contract and the maintenance period after the work is completed as contemplated in the conditions of the contract. Any change carried out by partners in the constitution of the firm without permission of Railway, shall constitute a breach of the contract, liable for determination of the contract under Clause 62 of the Standard General Conditions of Contract.

(c) Governing laws: The partnership firm agreement shall in all respect be governed by and interpreted in accordance with the Indian laws.

(d) No partner of the firm shall have the right to assign or transfer the interest right or liability in the contract without the written consent of the other partner/s and that of the Railway.

4.10 The tenderer shall clearly specify that the tender is submitted on behalf of a partnership firm. The following documents shall be submitted by the partnership firm, with the tender:

- (i) A notarized copy of the Partnership Deed or a copy of the Partnership deed registered with the Registrar.
- (ii) A notarized or registered copy of Power of Attorney in favour of the individual to tender for the work, sign the agreement etc. and create liability against the firm.
- (iii) An undertaking by all partners of the partnership firm that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of submission of bids, either in their individual capacity or in any firm/LLP in which they were / are partners/members. Any Concealment / wrong information in regard to above shall make the bid ineligible or the contract shall be determined under Clause 62 of the Standard General Conditions of Contract.
- (iv) All other documents in terms of explanatory notes in clause 10 (i.e. Eligibility Criteria) of GCC, April-2022.

4.11 Evaluation of eligibility of a partnership firm:

- (i) Technical and financial eligibility of the firm shall be adjudged based on satisfactory fulfillment of the eligibility criteria laid down in Clause 10 (i.e. Eligibility Criteria) of GCC, April-2022.

5.0 TENDERER SPECIAL CONDITIONS:

The tenderer should normally not stipulate any special conditions while submitting his tender. In such an eventuality, Central Railway reserves the right to summarily reject such tenders without assigning any reasons whatsoever. The tenderer should normally submit his tender in full conformity with the tender conditions of Central Railway, Bhusawal. If any particulars are furnished by the tenderer in response to specific tender conditions, by which such particulars are required to be furnished at the tender stage, this shall not be treated as special conditions for the purpose of this para.

6.0 PRICE VARIATION CLAUSE (PVC) : As per GCC along with latest amendments.

7.0 DEFECTIVE EQUIPMENTS TO BE CHANGED :

Not with standing completion of work in partial or full use of any equipment, if the completed equipment or any portion thereof before it finally taken over at the end of the guarantee period be found to be or to have become defective in course of usage by the Railway due to faulty material, design or workmanship, or otherwise fails to fulfill the requirement of the contract and/or its purpose, the purchaser shall normally give the contractor prompt notice setting forth the particulars of each defects or failure and the contractor shall forthwith make the defects good or modify or replace the equipment, as may be directed by the purchaser's Engineer, at his own cost in all respects to make comply satisfactorily with the said requirements. Should the contractor fail to do within a reasonable time the service of the said notice upon him or should time not permit of service of such notice, the purchaser may repair or reject and replace the whole or part of such defective equipment as the case may be, at the cost of the contractor. The contractor's full liability under this clause shall be satisfied by the payment to the purchaser of the extra total cost, if any, of such replacement delivered and erected as provided for in the original contract, such extra cost being the ascertained difference between the price paid by the purchaser under the provisions above mentioned for such replacement and the contractor's price for the plant so replaced, plus the sum, if any, paid by the purchaser to the contractor in respect of such defective equipment. Should the purchaser not so replace the rejected equipment within a

reasonable time, the contractor's liability under this clause shall be satisfied by the repayment by the contractor of all money paid by the purchaser to him in respect of such rejected equipment. Rejected/defective materials shall be returned to the contractor to the extent possible.

8.0 FINAL ACCEPTANCE:

The final acceptance of the entire equipment installed on the site shall take effect from the date of expiry of the period of guarantee. After expiry of the period of guarantee for each section, a certificate of final acceptance shall be issued by the Purchaser and the last of such certificate will be called the last and final acceptance certificate. The contract shall not be considered as completed until the issue of final acceptance certificate by the Purchaser. The Purchaser shall not be liable to the Contractor for any matter arising out of or in connection with the contract or execution of the work unless the Contractor shall have made a claim in writing in respect thereof before the issue of final acceptance certificate under this clause.

Notwithstanding the issue of final acceptance certificate, the Contractor and the Purchaser (subject to sub-clause as above) shall remain liable for fulfillment of any obligation incurred under the provision of the contract prior to the issue of final acceptance certificate which remains unperformed at the time such certificate is issued and for determining the nature and extent of such obligation the contract shall be deemed to remain in force between the parties hereto.

9.0 ISSUE OF IDENTITY CARDS TO CONTRACTOR'S LABOURS:

Following certificates/documents should be issued to each contract labourers nominated to work in the railway premises by the contractor, indicating Contract No, Name of the person, place of work etc.

1. Identity Card,
2. Character certificate issued by Police Department,
3. Certificate for technical competency.

If these are not issued to contract Labour, he / they will not be permitted to work in the Railway premises. The list of the labour should be submitted to this office for records.

10.0 ISSUE OF MATERIALS TO THE CONTRACTOR:

Contractors have to submit a Bank Guarantee for an amount equal to the cost of material paid to them and to be handed over to them for erection. The cost of material paid to them and handed over to them and under their possession at any time shall not exceed the value of the B.G. already submitted.

11.0 STANDING INDEMNITY BOND:

Cost of all the materials for which 'On Account' payments have been made to the contractor against the Contract and materials handed over to the contractor by the purchaser for the purpose of execution of the said Contract, until such time the materials are duly erected or otherwise handed over to the purchaser shall be covered by the standing indemnity bond(see FormNo.16).

12.0 INSPECTION :

All the material, required for this work shall be subject to inspection to ensure that the work is done in accordance with specification, drawings and is of the best quality suitable for the purpose. Following inspection schedule shall be followed.

- a) **Inspection of material :-**
- i) **At Firm's premises:-** Material having value above Rs.5 lakhs shall be inspected by RITES. Inspection of other materials shall be done by Railway's representative. Firm will submit manufactures original test certificate.
- ii) **After Receipt of material:-** Inspection of other item shall be done at depot / site by Railway Engineer's representative. Contractor shall produce all the test reports, material documents, etc. during inspection.
- iii) All the defects / discrepancies, if any, pointed out during inspection should be attended by the contractor immediately.
- b) **Stage Inspections:-** Stage inspections shall be carried out by Railway Engineer's representative from time to time during execution of the work at site. All the shortcomings noticed during stage inspection shall be attended by the contractor.
- c) **Final Inspections:-** After completion of work, contractor shall offer it for final inspection and testing. All the shortcomings noticed during final inspection shall be attended by the contractor, immediately and a joint inspection shall be carried out by Railway Engineer's Representative and by Contractor Representative after completion of the entire work and a joint inspection report shall be made. The joint inspection report shall be signed by the contractors representative, Railway's authorized Engineer for that work and shall be enclosed along with the final bill with details of works carried out in individual location. Any defect / shortcomings noticed shall be attended by the contractor immediately.

13.0 MATERIALS/EQUIPMENTS:

All materials used in the work shall be of the best quality and of the class most suited for the purpose specified. All the standard fittings, equipments, motor, gear box, breaks, governors, control panel, cables and other accessories required for this work shall be as per RDSO / RCF / ICF approved make conforming to relevant IS specifications against each schedule item. If any material does not appear in the RDSO / RCF / ICF approved list then make of material should approved by Sr.DEE(G) Bhusawal /Railway representative before supply.

All the equipments, materials, fittings and components will be subject to quality control program of being part of the quality assurance program of the contractor. All the major equipments / material shall be inspected as per inspection clause para 12.0.

14.0 WARRANTY/GUARANTEE :-

After successful completion of entire work and the same has been taken over by Railway, it shall be guaranteed for 12 months. During this period if any defects arise the same shall be made good by the contractor free of cost. LED fittings shall be guaranteed for 5 years.

15.0 RELEASED MATERIAL: -

The released materials should be returned by the contractor to Railways and acknowledged. The released materials should be transported to respective depot with the tenderers men and vehicle as per instruction of Railway's Engineer.

16.0 ELECTRICAL CONTRACTORS LICENSE:

The contractor shall submit self-attested copy of valid Electrical Contractor License as per Clause No. 45 IE Rule 1956 along with the offer. The offer will be summarily rejected in absence of valid Electrical Contractor License.

17.0 OTHER SPECIAL CONDITIONS: -

- 17.1 Tenderers should submit their offer with credentials regarding working capacity and financial capabilities.

- 17.2 Tenderers should submit the list of personnel / organization on hand and proposed to be engaged for the tendered work. Similarly list of Plant & Machinery available on hand and proposed to be inducted and hired for the tendered work.
- 17.3 Contractors found using un-approved materials shall be, on the spot, stopped from executing further work and suitable action taken to terminate the contract. Particular note of this should be taken and it shall be strictly ensured that only quality work is done.
- 17.4 All completed work shall be jointly recorded by contractors with Railways in 'Measurement Books' which will be available with Rly's engineer. No work, other than those recorded in M.B, will be recognized.
- 17.5 Bills shall be submitted in Rly's bill form only. All released materials shall be handed over to Railways at the depot of Senior Section Engineer (EM)'s. Contractors should keep a proper account of the released materials handed over, with proper acknowledgement from Railway's engineer and submit the same along with the bills.(NA)
- 17.6 During the process of work the contractor shall arrange to keep electric supply available to avoid any inconvenience to the occupant and the temporary wiring shall be safe and shall not pose any hazard to any points. It shall be contractor's responsibility to ensure the safety of his man and also materials and occupants from any hazard of electricity during the process of wiring. (NA)
- 17.7 During the process of work the contractors shall arrange to keep the material away from the LC gate to avoid any inconvenience of the traffic on gate.
- 17.8 The switchboard shall be of seasoned teak wood/ PVC confirming IS.
- 17.9 Code of practice for electrical wiring installation shall be followed as per IS-732 – 1989 with latest amendment.
- 17.10 PVC insulated wires for working voltages up to and including 1100 Volt shall be as per IS-694 – 1990 with latest amendment.
- 17.11 PVC insulated (heavy duty)/XLPE electric cables for working voltages up to and including 1100 Volt shall be as per IS-1554 – (Part – I) – 1988 with latest amendment.

18.0 OTHER SPECIAL CONDITION OF THE WORK

- The Contractor shall maintain a register showing names and addresses of the person so engaged along with photographs of each person and shall produce the same for inspection on demand by Welfare Officer or such other person so authorized by the owner. The Contractor shall not use or allow to be authorized to be used train or any part thereof for dwelling purpose and shall not allow any outsiders to loiter in or around the train without valid authority.
- 18.1 The contractor shall be required to employ/engage only that number of employees/workers as may be specifically authorized by Railway Administration from time to time and shall maintain complete records of such employees/workers with regard to their names, address qualifications, experience and other required details. The Railway shall have absolute right to test, interview or otherwise assess or determine skills, knowledge, proficiency, capability, etc. so as to ensure that such employees/workers are competent, qualified or otherwise suitable for efficient working. Workers rejected on this account by the Railways shall not be employed/ engaged by the contractor on the work covered by this contract.
 - 18.2 The contractor is liable to pay provident fund contribution. Leave salary, medical benefits to his employees and to observe statutory working hours. The contractor is responsible for the proper maintenance of registers, records and accounts so far as compliance with any statutory provisions/obligations is concerned. The contractor to keep proper records pertaining to payment of wages, etc. and also for depositing the provident fund contributions with the authorities concerned. The contractor is liable to defend, indemnify and hold harmless to the Railway from any liability or penalty which may be imposed by the Central, State or local authorities by reason of any violation by the contractor or such laws regulations and also from all claims, suits or proceedings that may be brought against the management arising

under or incidental to or by reason of the work provided/assigned under the contract brought by the employees of the contractor, third party or by the Central or State Government authorities.

- 18.3 The contractor will make aware his employees that the contract employee are employee of contractor and the employee are not entitled for any regularization in Railway Service. If such situation arises in future contractor is liable to defend indemnify & hold harmless to the Railway Administration from any such liability.
- 18.4 The contractor shall follow all labour Law, rules, regulation pertaining to labour, whether mentioned or not.
- 18.5 (i) Contractor is to abide by the provisions of Payment of Wages act & Minimum Wages act in terms of clause 54 and 55 of Indian Railways General Condition of Contract. In order to ensure the same, an application has been developed and hosted on website 'www.shramikkalyan.indianrailways.gov.in'. Contractor shall register his firm/company etc. and upload requisite details of labour and their payment in this portal. These details shall be available in public domain. The Registration/ updation of Portal shall be done as under:
- Contractor shall apply for onetime registration of his company/firm etc. in the **Shramikkalyan portal** with requisite details subsequent to issue of Letter of Acceptance. Engineer shall approve the contractor's registration in the portal within 7 days of receipt of such request.
 - Contractor once approved by any Engineer, can create password with login ID (PAN No.) for subsequent use of portal for all LOAs issued in his favour.
 - The contractor once registered on the portal, shall provide details of his Letter of Acceptances (LOA) / Contract Agreements on **shramikkalyan portal** within 15 days of issue of any LoA for approval of concerned engineer. Engineer shall update (if required) and approve the details of LOA filled by contractor within 7 days of receipt of such request.
 - After approval of LOA by Engineer, contractor shall fill the salient details of contract labours engaged in the contract and ensure updating of each wage payment to them on **shramikkalyan portal** on monthly basis.
 - It shall be mandatory upon the contractor to ensure correct and prompt uploading of all salient details of engaged contractual labour & payments made thereof after each wage period.
 - (ii) While processing payment of any 'On Account bill' or 'Final bill' or release of 'Advances' or 'Performance Guarantee / Security deposit', contractor shall submit a certificate to the Engineer or Engineer's representatives that "I have uploaded the correct details of contract labours engaged in connection with this contract and payments made to them during the wage period in Railway's Shramikkalyan portal at 'www.shramikkalyan.indianrailways.gov.in' till ____Month, ____Year."

18.6 The payment to the contract labours should be made through Bank / EFT only.

19.0 The registration of contractors working under Railway departments with ESIC is mandatory.

20.0 Special Condition for employment of staff by the contractor for works contract as per HQ's Policy L.no. L.253.AC.AMC/Policy Dated-15.01.2010

Employment of staff-

- The contract is liable for cancellation if either the contractor himself or any of his employee is found to be a person of Gazetted rank of Engineering Department which includes Civil, Mechanical, Signal & Telecommunication Department of Railways whether pensionable or non-pensionable who after retirement has sought engagement as contractor for or in

connection with the execution of public works whether on Railway, P.W.D. or Defence Forces or as an employee of such contractor within 2 years of his retirement without obtaining the permission of the President of India before taking up such engagement or employment.

- (b)** The contractor shall employ the following technical staff during the execution of the work.
 - i) At least one Graduate Electrical/ Electronics Engineer when the cost of the work to be executed is Rs. 50 lakhs and above.
 - ii) At least one qualified Electrical /Electronics diploma holder when the cost of the work to be executed is more than Rs. 10 lakhs, but less than Rs. 50 Lakhs.
- (c)** Technical staff should be available at site whenever required by the Engineer –in-charge to take instructions. In case the desired level of technical staff fails to take instructions of the Engineer –in-charge, contractor shall liable to pay a reasonable amount to the Railways not exceeding a sum of Rs. 5000/- (Rupees five thousand only) for each calendar month or part thereof for default in case of Graduate Engineer and Rs. 2500/- (Rupees two thousand five hundred only) for each calendar month or part thereof for default in case of Diploma holder.
- (d)** The decision of the Engineer-in-charge as to the period for which required technical staff was not employed by the contractor and as to the reasonableness of the amount to be deducted from the contractor, shall be final & binding on the contractor.
- (e)** The contract is liable to be terminated in case of persistent failure to engage suitable technical staff by the contractor.

CHAPTER – II

PRICES AND PAYMENT

CHAPTER – II

PRICES AND PAYMENT

1. SCOPE :-

This chapter deals with prices to be paid for the various items of work and other amount payable in accordance with accepted schedule of prices and conditions of payment herein mentioned.

2. SCHEDULE OF PRICES :-

The unit rates given against various items of work in tender papers are the schedule of rates. The tenderers are required to quote **rates above /at par/ below as specified** against schedule of rates while quoting the summary of prices. The actual payment to be made against any item of Schedule of rates shall be derived after loading the Schedule of rates prices with the tenderer's quoted percentage. The prices so obtained shall be the unit prices for the various items of work given in Schedule of rates.

3. INCIDENTAL CHARGES :-

The unit prices are including of loss, wastage, incidental charges for transportation, loading, unloading and handling of materials. It also include commissioning for arranging dispatch by rail, completing all necessary formalities in this respect, arranging payment of wages collection of railway receipt all insurance premier banker's charges etc.

4. OTHER PRICE PAYMENT :-

No adjustment in unit price on account of price fluctuation will be permitted on any account.

5. PAYMENT TERMS :-

(i) On A/c. payment for supply

(a) Payment to the extent of **70 %** towards cost of supply of materials will be made on receipt of the materials only either at site or at purchasers depot of the following tender schedule items as tabulated below :

Sch. A	21, 22, 25, 26, 28 to 34, 36 to 39, 42, 54 to 62, 73, 75, 76, 80, 81, 83 to 85, 88, 90 to 92
Sch. B	Nil
Sch. C	2, 5, 8

Received material shall be duly supported by Suppliers delivery challan and inspection certificates of Engineers representative. Engineers representative shall make proper accountal of material received.

(b) The following schedule items whose supply & erection rates are combined, payment to the extent of **60%** towards cost of supply of material shall be made subject to conditions as mentioned above:

Sch. A	27, 35, 69, 79, 82, 86, 87, 93
Sch. B	Nil
Sch. C	1

Further balance payment will be released after erection & satisfactory completion of each item and quantity as certified and measurements recorded i

n measurement book by engineer's representative.

(c) Firm will submit manufacturers original test certificate and material purchase proof from OEM or his authorized agents.

(ii) Issue of materials to the contractor for erection.

The material for which payment has been released will be issued by Railway to the contractor for execution of work as per site requirement and as per the discretion of 'Engineer'

(iii) Progress on account payment for Supply & erection

The contractor shall be paid payment to the extent of **30%** of supply & 100% of erection for such item as given above in **i)(a)** on satisfactory completion of each item and quantity as certified and measurements recorded in measurement book by engineer's representative.

(iv) 100% progressive payment for following schedule items of tender schedule shall be made after successful completion of same :

Sch. A	1 to 20, 23, 24, 40, 41, 43 to 53, 63 to 68, 70 to 72, 74, 77, 78, 89
Sch. B	1 to 8
Sch. C	3, 4, 6, 7, 9

(v) Final payment: - Final Bill of supply & erection shall be paid after successful completion of entire work as per terms, condition and scope of work of contract and provisional acceptance of the work.

(vi) Joint inspection report with engineer's representative and provisional acceptance certificate by engineer shall be submitted by contractor.

The payment shall be made against

- i) Certificate by the Railway representative that the work has been done in accordance with the provision of the contract agreement and all the material replaced by the contractor during the maintenance period has been of good quality and as per specification.
- ii) All the schedule as mentioned in the tender has been successfully carried out.
- iii) The statement of recovery if any.
- iv) Valid security deposit furnished in advance at the time of signing of agreement. All the above payments shall be subject to observance of all formalities viz. Signing of agreement, furnishing S.D., verification of power of attorney, MB formalities, bill in Railways standard form etc.

Note: Following particulars to be furnished by firm

i) PAN NO. ii) FULL ADDRESS iii) GST REGISTRATION

6. FINAL PAYMENT :-

On completion of entire work in all respect and on submission of joint inspection report and PROVISIONAL ACCEPTANCE CERTIFICATE, the contractor shall receive the final payment for remaining works.

7. REFUND OF SECURITY DEPOSIT:-

The security deposit will be refunded on submission of Final Completion Certificate after successful completion of the contract and after expiry of the guarantee obligation.

8. TAXES :-

The contractor should have GST registration number.

(i) Tenderers will examine the various provisions of The Central Goods and Services Tax Act, 2017(CGST)/ Integrated Goods and Services Tax Act, 2017(IGST)/ Union Territory Goods and Services Tax Act, 2017(UTGST)/ respective state's State Goods and Services Tax Act (SGST) also, as notified by Central/ State Govt. & as amended from time to time and applicable taxes before bidding. Tenderers will ensure that full benefit of Input Tax Credit (ITC) likely to be availed by them is duly considered while quoting rates.

(ii) The successful Tenderer who is liable to be registered under CGST/IGST/UTGST/SGST Act shall submit GSTIN along with other details required under CGST/IGST/UTGST/SGST Act to Railway immediately after the award of contract, without which no payment shall be released to the contractor. The contractor shall be responsible for deposition of applicable GST to the concerned authority.

(iii) In case the successful tenderer is not liable to be registered under CGST/IGST/UTGST/SGST Act, the Railway shall deduct the applicable GST from his/their bills under reverse charge mechanism (RCM) and deposit the same to the concerned authority. **(Authority –Railway Board's Letter No.2017/CE-I/CT/4/GST Dated 23/06/2017.)**

9. PENALTY :-

- 1) As per relevant clause of GCC April 2022.
- 2) A suitable token penalty shall be imposed if any deficiency in workmanship or quality of work is noticed during inspection by competent authority.

CHAPTER-III

TECHNICAL SPECIFICATION

Central Railway

Electrical (G) Branch

Bhusawal Division

E-Tender no.BSL-L-W-T-50-2026

This tender calls for the work of Electrification work in connection with Redevelopment of Amravati Railway station.

1.Schedule item no. A-1, A-16, A-18, A-20

Supply, erection, testing and commissioning of Point wiring for light, fan, exhaust fan in PVC casing capping with 2x2.5 sq. mm. FRLS multistranded PVC copper wire alongwith all accessories, running earth etc.

Supply of all materials required and single phase wiring by using 2 Nos. of 4.0 sq.mm PVC insulated FRLS type flexible copper cable conforming to IS.No:694, 1100 V grade with 1 No. of 4.0 sq.mm flexible copper cable through the PVC pipe already laid. Color coding shall be followed as directed by Engineering charge at site (3 Nos. of 4.0 Sq.mm Copper cable wire shall be taken as 1 Mtr. for measurement purpose).

Supply and wiring including termination by 3 nos. of 6 sq mm PVC insulated flexible copper cable conforming to IS.No: 694, 1100 V grade through the existing PVC pipe already laid, Color coding shall be followed as directed by Engineer in charge at site (3 nos. of 6 sqmm copper cable wire shall be taken as 1 m for measurement purpose)

Supply and wiring (3 Phase) including termination by 4 nos of 10.0 sqmm PVC insulated fire retardant low smoke (FRLS) flexible copper cable conforming to IS No: 694, 1100V grade with 1 no of 14 SWG tinned copper wire through existing PVC pipes already laid. Color coding shall be followed as directed by Engineer in charge at site.(4 nos of 10.0 sqmm copper cable and 1 no of 14 SWG tinned copper wire shall be taken as 1 m for measurement purpose.)

SYSTEM OF POINT WIRING

Point wiring shall be carried out with 2x2.5 sqmm FRLS Copper conductor in ISI Mark PVC Casing-capping / PVC Conduit pipe(If required as per site condition) on the walls/ ceilings along with running earth conductor of 2.5 sq.mm. FRLS Copper wire.

The point wiring of light, fan, plug socket of 5 amp. capacity shall be carried out with single core Flame Retardant Low Smoke PVC multi stranded copper wire of size 2.5 sq mm confirming to IS 694/1990.In addition to this the wire shall also confirm FRLS (Flame retardant Low Smoke) properties as per ASTM-D 2863 and IEC 60754-1 and of 1100 volts grade inside PVC casing/capping/ PVC conduit as specified in schedule. Point wiring shall include all accessories like bend, elbow, tee, junction box etc. with necessary fixing materials/hardware etc. complete with all respect. No joints are allowed in the wiring. The neutral connection in the board should be done with proper connectors.

TECHNICAL SPECIFICATION FOR WIRING**1.System of Interior wiring.**

The wiring (unless otherwise specified) shall be carried out in single core, multi-stranded PVC insulated copper wire conforming to IS-694/1990 with latest amendments and of the 1100 volts grade in rigid heavy-duty non-metallic flame retarding (PVC) casing/capping.

The PVC insulated wire shall be FRLS (Fire Retardant Low Smoke) with latest amendment. The wiring shall be done on the distribution system with main and branch distribution boards at convenient centers and without isolated fuses. All conductors shall be run, as far as possible along the walls and ceiling, so as to be easily accessible to and capable of being thoroughly inspected. Runs as marked out will be inspected and cables shall not be fixed until the lay-out is approved by Sr.DEE(G)BSL or his authorized representative whose decision is final and binding on the

contractor. The internal wiring shall be conforming to code of practice for electrical wiring as per IS-732 – 1989 with latest amendment.

The cables shall be run on rigid heavy duty non-metallic fire retarding (PVC) casing/capping with corresponding accessories. The conduit shall conform to IS-2509 and accessories to IS-3419 with latest amendments. The PVC casing/capping and accessories shall be ivory white with fire retardant as per clause of BS-4678 Part-IV-82.

In case where surface wiring with PVC conduit is specified the conduits shall be fixed to walls using spacer's etc. not more than 600 mm apart. Bends or diversions shall be done by employing normal bends, inspection bends, inspection boxes, elbows or similar fittings. Conduit joints shall be by means of plain or screwed couplers. For long run of straight conduit inspection type coupler shall be provided at intervals.

2.PVC Junction box.

All ceiling roses, lamp holder etc. shall be fixed on rigid PVC square junction box conforming to relevant IS, specification of stardust color Precision makes with Brass inserts.

Switch board – All electrical switchboard shall be of PVC fire retardant board of standard size.

3.Plugging walls or ceilings.

Plugs for ordinary walls or ceiling shall be of PVC of appropriate size. They shall be cemented into the walls or ceilings to within line of the surface and remainder being finished according to the nature of surface used with plaster or lime putty. Where owing to irregular coursings or other reasons, the plugging of the wall or ceiling present difficulties, the casing shall be attached to the walls or ceiling in a manner approved by the Sr.DEE(G)BSL.

Plugs for fixing square box for ceiling rose or single switch shall be sufficiently large to take two screws so as to prevent box from turning while in use.

4.Passing through floors and walls.

This shall be done strictly in accordance with code of practice for wiring installation as per IS-732 / 1989 with latest amendments.

5.White washing.

Walls cut or defaced during wiring will have to be made good and adequately white washed, distempered/painted as the case may be.

6.Wires and cables.

All conductors shall be standard Alum./copper and in accordance relevant IS specifications. The wiring shall conform to the IEE, wiring rules (Latest) and no conductors shall have a cross section of less than 2.5 sq.mm, unless otherwise specified.

Each coil of wire and cables proposed to be used must be accompanied by the makers test certificates stating that the 'Class' and giving the results of insulation tests.

7.Main and sub-distribution boards.

The fuses/switch board/ meter board must be the swing back type provided with suitable hinged unglazed cover permitting of inspection at back and having ample room behind the boards for the convenience and neat arrangement of the conductors and to take a small amount of slack necessary to enable cut out to be readily connected up. The board must be made of seasoned teak wood, impregnated with varnish and with a good finish and constructed with all joints dove tailed and provided with a back of the same materials or PVC Board. Meter should be provided on teakwood board of appropriate size.

Placement of fuses – Fuses shall not be placed in ceiling roses or in any position other than the distribution boards or the sub-distribution boards which shall be located as approved by the

Sr.DEE(G)BSL. No fuses shall be placed in the neutral conductor of a main, sub-main or sub-circuits.

Adequate space, clear of other fittings and to the satisfaction of the Sr.DEE(G)BSL or his representative shall be provided on each main distribution board for the installation of KWH Meters. Adequate size conduit casing/capping leading to the main board will be provided for the incoming mains.

Similarly adequate space shall be provided on the switchboards controlling fan light, plug for the installation of fan regulators.

Bus bar contacts and other live metal parts shall be suitably protected as to render it impossible for anyone to make accidental contact with them while replacing fuses. A strip of teak wood easily removable shall be provided in front of the neutral bus bar so as to avoid contact with it while fuses are being attended to.

8.Main and sub-distribution boards – Earthing.

Continuous running earth shall be provided by the contractor as given below:-

The continuity of earth wire shall be maintained throughout without any joints. This shall be in conformity with IEE Rules No. 32 & IS-3043 (latest) section 2 clauses 12 to 13.7.

1.	Main earth pit/pole to main meter board or distribution board	25mm x 3mm GI Strip
2	Meter board/distribution board to main switch inside quarters.	2.5 sq.mm. PVC copper stranded Green colour wire.
3	Main switch insides quarters to wall plug fan, fan regulators & any other metallic/ accessories.	2.5 sq.mm. PVC copper stranded Green colour wire.

The fuses shall be mounted as follows.

The distribution boards shall be fixed at such a height as to be within easy reach of a person standing on the floor. The installation of main and distribution boards shall be as per IS-732 Clause 4.3.

The cost of point wiring includes the cost of sub-main circuits unless otherwise specified, which shall not be less than 4 sq.mm and No sub-main circuit shall contain more than 10 (Ten) light/fan/5A, plug points. Wherever No. of points exceeds more than 10. The contractor shall draw separate sub-main circuit for each 10 points or part thereof.

The contractor shall observe all colour code in wiring viz. Red, Yellow, Blue for phases, Black for neutral and Green for earthing.

On completion of wiring of each quarters, contractor shall do routine tests as per IS. Free of cost and result of same shall be submitted along with bill duly certified by Railway's representative.

9.Joints.

All joints in conductors shall be made by mechanical connections in suitable joint boxes, jointing of aluminum conductors shall be in accordance with IS-732 appended 'C' Clause C-6. Joint boxes shall be as per approved make by Sr.DEE(G)Bhusawal or his representative at site.

10.Switches.

All switches, controlling points must be placed on 'Phase' wires. All switches shall be of Modular / Piano type (as per site requirement) 5/10 Amps capacity unless otherwise specified and conforming to relevant IS specifications of approved make and shall be provided with quick make and break movement and shall have substantial plain Bakelite cover. The switches shall be mounted at height of 2-4 feet from ground level unless otherwise approved. The switches shall generally comply with the relevant I.S. specification. The switches shall be of Original Approved make only.

11.Plugs and sockets.

Plugs shall be of a front entry pattern with hand shield. The shrouds of sockets and the grips of plugs shall be molded Bakelite and the bases of sockets shall be of vitreous porcelain or Bakelite. All sockets shall be complete with plugs of standard dimensions and shall be interchangeable. Each plug point shall be controlled by a switch on the supply side. The socket shall be 5-Pin Universal design 5 Amp unless otherwise specified with separate controlling switch and original.

12.Lamp holders, shades etc.

Bakelite lamp holders with necessary accessories shall be robust and of approved make. Lamp holders for use of brackets and the like shall be in accordance with IS-1258 (latest) and as per Clause 5.5 of I.S-732 / 1989 (latest).

13.Mountings.

All fittings such as switches, plugs etc mounted on board shall be adequate spaced with a uniform margin to the satisfaction of the Sr.DEE(G)BSL and only brass fixing screws/Nut bolts of approved sizes shall be used. The mounting heights from the floor shall be a generally as follows :- Switches, distribution boards etc. 1.5 mtrs., Lights –2.5 Mtrs.

14.Flexible wires and pendants.

Unless otherwise specified and except in PVC pipe pendants, flexible wire with PVC insulated and PVC sheathed copper conductors bearing ISI mark with a minimum of size of 24/0.2 mm or the nearest equivalent shall be used. This will be subject to approval by the Sr.DEE(G)BSL.

Suitable service tapings in all quarters at positions decided by the Sr.DEE(G)BSL or his authorized representative will be provided by the Railway.

15.Special clauses for the internal wiring.

The work shall comprise supply of all necessary materials, installations, testing and putting into operational lights, plugs etc. as per schedule, which is subject to slight variations at the time of execution of the work.

The system of wiring for lighting and fan point shall be PVC insulated cable on rigid PVC casing/capping.

The contractor shall on completion of the work but before the installation is taken over by the Railway, supply drawings as under :

- a) Wiring – diagram sub-mains mains with particulars of size of cables and wires used.
- b) Main and branch distribution boards.

16.Special Clauses for the internal wiring.

Conformity with Electricity Act, 2003. The installation shall be in conformity with the requirements of the Electricity Act, 2003 as amended up to the date and Indian Electricity Rules, framed, there under and also the relevant regulations of the electric supply authority concerned, and IS-732 of 1989 with latest amendments.

17.Materials.

All materials fittings, appliances, used in electrical installations shall conform to Indian Standard Specification and of approved make.

18.Workmanship.

Good workmanship is an essential requirement for compliance with the Rules in the code. The work shall be carried out under the direct supervision of a person holding a certificate of competency issued by the State Government for the type of work involved.

a. Position of lamp, fans and fittings, branch wires and not be shown, but the fittings etc. connected to each circuit must be clearly indicated by numbers on the fuse carrier of distribution board.

b. Any alternations in the position of fittings or modifications of the existing lay out of the schedule of suit local conditions as indicated by the representative of the Sr.DEE(G)BSL shall also be carried out while the work is in progress.

Before taking the work in hand a specimen of each of the materials and fittings proposed to be used as per schedule shall be submitted to the Sr.DEE(G)BSL for his approval. The letter of approval of materials by Sr.DEE(G)BSL shall be submitted along with final bill.

19.Metal casing

All metal casings of metallic coverings containing or protecting any electric supply line or apparatus shall be connected with earth by the contractor shall be jointed and connected across all junction boxes and other openings as to make a good mechanical and electrical connection throughout the whole length.

20. PVC Conduit Pipe

PVC conduit pipe shall be of suitable size as per IS : 9537 having ISI mark with requisite accessories.

NOTE:

- i. All wall plugs mentioned under clause page 6 shall be of Universal pin type, the earth pin being connected to the continuous running earth.
- ii. All fan even if supplied by the Railways shall be connected to the continuous running earth conductor.
- iii. Continuous running earth through 2.5 sq.mm. copper PVC conductor PVC wire green colour from the main board to the various wall plugs, fan points, regulator etc.
- iv. All existing FT fittings, fans, incandescent light fittings and other equipment shall be connected to ceiling rose/power point with 2 core twisted PVC insulated copper conductor of size not less than 1.0 sq.mm.

2.Schedule item no. A-9

Wiring of the concealed Light / fan Point with all accessories and running earthing copper conductor as per standard practise. The switches shall be of modular type.(along with the all accessories and including cutting the wall / ceiling / chipping and re plastering, distempered / painted as the case may be, the same as good condition as directed by Engineer in charge at site.)

Special requirements for Concealed wiring

I) For concealed wiring rigid plain conduits of insulating materials confirming to IS:9537 (Part-III), flexible conduit as per IS:6946 and fittings as IS:3419 shall be used.

II) Conduit shall be circular in cross section and not less than 25 mm diameter.

III) Hot dipped GI box, concealed GI boxes (for switch / socket / regulator and accessories etc) fabricated out of 14 gauge CRCA sheet, shall be provided with brass earthing stud and cover of 3 mm thick fire retardant Formica make Bakelite sheet of required sizes.

IV) Other technical requirements shall be as described above.

V) No on Account payments will be made for supply of wiring materials.

VI) Contractor should submit the detail drawing with single line diagram for location of all the points for approval before commencement of work.

The wiring for essential load and non-essential load should be done in separately so that complete electrical isolation is achieved. The Contractor should submit the as erected drawings in triplicate with original in reproducible form. The concealed wiring will be completed as per site condition with

necessary sub-main wiring, plug point wiring, power plug wiring and associated accessories, SDB, switch board etc. as per instruction of field Engineer. **The payment of concealed point wiring will be done as per actual quantity executed at site.**

1.System of Interior wiring.

The wiring (unless otherwise specified) shall be carried out in single core, multi-stranded PVC insulated copper wire conforming to IS-694/1990 with latest amendments and of the 1100 volts grade in rigid heavy-duty non-metallic flame retarding PVC conduit of Heavy duty.

The PVC insulated wire shall be FRLS (Fire Retardant Low Smoke) with latest amendment. The wiring shall be done on the distribution system with main and branch distribution boards at convenient centers and without isolated fuses. All conductors shall be run, as far as possible along the walls and ceiling, so as to be easily accessible to and capable of being thoroughly inspected. Runs as marked out will be inspected and cables shall not be fixed until the lay-out is approved by Sr.DEE(G)BSL or his authorized representative whose decision is final and binding on the contractor. The internal wiring shall be conforming to code of practice for electrical wiring as per IS-732 – 1989 with latest amendment.

The cables shall be run on rigid heavy duty non-metallic fire retarding PVC conduit Heavy duty. with corresponding accessories. The conduit shall conform to IS-2509 and accessories to IS-3419 with latest amendments. The PVC conduit of Heavy duty and accessories shall be ivory white with fire retardant type.

Bends or diversions shall be done by employing normal bends, inspection bends, inspection boxes, elbows or similar fittings if required at site. Conduit joints shall be by means of plain or screwed couplers. For long run of straight conduit inspection type coupler shall be provided at intervals if required at site.

2.PVC Junction box.

All ceiling roses, lamp holder etc. shall be fixed on rigid PVC square junction box conforming to relevant IS and of stardust colour.

Switch board –Electrical switchboard shall be of PVC fire retardant board of standard type as per IS. Electrical switchboard of seasoned teak will be used if required as per site condition.

3.Plugging walls or ceilings.

Plugs for ordinary walls or ceiling shall be of PVC of appropriate size. They shall be cemented into the walls or ceilings to within line of the surface and remainder being finished according to the nature of surface used with plaster or lime putty. Where owing to irregular coursings or other reasons, the plugging of the wall or ceiling present difficulties, the casing shall be attached to the walls or ceiling in a manner approved by the Sr.DEE(G)BSL

Plugs for fixing square box for ceiling rose or single switch shall be sufficiently large to take two screws so as to prevent box from turning while in use.

4.Passing through floors and walls.

This shall be done strictly in accordance with code of practice for wiring installation as per IS-732 / 1989 with latest amends.

5.White washing.

Walls cut or defaced during wiring will have to be made good and adequately white washed, distempered/painted as the case may be.

6.Wires and cables.

All conductors shall be standard copper and in accordance relevant IS specifications. The wiring shall conform to the IEE, wiring rules (Latest) and no conductors shall have a cross section of less than 2.5 sq.mm. Unless otherwise specified.

Each coil of wire and cables proposed to be used must be accompanied by the makers test certificates stating that the 'Class' and giving the results of insulation tests.

7. Main and sub-distribution boards.

The fuses/switch board/ meter board must be the swing back type provided with suitable hinged unglazed cover permitting of inspection at back and having ample room behind the boards for the convenience and neat arrangement of the conductors and to take a small amount of slack necessary to enable cut out to be readily connected up. The board must be made of seasoned teak wood, impregnated with varnish and with a good finish and constructed with all joints dove tailed and provided with a back of the same materials or PVC Board. Meter should be provided on teakwood board of appropriate size.

Placement of fuses – Fuses shall not be placed in ceiling roses or in any position other than the distribution boards or the sub-distribution boards which shall be located as approved by the Sr.DEE(G)BSL. No fuses shall be placed in the neutral conductor of a main, sub-main or sub-circuits.

Adequate space, clear of other fittings and to the satisfaction of the Sr.DEE(G)BSL or his representative shall be provided on each main distribution board for the installation of KWH Meters.

Adequate size of PVC heavy duty conduit leading to the main board will be provided for the incoming mains.

Similarly adequate space shall be provided on the switchboards controlling fan light, plug for the installation of fan regulators.

Bus bar contacts and other live metal parts shall be suitably protected as to render it impossible for anyone to make accidental contact with them while replacing fuses. A strip of teak wood easily removable shall be provided in front of the neutral bus bar so as to avoid contact with it while fuses are being attended to.

8. Main and sub-distribution boards – Earthing.

Continuous running earth shall be provided by the contractor as given below:-

The continuity of earth wire shall be maintained throughout without any joints. This shall be in conformity with IEE Rules No. 32 & IS-3064 (latest) section 2 clauses 12 to 13.7.

1.	Main earth pit/pole to main meter board or distribution board	25mm x 3mm GI Strip
2	Meter board/distribution board to main switch inside quarters.	2.5 sq.mm. PVC copper stranded Green colour wire.
3	Main switch insides quarters to wall plug fan, fan regulators & any other metallic/ accessories.	2.5 sq.mm. PVC copper stranded Green colour wire.

The fuses shall be mounted as follows.

The distribution boards shall be fixed at such a height as to be within easy reach of a person standing on the floor. The installation of main and distribution boards shall be as per IS-732 Clause 4.3.

The cost of point wiring includes the cost of sub-main circuits unless otherwise specified, which shall not be less than 4 sq. mm. and No sub-main circuit shall contain more than 10 (Ten) light/fan/5A, plug points. Wherever No. of points exceeds more than 10. The contractor shall draw separate sub-main circuit for each 10 points or part thereof.

The contractor shall observe all colour code in wiring viz. Red, Yellow, Blue for phases, Black for neutral and Green for earthing.

On completion of wiring of each quarters, contractor shall do routine tests as per IS. Free of cost and result of same shall be submitted along with bill duly certified by Railway's representative.

9.Joints.

All joints in conductors shall be made by mechanical connections in suitable joint boxes, jointing of aluminum conductors shall be in accordance with IS-732 appended 'C' Clause C-6. Joint boxes shall be as per approved make by Sr.DEE (G) or his representative at site.

10.Switches.

All switches, controlling points must be placed on 'Phase' wires. All switches shall be of Modular type (as per site requirement) 5/10/15 Amps capacity unless otherwise specified and conforming to relevant IS specifications of approved make and shall be provided with quick make and break movement and shall have substantial plain bakelite cover. The switches shall be mounted at height of 4'-6" from ground level unless otherwise approved. The switches shall generally comply with the relevant IS specification. The switches shall be of Original Approved make only.

The modular switch shall be having following features as mentioned below:-

S.No.	Descriptions	Dept.'s requirement
1	Standard	IS 3854
2	Voltage	240V AC
3	Construction	Modular
4	Installation	Snap fit with Modular Plates
5	Terminals	Brass (Screw Type)
6	Screws	Steel with zinc plating
7	Rocker spring	Stainless steel
8	Shall be	Flame Retardant
9	IP degree of protection	IP20
10	Tests	Marking, Mechanical Strength, Making & Breaking Capacity, Temperature rise, Insulation resistance, Electric Strength Test

11.Plugs and sockets.

Plugs shall be of a front entry pattern with hand shield. The shrouds of sockets and the grips of plugs shall be moulded bakelite and the bases of sockets shall be of vitreous porcelain or bakelite. All sockets shall be complete with plugs of standard dimensions and shall be interchangeable. Each plug point shall be controlled by a switch on the supply side. The socket shall be 5-Pin Universal design 5/15 Amp unless otherwise specified with separate controlling switch and original approved make.

The modular Sockets shall be having following features as mentioned below:-

S.No.	Descriptions	Dept.'s requirement
1	Standard	IS 1293 / IEC 60950
2	Voltage	240V AC
3	Construction	Modular with Shutters
4	Installation	Snap fit with Modular Plates
5	Terminals	Brass (Screw Type)
6	Screws	Steel with zinc plating
7	P-N-E Contact	Brass
8	Shall be	Flame Retardant
9	IP degree of protection	IP20
10	Tests	Marking , Resistance to ageing,

		Insulation resistance, electric strength, Temperature-rise , Making and breaking capacity , Mechanical strength
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12.Lamp holders, shades etc.

PVC casing/capping/heavy gauge conduit, pendants in open verandahs, and bakelite lamp holders with necessary accessories shall be robust and of approved make. Lamp holders for use of brackets and the like shall be in accordance with IS-1258 (latest) and as per Clause 5.5 of IS-732 / 1989 (latest).

13.Mountings.

All fittings such as switches, plugs etc mounted on board shall be adequate spaced with a uniform margin to the satisfaction of the Sr.DEE(G)BSL and only brass fixing screws/Nut bolts of approved sizes shall be used. The mounting heights from the floor shall be a generally as follows:- Switches, distribution boards etc. 1.5 mtrs., Lights –2.5 Mtrs.

14.Flexible wires and pendants.

Unless otherwise specified and except in PVC pipe pendants, flexible wire with PVC insulated and PVC sheathed copper conductors bearing ISI mark with a minimum of size of 24/0.2 mm or the nearest equivalent shall be used. This will be subject to approval by the Sr.DEE(G)BSL.

Suitable service connections by cable etc. at positions decided by the Sr.DEE(G)BSL or his authorized representative will be provided.

15.Special clauses for the internal wiring.

The work shall comprise supply of all necessary materials, installations, testing and putting into operational lights, plugs etc. as per schedule, which is subject to slight variations at the time of execution of the work.

The system of wiring for lighting and fan point shall be PVC insulated cable on rigid PVC heavy duty conduit.

The contractor shall on completion of the work but before the installation is taken over by the Railway, supply drawings as under :

- a) Wiring – diagram sub-mains mains with particulars of size of cables and wires used.
- b) Main and branch distribution boards.

16.Special Clauses for the internal wiring.

Conformity with Indian Electricity Act, 2003. The installation shall be in conformity with the requirements of the Indian Electricity Act, 2003 as amended up to the date and Indian Electricity Rules, framed, there under and also the relevant regulations of the electric supply authority concerned, and IS-732 of 1989 with latest amends.

17.Materials.

All materials fittings, appliances, used in electrical installations shall conform to Indian Standard Specification and of approved make.

18.Workmanship.

Good workmanship is an essential requirement for compliance with the Rules in the code. The work shall be carried out under the direct supervision of a person holding a certificate of competency issued by the State Government for the type of work involved.

- a) Position of lamp, fans and fittings, branch wires and not be shown, but the fittings etc. connected to each circuit must be clearly indicated by numbers on the fuse carrier of distribution board.
- b) Any alternations in the position of fittings or modifications of the existing lay out of the schedule of suit local conditions as indicated by the representative of the Sr.DEE(G)BSL shall also be carried out while the work is in progress.

Before taking the work in hand a specimen of each of the materials and fittings proposed to be used as per schedule shall be submitted to the Sr.DEE(G)BSL for his approval. The letter of approval of materials by Sr. DEE (G) BSL shall be submitted along with final bill.

19.Metal casings.

All metal casings of metallic coverings containing or protecting any electric supply line or apparatus shall be connected with earth by the contractor shall be jointed and connected across all junction boxes and other openings as to make a good mechanical and electrical connection throughout the whole length.

NOTE:

- i. All wall plugs mentioned under clause page 6 shall be of Universal pin type, the earth pin being connected to the continuous running earth.
- ii. All fan even if supplied by the Railways shall be connected to the continuous running earth conductor.
- iii. Continuous running earth through 2.5 sq. mm. copper PVC conductor PVC wire green colour from the main board to the various wall plugs, fan points, regulator etc.
- iv. All existing indoor FT/LED fittings, fans, incandescent light fittings and other equipment shall be connected to ceiling rose/power point with 2 core twisted PVC insulated copper conductor of size not less than 1.0 sq.mm.
- v. Concealed wiring shall be carried out with 2x2.5 sqmm FRLS Copper conductor along with running earth conductor of 2.5 sq.mm. FRLS Copper wire.

3.Schedule item no. A-13

SETC of Wiring of the concealed 6 A / 3 Pin Universal plug point as per latest IS on switch board with all accessories and running earthing copper conductor as per standard practise. The Switches shall be of Modular Type.

The price shall cover the cost of supply, loading, transportation and erection of 5A /5 Pin or 6A / 3 Pin Universal Plug Point on switch board with all accessories and running Earthing copper conductor to site as per standard practice. The switches, plugs, sockets shall be of modular type and to be provided on board.

The wire shall also confirm FRLS (Flame retardant Low Smoke) properties as per ASTM-D 2863 and IEC 60754-1 and of 1100 volts grade.

Note : along with the all accessories and including cutting the wall / ceiling / chipping and re plastering, distempered / painted as the case may be, the same as good condition as directed by Engineer in charge at site.

4.Schedule item no. A-12

Supply, erection, testing & commissioning of 6A & 3 Pin Universal Modular Type Plug Socket as per latest IS with switch & concealed type point wiring with 2x2.5 sq mm FRLS Multistranded PVC Copper wire with all accessories and running earth on separate board. (along with the all accessories and including cutting the wall / ceiling / chipping and re plastering, distempered / painted as the case may be, the same as good condition as directed by Engineer in charge at site)

The price shall cover the cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of material, fixing of concealed wiring 6A & 3 Pin plug point and switch on separate PVC control board and in connection with 2.5 sq.mm PVC insulated 1.1 KV grade multistranded copper conductor along with 2.5 sq. mm green colour copper earth wire including sub-mains of 4 sq. mm PVC insulated copper wire as per standard practice. The switches, plugs, sockets shall be of modular type.

The wire shall also confirm FRLS (Flame retardant Low Smoke) properties as per ASTM-D 2863 and IEC 60754-1 and of 1100 volts grade.

Note : along with the all accessories and including cutting the wall / ceiling / chipping and re plastering, distempered / painted as the case may be, the same as good condition as directed by Engineer in charge at site.

5.Schedule item no. A-11

Supply of material and fixing and concealed wiring for (3 Plug & 3 switch on separate board) 6 A 3 pin universal socket outlet complete with 6 Sqmm PVC insulated copper conductor wires along with 14 SWG tinned copper earth wire in 25mm/ 32mm dia PVC conduit pipe flush type 5A socket outlet and 5A piano type switch in GI box with PVC topsheet 5mm thick..(along with the all accessories and including cutting the wall / ceiling / chipping and re plastering, distempered / painted as the case may be, the same as good condition as directed by Engineer in charge at site)

The price shall cover the cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of material, fixing and concealed wiring for (3 plug & 3 switch on separate board) 5/6 amps universal socket outlet as per specification complete with sub-mains of 6 sq.mm, PVC insulated copper conductor wires along with 14 SWG tinned copper earth wire in 25 / 32 mm dia PVC conduit pipes, flush type 6 amps socket outlet 6 amps in PVC box with PVC top sheet 5 mm thick and wiring as per standard practice. The switches, plugs, sockets shall be of modular type.

The wire shall also confirm FRLS (Flame retardant Low Smoke) properties as per ASTM-D 2863 and IEC 60754-1 and of 1100 volts grade.

Note : along with the all accessories and including cutting the wall / ceiling / chipping and re plastering, distempered / painted as the case may be, the same as good condition as directed by Engineer in charge at site.

6.Schedule item no. A-14

Wiring of Concealed 15 A 3 Pin Wall Socket Point complete with 4 Sqmm Wiring all accessories and running earthing copper conductor as per standard practice. The switches shall be of modular type for Gyser, Kettle & Fridge.(along with the all accessories and including cutting the wall / ceiling / chipping and re plastering, distempered / painted as the case may be, the same as good condition as directed by Engineer in charge at site)

The price shall cover the cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of material, fixing of concealed wiring for 15 amps universal

socket outlet as per specification complete with 4 sq.mm, PVC insulated 1.1 KV grade multistranded copper conductor wires along with 2.5 sq. mm green colour copper earth wire in 25 / 32 mm dia heavy duty PVC conduit pipes, flush type 15 amps socket outlet 15 amps switch in PVC box with PVC top sheet 5 mm thick including sub-mains of 4 sq.mm. PVC insulated copper wire as per standard practice. The switches, plugs, sockets, board shall be of 20A DP modular type MCB. Wiring includes all accessories and including cutting the wall / ceiling / chipping and re plastering the same as good condition as directed by Engineer in charge at site. The wire shall also confirm FRLS (Flame retardant Low Smoke) properties as per ASTM-D 2863 and IEC 60754-1 and of 1100 volts grade.

Note : along with the all accessories and including cutting the wall / ceiling / chipping and re plastering, distempered / painted as the case may be, the same as good condition as directed by Engineer in charge at site.

7.Schedule item no. A-2

Supply, erection, testing and commissioning of 6 Amp. 3 pin universal plug socket as per latest IS complete with switch and point wiring in PVC casing capping with 2x2.5 sq mm FRLS multistranded PVC copper wire alongwith all accessories, running earth etc. on Separate Switch board.

Supply, erection, testing and commissioning of 6 amp 3 pin universal socket with switch along with point wiring on separate board. Point wiring for 6 amp 3 pin socket shall be done with 2 x 2.5 sq mm FRLS copper conductor and running earth 2.5 sq.mm. copper conductor in PVC casing capping / PVC Conduit pipe(If required as per site condition) with all fixing accessories/ materials. The wiring shall be done in an approved manner as per the specification given for point wiring. Each socket outlet shall be controlled by a piano type switch preferably located immediately adjacent thereto. Switch controlling the socket outlet shall be connected to the phase wire i.e. on live side of the line. The work shall be done in an approved manner as per the site condition and the instructions of field Engineer.

8.Schedule item no. A-3

Supply, erection, testing & commissioning of 6 A 3 Pin universal plug socket complete as per latest IS with switch, wiring and earth connection, to be provided in Existing light/fan board.

Supplying and erecting shockproof 6 amps 3 pin socket outlet with flush type erected on Provided board for light and fan duly connected with earth terminals and supply system. The socket outlet shall be 3- pin universal design 6A capacity. The socket outlet shall confirm to IS 1293 of 1988 with latest amendments. Socket shall be of front entry pattern with hand shield shall be of 3 pin type & unbreakable to be connected with 2 x2.5 sq.mm. FRLS copper wire. Each socket outlet shall be controlled by a piano type switch preferably located immediately adjacent thereto. Switch controlling the socket outlet shall be connected to the phase wire i.e. on live side of the line.

9. Schedule item no. A-4

Supply, erection, testing and commissioning of 6 A 3 Pin Plug socket as per latest IS complete complete with switches and point wiring with 2x2.5 sq.mm FRLS copper conductor and copper earthing wire- 4 Nos plug in each board complete.

Supply, Erection, testing and commissioning of 6 amp 3 pin plug socket 4 nos. complete with 4 nos. switches on separate board. Point wiring for 6Amp 3pin universal plug socket (4 plug & 4 switches on separate board) shall be provided separately with 2 x 2.5 sq mm PVC insulated FRLS copper, 1.1 KV, multistranded wire on rigid PVC casing capping/ PVC Conduit pipe (If required as per site condition) with all accessories and running earthing of 2.5 sq.mm. of copper conductor with green colour PVC insulated 1.1 KV connected to each plug on switch board with all fixing accessories /materials. Point wiring shall be carried out as per the specification for point wiring.

10.Schedule item no. A-5

Supply, erection, testing and commissioning of 15 A 3 pin universal plug socket with switch alongwith independent point wiring in PVC casing capping with 2x4 sq. mm. FRLS multistranded PVC copper wire alongwith all accessories, running earth etc.

The socket outlet shall be 3-pin universal design 15 amp capacity with piano type switch, fuse, indicator. The socket outlet shall confirm to IS 1293 of 1988 with latest amends & ISI mark. Each socket outlets shall be controlled by a separate Point Wiring With 2x4 sqmm FRLS PVC Copper wire from nearest Sub distribution board. Piano type Switch controlling the socket outlet shall be on phase side of the line. Each 15 Amp. 3 pin socket and switch will be fixed on separate switch board and running earthing of 2.5 sq.mm. copper conductor with green colour PVC insulated to metallic part.

MCB- MCB shall be 'C' Class, of 10 kA breaking capacity and conforming to IS 8828 –78 with latest amendments. MCB shall be with ON/OFF indication, IP 65 degree protection, showing mid trip position in case of overload or short circuit conditions. MCB shall be having bi-connect terminals, load-line reversibility and with energy limitation class –III features.

11.Schedule item no. A-89

Supply, erection, testing & commissioning of Shock safe PRCD plug , 16 A plug with in-built RCD, 16 A, 30 mA, IEC 61540, 230 V 50 Hz, IP 40, with 3 No of terminals, Earth leakage protection, Auto trip & visual indication of Power, Power indicator for on / off status,Built in TEST & RESET Buttons.

The price shall cover the cost of supply, erection, testing and commissioning, loading, unloading of Shock safe PRCD plug, 16 A plug with in-built RCD, 16 A, 30 mA, IEC 61540, 230 V 50 Hz, IP 40, with 3 No of terminals, Earth leakage protection, Auto trip & visual indication of Power, Power indicator for on / off status, Built in TEST & RESET Buttons.

- Heavy Duty, Nickel Plated Brass Terminals- For Higher conductivity
- Rating- Rated 16 A / 250 V AC 50 Hz / 3000 W
- 16 A plug with in-built RCD
- LIFESAUIOR - trips the connected appliance in case of any detection of current leakage. Prevents chances of any electrical shock., Auto trip & visual indication of Power, Power indicator for on / off status
- Built in TEST & RESET Buttons, Test function is for checking any abnormality in the circuit. RESET function is for switching on the appliance after its shut down., Can be used with multiple appliances –Irons, Microwaves, OTGs, washing machines, water heaters etc.

12.Schedule item no. A-6

Supply, erection, testing and commissioning of submain from switch board to single phase DP switch / DP one circuit meter comprising of 2x4 sq.mm. PVC insulated FRLS 1.1KV multistranded wire & one running earth of 2.5 sq.mm. copper conducting PVC insulation green colour of 1.1 KV grade on rigid PVC casing /capping with all accessories.

Supply, erection, testing and commissioning of Submain with 2x4 sq mm 1100V grade PVC FRLS copper wire. The wiring for submains shall consist of two wires of single core 4 sq.mm. PVC insulated multi-stranded FRLS copper wire of 1.1 KV grade on rigid PVC casing capping/ PVC Conduit pipe (If required as per site condition) along with running earthing with one wire of 2.5 sq.mm. wire insulated with green colour PVC. For measurement purpose each meter of submain shall comprise of 2 wires of 4 sq.mm. of 1 mtr. length each and one earthing wire of 2.5 sq.mm of 1 mtr. length along with associated accessories like PVC casing –capping/ PVC conduit etc. The sub-mains shall be run inside the PVC casing capping /PVC conduit of suitable size as per site condition

as per standard practice specified above as per the instructions of field Engineer. The item sub main shall be measured only for length upto switch board in room. If more than one switch board is provided in a room or adjacent room and total no. of points is upto 10, then interconnection between switch boards as per schedule item of point wiring shall be done as stated in specification for point wiring.

13.Schedule item no. A-7

SETC of Submain with 2x6 sqmm FRLS copper wire inside PVC Casing capping with running earth etc complete. (1 m length of submain consists one ckt mtr including all accessories & 2 wire of 6 sqmm with one wire of 2.5 sqmm for earth conn)

The wiring for sub-mains shall consist of two wires of single core 6 sq.mm. PVC insulated multistranded FRLS copper wire of 1.1 KV ISI mark and confirming to IS-694/1990 or latest grade on rigid PVC casing capping/ PVC conduit along with running earthing with one wire of 2.5 sq.mm. wire insulated with green colour PVC. For measurement purpose each meter of submain shall comprise of 2 wires of 6 sq.mm. of 1 mtr. length each and one earthing wire of 2.5 sq.mm of 1 mtr. Length along with associated accessories like PVC casing–capping/ PVC conduit etc. The sub-mains shall be run inside the PVC casing capping /PVC conduit of suitable size as per site condition as per standard practice specified above as per the instructions of field Engineer. The item submain shall be measured only for length upto switch board in room. If more than one switch board is provided in a room or adjacent room and total no. of points is upto 10, then interconnection between switch boards as per schedule item of point wiring shall be as stated in specification for point wiring.

14.Schedule item no. A-8

Supply, erection, testing and commissioning of Submain with 2x10 sqmm FRLS copper wire inside PVC Casing capping with running earth etc complete.(1 m length of submain consists one cktmtr including all accessories & 2 wire of 10 sqmm with one wire of 2.5 sqmm for earth conn.) and finishing of the surface after rewiring.

The wiring for sub-mains shall consist of two wires of single core 10 sq.mm. PVC insulated multistranded FRLS copper wire of 1.1 KV ISI mark and confirming to IS-694/1990 or latest grade on rigid PVC casing capping/ PVC conduit along with running earthing with one wire of 2.5 sq.mm. wire insulated with green colour PVC. For measurement purpose each meter of submain shall comprise of 2 wires of 10 sq.mm. of 1 mtr. length each and one earthing wire of 2.5 sq.mm of 1 mtr. length along with associated accessories like PVC casing –capping/ PVC conduit etc. The sub-mains shall be run inside the PVC casing capping /PVC conduit of suitable size as per site condition as per standard practice specified above as per the instructions of field Engineer. The item submain shall be measured only for length up to switch board in room. If more than one switch board is provided in a room or adjacent room and total no. of points is upto 10, then interconnection between switch boards as per schedule item of point wiring shall be as stated in specification for point wiring.

15.Schedule item no. A-15, A-17, A-19

Supply and concealing of rigid PVC conduits of 20 mm, 25 mm, 32 mm Dia (IVORY colour) confirming to IS 9537/P3/1983 or latest (ISI marked) with wall thickness not less than 2.0 mm along with the all accessories and including cutting the wall / ceiling / chipping and re plastering distempered / painted as the case may be, the same in good condition as directed by Engineer in charge at site.

The price shall cover the cost of supply, loading, transportation and unloading to site, erection, testing, commissioning and concealing of rigid PVC conduits of 20 mm, 25 mm, 32 mm Dia (IVORY colour) confirming to IS 9537/P3/1983 or latest (ISI marked) with wall thickness not less than 2.0 mm along with the all accessories and including cutting the wall / ceiling / chipping and

re plastering distempered / painted as the case may be, the same in good condition as directed by Engineer in charge at site. As per IS 9537-3 (1983): Conduits for electrical installations, Part 3: Rigid plain conduits of insulating materials.

16.Schedule item no. A-24

Supply, erection, testing and commissioning of teakwood/PVC Main Board with electronic KWH meter 5-30 A cap.230 V, 50 HZ single phase duly wired with FRLS multistranded PVC copper wire with MCB, cutout, neon indication and earth connection etc.

The teakwood/PVC board of size 12"x10" of good strength shall be supplied by contractor. Teakwood/PVC board shall be properly varnished. All required accessories like Electronic KWH meter 5-30 amps as per requirement, DP MCB, cut out 2 nos. with HRC fuse, neon indication and earth connection shall be supplied and erected on main board by contractor including wiring etc. in an approved manner.

All connections between meter board, MCB, Cutout shall be done with 10 sq.mm. FRLS copper wire as per IS 694 as per specified colour coding.

KWH meter shall be provided on main board along with switchgear with adequate spacing to ensure easy maintenance as per the instructions of Sr.DEE(G) or his authorized representative Make and Sample of the KWH meter and MCB shall be got approved from Sr.DEE/G. Sample of teakwood/PVC board shall be approved from Sr.DEE/G. meter before commissioning shall be deposited with the office of SSE/ incharge for the calibration and giving Rlys. Serial numbers. Adequate space shall be kept available on meter board for provision of ELCB/RCCB/RCBO.

The meter board shall be supplied with following items

SPECIFICATION OF ELECTRONIC TYPE KWH METER

A. Electrical -

Current rating- 5-30 amps

Voltage rating-

Rated voltage- 240 V AC

Operating voltage-140 V to 300 V AC,

Frequency- 50 Hz

Class of accuracy- 1

Meter constant-1600/3200(impulses/kwh)

Starting current-0.4 % of basic current

Resolution kWh -1, 1/10,

Power consumption- less than 1 W

Output Device-Pulsating red colour LED provided for metrology indication

Indication - LED provided for temper indication.(Reverse & earth)

Dielectric test- 2 KV, 50 HZ for 1 minute.

Protection level- IP 51

B. Mechanical-

Register- Stepper motor counter, impulse counter,

Temp. range- -10° to 60° C

Humidity- upto 95% RH non condensing.

Sealing- 2 No. meter cover sealing screws and 1 terminal cover sealing screws.

Terminal- Brass /Tin plated brass.

C. Tamper proof features :

- Internal and external potential links.
- Immunity to passage of direct current.
- Capable of withstanding line to line momentary faults.
- Register accurately in current reversal. i.e. interchange of load and supply lines.
- In case of single phase, meter registers accurately when earth is used as a return path partially or fully, even when phase and neutral connection are reversed.
- Ultrasonically welded window pane in sheet steel case.

- Extended terminal cover ensuring total encapsulation of the cable termination.

D. Salient features.

- Accuracy class 1
 - Negligible effect of influence quantities such as frequency, voltage and temperature variation on the accuracy.
 - Low power consumption.
 - Factory calibrated. No modification of calibration possible at site by whatsoever means
 - Low starting current for low loads.
 - DC Immune - The meter does not saturate on passage of direct current and thus meets the requirement of affects of DC component in AC supply.
- The work of erection of Main Board shall be done in an approved manner as per the site condition and the instructions of field engineer.

17.Schedule item no. A-10

Supply, erection, testing & commissioning of Mini MCB modular type 6A-32 A.

Key Features

- Compact in size small in size can be easily mounted
- Matt Finish
- FR grade engineering Plastic
- Long life and Durable
- Safety-Inbuilt Overload Protection
- Fire Retardant - Self extinguishing properties
- IS IEC 60898 1 - Yes
- Material- Polycarbonate
- Type - C Curve
- Warranty - 2 Years

18.Schedule item no. A-22

Supply, erection, testing & commissioning of Mains with 2x1.5 Sq.MM FR Copper PVC insulated wire laid in provided conduit/ Trunking/ inside pole/Bus-bars or any other places.

Supply, erection, testing and commissioning of 2x1.5 sq mm 1100V grade PVC FR copper wire. The wiring shall consist of two wires of two core 1.5 sq.mm. PVC insulated multi-stranded FR copper wire of 1.1 KV grade on rigid PVC casing capping/ PVC conduit.

The wire shall be run inside the PVC casing capping /PVC conduit of suitable size as per site condition as per standard practice specified above as per the instructions of field Engineer. The wire shall be measured only for length upto fitting.

19.Schedule item no. A-23

SETC of PVC Flexible pipe 1/2 Inch

The cost includes supply, erection testing and commissioning of PVC Flexible pipe 1/2 Inch as per Standard practice specified & as per the instructions of field Engineer.

20.Schedule item no. A-34

Supply, erection, testing and commissioning of BLDC Super efficient electrical Ceiling Fan 1400 mm sweep (56") 260-280 RPM, Services value 7.7 input voltage 140-285 V. Power consumption 26 W to 30 W. Air delivery 270 CMM or more, 3 blades with double ball bearing with regulator of electronic step type and down rod 300-600 mm as per requirement, canopies, shackle.

Supply, erection, testing and commissioning of Ceiling fan 1400 mm sweep BLDC with Down rod and other accessories with regulator of electronic step type.

SIZE PERFORMANCE/Generic	
Sweep Size (mm)	1400 millimeter
Minimum Air Delivery (Cu. Mtr/min)	270 cu. meter/min or more
Service value	7.7 or more
Motor	Brushless DC (BLDC)
Super-efficient Power consumption (W)	26 W to 30 W
Total Harmonic Distortion (%)	15 percent
Standard Color	White
Blade Thickness (Min.)	1.1 millimeter
Blade Material	Aluminium
Double Ball bearing	Yes
Length of Down Rod (without Shackle) (mm)	300-600 millimeter or as per requirement
Shank Thickness – Minimum (mm)	2 millimeter
Shackle Thickness – Minimum (mm)	2 millimeter
Canopy (nos.)	2
Guarantee	5 years
Ceiling fan conforming to	IS : 374 : 2019 with latest amendments
Power factor	More than 0.9
Certification	BEE certified 5 star rating
Winding	copper
Anti Dust	Antidust paint.
noise levels	less than 57 dB
Safety Wire Set	1.6 mm Strand Wire, 2 U Clamp, 1 L Clamp

The necessary fixing arrangement for the erection of ceiling fan in an approved manner shall be done by the contractor. Fixing arrangement/hook shall be provided by the contractor. Unless and otherwise specified and directed by site supervisor all ceiling fan shall be hung at a height of 2.75 mtrs from the floor. Necessary down rod to the requisite length should also be provided as and where required. Ceiling fan shall have to be provided with pipe, pendant/ downing rod of requisite length wherever necessary at suitable height to suit the site. **The MS bracket, clamp etc. Shall be Hot dip galvanized.**

Provision of connecting wire of reputed brand while installing the fans. The wires shall be flame retardant low smoke PVC multistranded copper wire conforming to IS 694/1990.

Specification for electronic type fan regulator.

This specification deals with safety and performance requirement of electronic type fan regulator for use with single phase, 50 Hz. The rated voltage for regulator shall be 230 V, 50 Hz, single phase A.C. It shall be suitable for supply voltage variation of +/- 5% A.C. The rated frequency will be 50 Hz, $\pm 3\%$. As per IS 11037 or latest.

S.No.	Descriptions	requirement
1	Standard	IS 11037
2	Voltage	240V AC
3	Operation	Knob Operated 5 Steps
4	Material (Top cover, Base & Knob)	Polycarbonate
5	Construction	Modular
6	Installation	Snap fit with Modular Plates
7	Terminals	Brass (Screw Type)
8	Screws	Steel with zinc plating
9	Shall be	Flame Retardant
10	IP degree of protection	IP20
11	Tests	Leakage current , High voltage, Insulation resistance , Earthing connection , Protection against electric shock , Moisture resistance , Performance , Mechanical endurance, Power losses

PERFORMANCE:

It shall be full rotation in five steps socket type regulator.

The fan regulator supplied shall be guaranteed for a period of 5 years from the date of commissioning. Electronic type fan regulator shall be supplied and erected on board provided for light and fan switch board with necessary wiring in an approved manner. Regulator shall be erected with proper fixing arrangement in an approved manner as per the site requirement and as per the instructions of site Engineer.

21.Schedule item no. A-35

Supply, fixing, testing & commissioning of energy efficient BLDC motor industrial exhaust fan of size 300 mm (12") sweep and standard accessories, (Minimum Warrantee - 2 years)

1. SFTC of Heavy duty, low noise, super energy efficient BLDC motor industrial exhaust fan.
2. Fan sweep size shall be 300mm (12"), Power consumption – 22W max. Fan body Finish: Metallic, Blade finish: Metallic, Speed (RPM): 900, No. of blades: 4, Air Delivery: 1275 cu.mtr/m., Power Factor – 0.92 min. Rated Voltage (Volts): 230V, Rated Frequency: 50 Hz Speed control option – Single speed Protection: Temperature protection, High Voltage protection, Over current protection.
3. Pre-lubricated double ball bearing for maintenance free running.
4. Protection: Bird guard / louvers shutter to protect the fan in running condition.
5. The exhaust fan shall be fixed on wall with proper fixing arrangement / suitable size fasteners arrangement / M.S. bracket rag bolts of suitable size to withstand the weight and thrust.
6. The fan shall be connected with the supply point (within 3 mtr distance) using PVC insulated & sheathed, FRLS, copper wire 03 core 1.5mm² size conforming to IS 694/2010 or latest and ISI marked, in PVC pipe or as per site conditions, with proper workmanship or as per OEM's supply cable.

22.Schedule item no. A-36

Providing and erecting air circulator 600 mm sweep oscillating type, wall mounting 1440 RPM without speed regulator, overheat protection unit, totally enclosed, flame proof motor suitable for 230/250 Volts single phase, 50 cycles A.C. supply, core lead wire and with moisture proof treatment to winding and with 'E' class insulation complete.

Supply, Erection testing, commissioning of heavy duty industrial type air circulating fan 600 mm sweep working on A.C 230 volt 50 Hz supply, 1400 RPM, Oscillating type, metal blades chrome

plated guard with regulator and moisture proof treatment to winding and with class 'E' insulation, Air delivery 7500 M3/H with peak air velocity 250 m/min, Noise level shall be 64 dBA. Air circulating fan shall be epoxy powder coated, aerodynamically designed blades for higher air delivery and minimum noise level., Dynamic balancing of blades, with double 'Z' (shielded) ball bearings for longer life, Oscillation to 90° for total flexibility, Sturdy brazed wire guards with powder coating to ensure corrosion resistance. The air circulating fan shall be generally conforming to IS :2997-1964.

The air circulating fan shall be erected on walls with all necessary fixing as per site conditions. The work shall be done as per instruction of field Engineer. After successful commissioning of the same shall be tested for its consistence working.

23. Schedule item no. A-26

Supplying LED concealed type foot / step light with aluminium body for indoor application suitable for upto 5 W LED including driver and erecting by making necessary arrangement/ recess in wall to make it flush with surface.

The price shall cover cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of LED Step light with Die Cast Aluminum Housing with warm white COB LED reflector and IP65 protection. The luminaire comprises of a white powder coated cast aluminium body. Low power white LEDs covered with heat resistant frosted glass fixed to the housing with frame protection grill. LED Color temperature is 5700K, Highly efficient constant current electronic driver having operating voltage range from 140 - 280 volt AC; provided with high voltage, open and short circuit protection. Similar to Bajaj Razor BLSGV 2W LED WH - 5W LED Step Light. Luminaire efficacy required minimum guaranteed 100 Lumen/watt at luminaire level. LED fittings shall be guaranteed for 5 years.

Specification

IP Rating:- IP 54

Nominal Voltage:- 240 V

Power Factor:- > 0.95

System Wattage:- 5 W

24. Schedule item no. A-27

Supply, fixing, testing & commissioning of indoor type LED luminaires 20W maximum, 4 ft long, having inbuilt auto dimming driver and sensor, System efficacy 110 lm/W, Luminaires must be capable of delivering minimum 2200 lumens, luminaires complete with all accessories

This price shall cover of energy efficient 1 × 20 W LED batten with aluminium housing with integrated LED Driver & Tube Complete with PIR motion Sensor base auto dimming & on/off control system as per the passengers' movement. The batten should be 100% repairable even after warranty period the sensor neck should move in 360° angle and should be adjustable should have test report of LM 79 & LM80 from a NABL approved LAB. Supply erection fitting & Commissioning of energy efficient, System efficacy 110 lm/W, PF ≥ 0.95, THD <10%, CCT 6500, CRI ≥ 70. LED fittings shall be guaranteed for 5 years.

25. Schedule item no. A-28

Supply, erection, testing and commissioning of 2x20 Watts LED surface/suspended water proof industrial luminaries with polycarbonate housing and diffuser.

The price shall cover cost of supply, erection, testing and commissioning for 2x20 Watts LED surface/suspended water proof industrial luminaries with polycarbonate housing and diffuser and 20 W Tube-02 Nos for each fitting complete with suitable mounting arrangement. 2x20 W LED

Luminaire Batten prewired complete with inbuilt driver, 20 W. LED fittings shall be guaranteed for 5 years.

1	Wattage	2 x 20 W
2	Operating Voltage	140 - 270 Volts
3	Frequency	50 Hz
4	Degree of protection	IP 65
5	Luminous efficacy (SMD LED module)	140 lm/ W
6	Colour temperature	6500 K SMD LED
7	CRI	≥ 80
8	Burning Hours	Average life: 50000 Hrs
9	PF	≥ 0.95
10	Certification	as per LM 80 certified SMD Super Bright LED
11	IS	IS 10322 (Part 5/Sec 1): 2012
12	System Lumens	2100

The necessary items should be provided by the contractor such as screw, PVC raval plugs etc with fixing arrangement in an approved manner with clamps, brackets etc. as per site condition and instructions of as per field Engineer for fixing of LED fitting.

26.Schedule item no. A-29

SETC of 2Ft 10 watt LED tube 4000 k all in one fixtures for Dressing, mirror and kitchen.

The price shall cover cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of 2 FT 1x10 watt LED tube fitting with accessories complete, Polycarbonate co-extrusion tube for LED light housing with engg-plastic end caps. Opal diffuser provides smooth light distribution. LED populated on PCB comprising of LED's connected in series parallel. LED fittings shall be guaranteed for 5 years.

Wattage	10 W
Ingress Protection	IP 20
Luminaire efficacy	100 lm/ W
PF	≥ 0.90
THD	<15%,
CCT	4000 K
CRI	≥ 70

27.Schedule item no. A-32

SETC LED Panel Light 39 to 42 Watt 6500K : 595x595x60 MM, 230 Volt, 50 HZ, AC similar to Philips product description RC370B LED 28S6500 L60W60 PSU or as per Make list of Annexure-I.

The price shall cover cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of energy efficient LED Panel Light 39 to 42 Watt 6500K : 595x595x60 MM, 230 Volt, 50 HZ, AC similar to Philips product description RC370B LED 28S6500 L60W60 PSU OD with CRCA sheet housing comprising connected in series parallel. Opal diffuser fixed in separate CRCA sheet frame. Opal diffuser frame is held in with housing by screws for easy maintenance. Driver: Constant current LED driver. Finish : Housing white powder coated. (RAL9016) Luminaire efficacy required minimum guaranteed **110 lumen/watt**, beam angle 100 degree, PF ≥ 0.95 , Built in surge protection of 3 KV, THD<10%, CCT (6500)K, CRI = 80, Operating Temperature range -10°C to 45 °C. LED fittings shall be guaranteed for 5 years.

28.Schedule item no. A-33

SETC of 15/18 Watt Warm White SLD Square / Round LED downlight fitting of size 6"x6" complete with all accessories.

The price shall cover cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of energy efficient 15/18 Watt Warm White SLD Square / Round LED downlight fitting of size 6"x6" complete with all accessories. The fitting shall be 6*6 by supply installation and commissioning of maximum 15/18W with CRCA sheet housing comprising connected in series parallel. Opal diffuser fixed in separate CRCA sheet frame. Opal diffuser frame is held in with housing by screws for easy maintenance. Driver: Constant current LED driver. Finish: Housing white powder coated. (RAL9016) Luminaire efficacy required minimum guaranteed **125 lumen/watt**, beam angle 100 degree, PF ≥ 0.95 , Built in surge protection of 3 KV, THD $<10\%$, CCT (3500-4100)K, CRI = 80, Operating Temperature range -10°C to 45°C . LED fittings shall be guaranteed for 5 years.

29.Schedule item no. A-38

SETC of LED street Light Roadway fittings in aluminium PDC housing, toughened glass cover with IP66 protection, Wattage-72 watts, input voltage-240 volts ac, 50Hz. Complete.

The price shall cover cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of LED street light Road way fittings in Aluminum PDC housing and toughened glass cover with IP66 Protection, wattage- 72 W, input voltage-240 volts AC, 50 Hz complete with Pressure die cast aluminum housing graphite powder coated finish with mid power LEDs, Luminaire efficacy required minimum guaranteed **110 Lumen/watt**, CCT ≥ 5700 , CRI >70 , Driver efficiency $> 85\%$, Beam Angle 120 degree, P.F ≥ 0.95 , THD $< 10\%$, Short Circuit /open load/reverse polarity surge voltage protection should be available. External surge protection provided for additional safety. LED fittings shall be guaranteed for 5 years.

30.Schedule item no. A-30

SETC of LED Post top 65 Watt with spun aluminium housing for lamp and reflector assembly with clear polycarbonate cover and IP 65 protection.

The price shall cover cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of LED Post top 65 Watt with spun aluminium housing for lamp and reflector assembly with clear polycarbonate cover and IP 65 protection. The fitting shall be exactly similar to **Bajaj model No. Flounce/Auracrest/Archner/Antiqua/Borage/BNRRL** Post Top 65 W LED from any approved make. Luminaire efficacy required minimum guaranteed ≥ 110 **Lumen /watt** at luminaries level. LED fittings shall be guaranteed for 5 years.

Specifications

- Powder coated spun aluminium housing for lamp & reflector assembly
- Powder coated spun aluminium reflector with UV stabilized clear polycarbonate cover is
- fixed to the housing from top with mounting arrangement for incoming pole of 40 to 50 mm
- O/D pipe
- Colour temp. – $5700^{\circ}\text{K} \pm 300^{\circ}\text{K}$ / 3000°K
- Driver has protection against over voltage & short circuit.
- Input voltage range: 140–310V AC.
- Ingress protection : IP66
- IK- 09
- Input Voltage(V) AC - 240V AC
- System Current - 0.270 (Amp.)
- System Wattage – 65 (W)

- Power Factor - 0.95
- IS 10322 (PART 5/SEC 3) : 2012
- IS 15885 (Part 2/Sec 13): 2012
- LED module with SMD LED package mounted on MCPCB.

Features – 1) No harmful UV & IR radiations.
 2) Spun aluminium powder coated housing with casted aluminum heat sink.
 3) Graphite Grey powder coated-RAL 7024
 4) Optical grade injection moulded polycarbonate diffuser.
 5) Constant current electronic driver provided with high voltage open and short circuit protection.

Electronic driver - Built-in potted electronic LED driver with APFC, (SMPS based constant current supply), lower THD, Open Circuit Protection, over Voltage protection, Surge Voltage Protection upto 10kV With Built In SPD & other safety test as per IS 15885 Part-2/Sec 13.

31.Schedule item no. A-31

SETC of Chandeliers with LED Bulbs complete

The price shall cover cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of Chandeliers with LED Bulbs complete, material shall be glass minimum No of lights shall be 7 or more LED. The chandeliers shall be of white & golden in colour & Built in tinted glass. The sample shall be got approved before supply. LED fittings shall be guaranteed for 5 years.

SPECIFICATION OF LED LUMINAIRES

Ref: RDSO Doc. No. RDSO/EM/ LED Norm/ 01, Ver: 1.0 Date: 18.09.2014

Technical requirements of LED

S.No.	Description	Specification
1	LED Make	Nichia, Osram, Seoul, Philips, Lumileds, Cree and Lednium
2	LED Type	High Power, SMD (Surface Mounting Device) LED
3	Lumen Out Put / Efficacy at luminaries Level	I. >125 lumen/Watt for Indoor Light fittings. II.>100 Lumen/Watt for Street Light up to 45 watt &>110 lumen/Watt above 45 Watt. III. >110 Lumen/Watt for Flood Light up to 100 Watt & >120 lumen/Watt above 100 Watt. IV. >120 lumen/Watt for Highbay Fittings up to 100 Watt &> 140 Lumen/Watt above 100 Watt.
4	LED Life	> 50,000 Burning Hours.
5	Depreciation	30% max. after 50,000 Burning Hours.
6	Nominal Voltage	220 V, 50 Hz AC
7	Input Operation Voltage	90-300 Volts AC
8	Control of Distribution	Fully cut Off
9	Driver Type	Constant Current Driver with short circuit Protection.
10	Driver Component	Industrial Grade only
11	THD	< 10 %
12	Efficiency of Driver	> 90 %
13	Driver Surge Protection	10 KV
14	Color Temperature	5665 \pm 355 K
15	Color Rendering Index	\geq 65
16	Power Factor	> 0.95
17	Construction of Housing	Extruded Aluminum /CRCA/ Die Cast Aluminum

18	Finishing	Powder coated / anodized
19	Lamp cover	Poly Carbonate / Toughened glass
20	Secondary Optics	Poly carbonate reflector / Poly carbonate lens
21	Mounting	Suitable for surface /recessed /Pole (as per requirement)
22	Ingress Protection	For Indoor :- IP20 & for Out Door :- IP 65
23	Temperature Rise	Soldering point temperature of the LEDs must be equal to or less than 85 ⁰ C. Temperature rise (above ambient) of heat sink should generally remain within 20 ⁰ C.
24	Report to be submitted	LM 79, duly certified by NABL accredited Lab- for LED Luminaire Performance. LM 80, duly certified by accredited Lab of the host country for LED Chip Performance.

32.Schedule item no. A-25

Supply, erection, testing & commissioning of Occupancy / Movement Sensor with contactor for Lighting Circuit.

The price shall cover the cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of False Ceiling / Recessed Mount PIR Occupancy Sensors.

Occupancy sensor is an intelligent device which detects IR Rays emitted by Human Being and controls the ON-OFF operation of electrical loads. Electrical Loads can be Lights, Fans, AC for Energy Saving Application or Siren, Buzzer, Feedback to Home Automation Controller along with Lights for Security Application. This highly sensitive Sensor Element detects human movement within its detection area and automatically turns the load ON. The Loads are kept ON till the Human Movement persists in the room. The Loads are turned OFF after preset time delay if no movement is detected within the set time It has an additional in built photo sensor (dusk to dawn sensor) which can set the sensor to turn ON artificial light only when the ambient light condition (LUX Level) drops below the set value. This reduces the large amount of energy wastage and helps in making the most energy efficient system along with security.

Technical Specifications –

- Operating voltage range: 140V AC to 270V AC Overvoltage/Under voltage protection
- PIR Sensor: Highly Sensitive Quad Element Pyro Electric Sensor
- TIME Setting: Built in Re-triggerable Timer setting between 30 sec to 30 minutes from the last movement detection
- LUX setting: Additional Photo Sensor (Ambient Light Sensor) to select the control of electrical loads during DAY Light, PARTIAL Light and NIGHT condition.
- Current capacity: 5A/ 1000 W- Resistive load, 200 W of Fluorescent Tubes/LED Light load, For AC Control Additional Contactor of 40 Amp rating 3P coil 230V
- Sensor warm-up time: 1 Minute
- Sensing angle: 360 degrees
- Sensing distance: 0-7 Meters
- Operating Temperature: -10°C to 50°C
- Protection class: IP25 Enclosure is protected from environmental conditions that are water and dust.
- EMI protection: Protection against electromagnetic interference noise caused by cell phones, TV, tuners, audio players.
- Over Current & Short Circuit Protection by an external replaceable fuse
- In built Protection circuit for lighting load.
- Provision for Dry Contact Output Terminal available RELAY- NO/NC/COMMON Contact available outside.
- Protection from false switching.

33.Schedule item no. A-39

Supply, erection, testing and commissioning of astronomical street light control panel outdoor type CRCA sheet steel powder coated capacity- 6 kW single phase consisting digital 24 Hr timer,32 A TP contactor, 40 A SPN (DP) MCB, auto/manual switch with complete wiring suitable to be mounted on channel/angle fixed on electrical pole IP-32

Supply, erection, testing and commissioning of Astronomical Street Light timers for automatic controlling of street lighting with 100Amp contactor power, AC-1 rating 440V, 50Hz confirming to IS 60947-4-1.

GENERIC ATSC is an intelligent Street light control timer that can be used to control several existing street light

Technical specification for Street Light Timer

1	Operating Voltage	240VAC
2	Rated Frequency	50 Hz
3	Installation Type	DIN Rail
4	Type of Contact	Changeover Contact
5	Program Functions	ON/OFF
6	Number of Programming	8 ON/8 OFF (or) better
7	Power Reserve	48 Hrs (or) better
8	Switching Capacity at 250 VAC, cos =1	43A
9	Switching Capacity at 250 VAC, cos=0.6	24A
10	Shortest Switching Time	< 1 Min
11	Mechanical Life	10 ⁷ or more
12	Electrical Life	10 ⁵ or more
13	Time Accuracy	< 2 s/day
14	Power Consumption	< 4 VA
15	Degree of Protection	IP 65
16	Ambient Temperature	10°C to + 40° C
17	Over voltage protection	260 V ± 5V
18	Under voltage protection per phase	160 V ± 5V
19	Over load minimum 10% of rated load	protection per phase
20	Programmable time switch	Programmable time switch shall automatically adjust the ON/OFF set time along with seasonal variations like sun rise and sun set as per the geographical area

34.Schedule Item No. A-37

Supply, erection, testing & commissioning of 7 m high (clear height) galvanised octagonal pole with bracket (Single/Double arm as per site requirement), internal wiring foundation bolts having bottom of 130 mm A/F, top 70 mm A/F on provided foundation.(Along with 2 pole RCBO 6A, with 30 mA sensitivity).

The price shall cover the cost of Supply, Erection, Testing, commissioning of 7 m high (clear height) galvanized octagonal pole with arm bracket, foundation bolts having bottom of 130 mm A/F, top 70 mm A/F on provided foundation. The poles should be hot dip galvanized after fabrication, internally & externally in accordance with IS-2629/BSEN ISO 1461 or equivalent. The steel poles is as per BSEN 10025 grade S 355 Jo or equivalent.

Sr. No.	Description	Particular
1	Base plate	IS 2062
2	Yield Strength	Min 355 N/mm ²
3	Tensile Strength	490-630 N/mm ²
4	Pole Height	7 mtr
5	Top Dia	70 mm
6	Bottom dia	130 mm
7	Sheet Thickness	Min 3 mm
8	Base Plate Dimensions (LxBxT)-	225x225x16 mm
9	Bolt Size	4 Nos 20 mm dia.
10	Pitch Circle dia	225 mm
11	Bolt Length	700 mm
12	Projected Bolt length	100 mm
13	Anchor plate thickness	3 mm

1. The octagonal poles shall be hot dipped galvanized in single dip with **minimum** coating thickness of 65 micron DFT as per IS :2629/ IS :2633/ IS: 4759 standards.
2. The octagonal poles are designed for maximum wind speed of 169 Km/Hr.
3. The octagonal poles are manufactured in single section.
4. The structure shall confirm to IS : 875 – part 3 : 1987 relating to wind load on structures and also confirm to BSEN 40-I:1992 relating to general construction if applicable.
5. Bending of sheet into polygonal shape shall be done through a CNC controlled. Laser aligned will be as per IS : 1367.

Note :- Connection to the street light fittings shall be given through inside the pole with flexible, 3-core, multistrand copper conductor, PVC insulated & sheathed wire.

RCBO - It shall be 2 pole type Earth leakage circuit breaker of rating 6 amps with rated residual operating current of 30 mA. with enclosure. It shall be provided with rotary handle with ON/OFF indication, positive contact indication along with test button for regular inspection. It shall be Conforming to IS 12640-1/2000.

It shall be erected in an approved manner as per site condition & instructions of field supervisor.

RCBO –

RCBO shall have conformance to IS 12640-2 / IEC 61009-1.

RCBO shall be of breaking capacity of 10kA.

RCBO shall not be line load biased.

RCBO shall have minimum electric life of 10,000 electric operations.

Single Phase RCBO of 6A-40A to be in 2 Modules size with a breaking capacity of 10kA.

The RCBO shall have separate indications for short circuit fault and earth leakage fault.

The RCBO shall trip on leakage fault of AC waveform consisting of pulsating DC along with transients and harmonics.

The RCBO shall have pollution degree 3.

The RCBO shall have rated impulse withstand of 6 kV.

The RCBO shall have IP20.

The RCBO shall have a test button to check health of RCBO by creating artificial fault.

The RCBO shall be suitable for isolation.

The RCBO shall have bi-connect terminals for both bus bar and cable termination.

The RCBO, up to 63A, shall have cable termination capacity of 35 sq mm for rigid cable & 25 sq mm for flexible.

The RCBO shall have safety shutter to avoid any wrong insertion of cable.

The RCBO shall have operating temperature -5 °C to +60 °C.

The RCBO shall have a provision for padlock to prevent unauthorized access.

The RCBO shall have provision for mounting of accessories – Auxiliary Contact, Trip Alarm Contact, UV, OV, Shunt Release.

The RCBO shall have DIN clip on both the sides for easy removal of an RCBO from the DIN rail.

35.Schedule item no. A-79

Supply, installation, testing & commissioning of single phase RCBO of 32A capacity, 30mA sensitivity with metal enclosure.

It shall be single phase RCBO of 32 A, electromagnetic type with 30 mA sensitivity with earth leakage trip indication complete as per specification with Metal enclosure. It shall be Conforming to IS 12640-1/2000. It shall be erected in an approved manner as per site condition and instructions of field supervisor.

Residual Current Circuit Breakers: - The RCCB shall have conformance to IS 12640-1 / IEC 61008-1

- The RCCB shall be truly current operated and shall operate on Core Balance Current Transformer (CBCT) mechanism
- The RCCB shall have advanced neutral mechanism
- The RCCB shall have pollution degree 3
- The RCCB shall have minimum electric life of 10,000 electric operations
- The RCCB shall have terminal capacity of 35 sq. mm up to 63A, 50 sq. mm up to 100A
- The RCCB shall have IP20
- The RCCB shall have operating temperature -5 °C to +60 °C.
- The RCCB shall have a test button to check health of RCCB by creating artificial fault
- The RCCB shall have rated impulse withstand up to 6 kV
- The RCCB shall have no line load bias.
- The RCCB shall have bi-connect terminals for both bus bar and cable termination
- The RCCB shall give an indication for leakage fault when tripping
- The RCCB shall have rated conditional short circuit current of 10kA
- The RCCB shall have rated residual making and breaking capacity of 1kA
- The RCCB shall have flag indication for Earth Leakage Faults - The RCCB shall have a provision for padlock to prevent unauthorized access
- The RCCB shall have provision for mounting of accessories – Auxiliary Contact, Trip Alarm Contact, UV, OV, Shunt Release
- The RCCB shall be suitable for isolation
- The RCCB shall have safety shutter to avoid any wrong insertion of cable
- The RCCB shall have DIN clip on both the sides for easy removal of an RCCB from the DIN rail

36.Schedule item no. A-42

Supplying & erecting mains with 4x10 sq.mm and earth wire 6 sq.mm FR PVC copper wire, in rigid PVC conduit 32mm dia as per specification

Supply, erection, testing and commissioning of mains with 4x10 sq.mm. and earth wire 6 sq.mm 1100V grade PVC FR copper wire inside rigid PVC conduit-32 mm dia. The wiring shall consist of four wires of single core 10 sq.mm. and earth wire 6 sqmm. PVC insulated multi-stranded FR copper wire of 1.1 KV grade on rigid PVC casing capping/ PVC conduit.

The wire shall be run inside the PVC box /PVC conduit of suitable size as per site condition as per standard practice specified above as per the instructions of field Engineer.

The necessary connection, Lugs, termination inside the Junction Box shall be carried out by contractor on his own w.r.t. Phase wires terminated in phase connector.

- Neutral wire terminated in neutral connection.
- Earth wire of 6 sqmm FR terminated in earth connections.
- Termination of wire shall be done using suitable crimping type thimbles.
- One meter consist of 4 wire of 10 sqmm & 1 wire of 6 sqmm.
- Suitable clamping arrangement for rigid PVC conduit 32 mm shall be provided

37.Schedule item no. A-43

Supply, erection, testing and commissioning of 11 kV HT outdoor heat shrinkable cable jointing/ terminating Kit suitable for 3 core 70/95/120/185 Sq.mm Aluminium armoured XLPE cable.

Supply, erection, testing and commissioning of cable end termination kit outdoor type, heat shrinkable type for HT XLPE 11 KV grade Armoured Aluminium conductor cable of size 3 core 95/120/185 Sq.mm Aluminium armoured XLPE cable conforming to IS 13573-1972.

The work shall be done in an approved manner as per the instructions of field supervisor.

38.Schedule item no. A-44 to A-48

Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 2.5 to 16 sq mm., with necessary material as per specification

Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 25 to 50 sq mm., with necessary material as per specification

Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 70 to 95 sq mm., with necessary material as per specification

Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 120 to 185 sq. mm., with necessary material as per specification

Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 300 sq mm., with necessary material as per specification

Cable termination kit shall be suitable for termination of the cable on indoor switchgear or outdoor installation as per requirement. The type of cable will be XLPE insulated. The cable termination jointing kits shall be as per defined in IS- 13573.

- 1.1 Proper stress control, stress grading and non-tracking arrangement in the termination and joint shall be offered by means of proven methods, details of which shall be elaborated in the offer. Detailed sectional views of the assemblies shall be submitted along with the offer. In case of heat shrinkable cable accessories, stress control tubing, shall have volume resistivity of minimum 1,00,00,000 Ohms- meter for both termination and straight through joints.
- 1.2 Further, impedance of stress control tubing shall not change over a range of temperature from 0°C to 125°C. The impedance also remains constant in spite of the difference in stress, which will exist within the sleeve due to heating effect within the conductors and the temperature of the environment. Tenderer must submit graph-showing effect on the impedance value of stress control humbling due to temperature variations and thermal ageing with his offer. In case of tapex cast resin type straight through jointed capsulation of joints is done by specially developed resin system, which is compatible with the material used for bonding. The jointing kit shall be with aluminum crimping type ferrules, semi-conductor self-bonding tape, the self-amalgamating tape [or EPR or equivalent] stress grading pad etc. The straight through joints should be absolutely impervious to the entry of water. The manufacturer shall use the proven technologies and design to ensure a construction, which will prevent entry of water or any other liquid inside the straight through joint and cable. Proven technologies such as resin injection, hydrophobic sealants etc. shall be deployed in the critical areas. In all type of kits offered, the external leakage insulation between high voltage conductor and ground as specified in I.E.E.E. –48 /

1975 amended up to time to time shall be of non-tracking erosion resistant and weather resistant flexible sleeve.

- 1.3 For 3-core cable, the gripping tubing [termination boot] for the cable where the trifurcation takes place shall be considered as a part of the kit.
- 1.4 The kit offered shall provide for total environmental sealing of the cable crutch and at the lug end.
- 1.5 Termination and jointing system shall be suitable for use with standard aluminum conductor fittings [cable lugs and ferrules] of compressed crimping type.
- 1.6 The termination of straight through jointing kit of heat shrinkable type kit, the joint shall include heat shrinkable dual wall tubing, which shall be insulating from inside and semi-conductor from outside. Tenderer shall specifically give compliance to this along with the offer.
- 1.7 For straight through joint the kit shall also include tubular Sleeve in line connectors for solder less crimping of cable connector. The connector shall be of aluminum alloy A 6 drop forged type or other equivalent or better material.
- 1.8 Material used for construction of a joint/termination shall perfectly match with the dielectric, chemical and physical characteristics of the associated cable. The material and design concepts shall incorporate a high degree of operating compatibility between the cable and the joints.
- 1.9 The tenderer shall indicate the required net dimensions of the indoor cable, joints for various cable sizes, in the form of Length X Breadth X Depth in mm.
- 1.10 The tenderer shall specifically bring out the precautions to be observed in execution of the jointing / termination work to avoid any loss or damage to the cable, the kit, the personnel or the installation. An instruction booklet shall be supplied with each kit.
- 1.11 The kit which requires lesser skill for the cable jointing which can be done in shorter time and guarantee a reliable and long operating life and reduced or no waiting time for erection shall be given preference.
- 1.12 Type Test: The jointing kits offered, shall be fully type tested at CPRI as per the relevant standards. The tenderer shall furnish four sets of the type test reports along with the offer. Offers without type test reports will not be considered. For any change in the Design/type already type tested and the design/type offered against this specification, the purchaser reserve the right to demand repetition of type tests without any extra cost in presence of purchaser's representative. Type tests shall be carried out as per the test sequence given in I.S.: 13573 or VDE-0278 at C.P.R.I. Laboratory as amended from time to time. The test report will have to be submitted for the test carried out.

39.Schedule item no. A-49 to A-53

Providing & erecting epoxy outdoor / indoor end termination kit for LT XLPE armoured cable 2.5 to 16 sq mm., with necessary material as per specification

Providing & erecting epoxy outdoor / indoor end termination kit for LT XLPE armoured cable 25 to 50 sq mm., with necessary material as per specification

Providing & erecting epoxy outdoor / indoor end termination kit for LT XLPE armoured cable 70 to 120 sq mm., with necessary material as per specification

Providing & erecting epoxy outdoor / indoor end termination kit for LT XLPE armoured cable 150 to 185 sq mm., with necessary material as per specification

Providing & erecting epoxy outdoor / indoor end termination kit for LT XLPE armoured cable 240 to 300 sq mm., with necessary material as per specification

Supply, erection, testing and commissioning of epoxy outdoor / indoor end termination kit for LT XLPE armoured cable 2.5 sq mm upto 300 sq mm of various sizes, with necessary material as per IS. The work shall be done in an approved manner as per the instructions of field supervisor.

40. Schedule item no. A-54 to A-66, A-70

Supply of 4 Core x10 Sqmm Copper Unarmoured Cable.

Supply of 4 core 16 sqmm armoured XLPE Cable.

Supply of 4 core 25 sqmm armoured XLPE Cable.

Supply of 4 Core 70 sqmm armoured LT XLPE Cable.

Supply of 4 Core 95 sqmm armoured LT XLPE Cable.

Supply of 4 core 120 sqmm armoured LT XLPE cable ISI mark.

Supply of 4 core 185 sqmm armoured XLPE Cable.

Supply of 4 core 300 sqmm armoured LT XLPE cable ISI mark.

Trenching & refilling of LT/HT/ Various sizes of PVC / XLPE cables- Along the Road (Size - 900mm x 300mm)

Digging of cable trench 300/450 mm x 1000 mm in RCC/PCC/hard soil & refilling as per specification and requirement at the site.

Transportation, Laying, Installation, terminating, testing and commissioning of LT/HT cable of sizes 10 sqmm to 300 sqmm in existing trench, pipe or on structure.

Erection, testing and commissioning of cables other than trench i.e. Wall/Truss including clamp, GI wire and hardware.

Supply and laying of RCC Hume Pipe of size 6" (150mm) dia 2 mtr. Length.

LT XLPE Copper Cable

Cable shall be cross linked polyethylene and XLPE insulated PVC outer sheathed cable with copper conductor suitable for rated voltage at 1100 V grade and confirming to IS : 7098 Part -1 1988 with amendment number 1, 2 & 3 Reaffirmed 2005 or latest.

Armouring – Galvanised steel strip armoured

Shape of conductor -stranded

No. of core – 4 core / 2 core (as per schedule item description)

BIS marked,

Material of conductor – Copper EC grade.

Cable to be supplied on wooden drums confirming to IS : 10418/82 with latest amendments.

In addition to marking requirement as per relevant specification, sequential marking for length, size of the cable, type of the cable & drum No., shall be embossed /printed on the cable.

LT XLPE Aluminium Cable –

Cable shall be cross linked polyethylene (XLPE) insulated PVC outer sheathed cable with alluminium conductor suitable for rated voltage at 1100 V grade and confirming to IS : 7098 Part -1 1988 with amendment number 1, 2 & 3 Reaffirmed 2005 or latest.

Armouring – Galvanised steel strip armoured

Shape of conductor -stranded

No. of core – 4 core / 2 core (as per schedule item description)

BIS marked,

Material of conductor – Aluminium EC grade.

Cable to be supplied on wooden drums confirming to IS : 10418/82 with latest amendments.

In addition to marking requirement as per relevant specification, sequential marking for length, size of the cable, type of the cable & drum No., shall be embossed/printed on of the cable.

1. SPECIFICATION OF CABLES**1.1 L.T CABLE**

Cross linked polyethylene insulated PVC sheathed conductor cable with common covering over cores, provided other by extended inner sheath of thermo plastic vulcanized or invulcanized rubber galvanized single trip armoring suitable for 1100 volts grade conforming to IS 157098

(Pt-I) of 1988 with latest amendments size of cable should be as per requirement shown in plan & scope of work.

1.2 ARMORING

Armoring of cable should be conform to ISS: 3975/79

1.3 INSULATION

The insulation of cable should conform to IS 7098 - Pt. -I –1988 table I.

1.4 ALUMINUM CONDUCTOR

The Aluminum conductor should comply with 8130-1984

1.5 CABLE

It should be ISI marked and should be of the make specified in attached approved list of Materials

Supply of 11 kV 3 core 120 sqmm HT Aluminium armoured cable conforming to IS: 7098-Part 2 :2011

The price shall cover cost of supply, loading transportation & unloading to site of 11kV 3 core 120 sqmm HT Aluminium armoured cable.

- a. Type of cable – Three core armoured, screened.
- b. Voltage grade-Earthed systems 11 KV.
- c. Cable shall be cross linked polyethylene insulated Thermoplastics sheathed cable for working voltage.
- d. 11KV confirming to IS 7098-Part 2 : 2011 latest.
- e. BIS marked with license Number.
- f. Conductor material (as per C.I 4 of IS 7098 Part 2); 2011 latest – Aluminium, outer sheath (type ST 2) PVC.
- g. Armoured-Galvanized formed wires armoured.
- h. Cable packing type (Wound or drum) as per CI 22.1 of IS 7098 (Part 2) : 2011 latest
Identification on cable as per CI -21 of IS : 7098 (Part -2) : 2011 Latest.
- i. Marking on cable (as per CI : 22.2 of IS 7098) (Part -2) : 2011 latest.

LAYING OF LT / HT CABLE -

(A)The cable laying shall confirm to IS 1255/1983 or latest. The cable shall be laid by digging a trench in the ground and laying cables on a bedding of minimum 75mm riddled soil or fine sand at the bottom of the trench and covering it with additional riddled soil or sand of minimum 75 mm. The width of the trench should be at-least 300mm(12") and make the surface as original/earlier.

(B)Cable should be covered with best quality of tiles, bricks or slabs continuously on entire length of cable. Layer of bricks/ tiles / slabs shall be ensured to protect the cable from damages. After that it shall be refilled properly upto the ground surface keeping a crown of 150mm (6") above the ground level.(FOR LT CABLE)

(C) The cable shall be covered with RCC Warning Cover of size 450mm X175mmX 37mm (18"X7"X1.5") completely. After that it shall be refilled properly upto the ground surface keeping a crown of 150mm(6") above the ground level.(FOR HT CABLE)

(D) Cable marker should be provided at a spacing of 50 Mtrs. On straight runs one marker at 50 Mtr shall be provided and ends of track or road crossing or as per instructions of railways engineer at every turning of cable. (FOR HT CABLE)

(E) While terminating the cable on the wall, it shall be fixed with the help of "J" hooks and secured properly on walls. Size of hook shall depend on size and weight of the cable.

(F) Where cable has to be taken on pole the suitable size of clamp, nut Bolt shall be used. The cable shall go through GI pipe of suitable size.

(G) The laying of RCC pipe /GI pipe /PVC pipe is also the part of cable laying cost under track /Road/ on pole. However supply of RCC hume pipe /GI pipe/PVC pipe shall be covered separately in schedule or supplied by Rly. at SSE's depot.

(H) Wherever cables are to be taken through pipe on existing steel structures / walls, the pipe shall be supported on steel structures with suitable and proper clamps made from 50 X 6 mm thick GI flat, fixed to the structures with, 16 mm dia GI bolt, nut and plain, spring washer.

(I) **MINIMUM PERMISSIBLE BENDING RADII** –The cable should not be bent to sharp radius. Wherever possible larger radii should be used. Minimum recommended Bending Radii are given as follows-

VOLTAGE RATING	PVC & XLPE CABLE	
KV	Single core	Multi core
Upto 1.1	15 D	12 D
Above 1.1 to 11	15 D	15 D
Above 11	20 D	15 D

Note D' is outer diameter of cable. Special precaution should be taken so as not to damage the cable. At joints and terminations bending radius for the individual cores should be above 12 times the diameter over the insulation.

(J) **DEPTH :-** The desired minimum depth of laying from ground surface to the top of cables is as follows-

i) Cable up to 11 KV rating =0.9 mtr

ii) 22 KV to 33 KV rating =1.05 mtr

iii) Cables at road crossing =1.00 mtr

iv) Cables at railway level crossing (measured From bottom of sleepers to the top of pipe) =1.00 mtr

Supply and laying of RCC Hume Pipe of size 6"(150mm) dia of 2 mtr. Length for each pipe of standard thickness as per IS 451 Type – NP-2 in provided depth below ground /Road/Track to enclose the cable and necessary back filling.

Note : LT XLPE cable to be terminated by suitable termination kit of reputed make.

TESTING OF CABLE-

i. After laying the XLPE cable and making the cable end termination, it shall be tested by the contractor with high pressure testing equipment as per relevant IS specification in the presence of Railway representative. High pressure testing set shall be arranged by the contractor at site.

ii. Insulation resistance reading of the cable shall be taken before the contractor is allowed to lay the cable or allowed to carry out cable end termination work.

iii. Insulation resistance (IR) values of cable shall be taken in the presence of Railway representative before and after the high pressure testing. Tenderer shall ensure the IR value does not reduce appreciably after carrying out the cable laying, making cable end termination and high pressure testing

iv. The test results jointly be signed by the contractor and SrDEE(G)'s authorized representative.

Laying erection, testing and commissioning of LT 1100V grade PVC armoured aluminium conductor cable of various size as per specification.

Laying/Erection, testing and commissioning of XLPE armored cable with continuous GI Earth wire, Glands/lugs etc. on wall /trusses/pole/pipe etc as per the instruction of field engineer.

Clearances

The desired minimum clearances are as follows -

Power cable to control cable - 200 mm

Power cable to communication cable - 300 mm

Power cable to gas / water main - 300 mm

Power to power cable - Clearance not necessary: however, larger the clearance, better would be current carrying capacity.

CABLE LAYING (HT & LT) SHOWN

SEPARATE Date of test

Voltage of megger used

Location from

to Size in sq

mm Total

length

Megger value at the time of issue

Megger value during laying & before covering

Signature of contractor

High voltage testing before commissioning HT/LT cable and overhead lines work

Cable works

i) Wherever high voltage test was conduct ----- Yes / No

ii) If conducted, system of supply -----

Test H/V applied -----KV for ----- minutes.

Result of test ----- (Satisfactory / Unsatisfactory)

iii) If not conducted

Voltage of megger used -- - - - -

Result of megger used -----

Result of megger testing -----

Between R & Y

Y & B

B & R

-do- R & N

Y & N

B & N

-do- R & E

Y & E

B & E

N & E

Signature of contractor's

Cable jointing No of joint Location

Type of jointing

Size of cable I

II

Clause Nos

Voltage of megger used I

II

i) Insulation resistance before jointing

Cable I a) Between R & Y

Y & B

B & R

b) -do- R & N
Y & N
B & N

c) -do- R & E
Y & E
N & E

Cable II a) Between R & Y
Y & B
B & R

b) -do- R & N
Y & N
B & N

c) -do- R & E
Y & E
N & E

ii) Insulation resistance of jointed cable

a) Between R & Y
Y & B
B & R

b) -do- R & N
Y & N
B & N

c) -do- R & E
Y & E
N & E

Signature of contractor

IS for Cables

1	IS : 7098 (Part-I)	Cross linked polyethylene insulated PVC sheathed cable for working voltage and including 1100 Volts.
2	IS : 1554 (Part-I)	PVC insulated (heavy duty) electric cables for working voltage upto and including 1100V.
3	IS : 3961 (Part-II)	Recommended current ratings for cables.
4	IS : 3975	Mild steel wires, strips and tapes for armouring of cables
5	IS : 4905	Methods for random sampling
6	IS : 5831	PVC insulation and sheath of electrical cables.
7	IS : 8130	Conductors for insulated electrical cables and flexible cords
8	IS : 10418	Specification for drums for electric cables.
9	IS : 10810	Method of tests for cables.

10	ASTM-D-2843	Standard test method for density of smoke from the burning or decomposition of plastics.
11	ASTM-D-2863	Standard method for measuring the minimum oxygen concentration to support E3 candle like construction plastics.
12	IEC-754 (Part-I)	Test on gases evolved during combustion of electric cables.
13	SS:424-1475	Flammability testing of cables.

Technical parameters-

1	Power system details	415 V +/-10%, 3 phase, 4 wire solidly earthed.
2	Frequency	50 Hz.
3	Size of cable, conductor & quantity	As per S.O.Q.
4	Core identification	Colour scheme as per IS 1554 (part I) /88 or latest
5	Conductor	Stranded circular/sector shape core Aluminium/Copper conductor
6	Rated voltage	1100 Volts
7	Insulation	XLPE
8	Maximum conductor temperature at rated current.	90°C
9	Maximum conductor temperature during short circuit under hot condition	250°C
10	Inner sheath	Extruded PVC inner sheath
11	Filler material	If used, shall be compatible with other materials of cable construction
12	Armouring	Single layer galvanized steel round wire/ flat strip armoured.
13	Overall serving (outer sheath)	Anti rodent and anti termite extruded black FRLS grade PVC sheath (Type ST-2)
14	Embossing on the cable	Cable shall be embossed / printed on the outer sheath at every 1 m. length as under :1.1 kV, PVCA/XLPE, conductor material, No. of core and size of cable, sequential marking for the metered length of cable, make and year of manufacturing

41.Schedule item no. A-78

Supply, erection, testing & commissioning of GI Wire 8/10 SWG

The work covers Supply and erection of Hard drawn 8 SWG GI Wire for earthing. The work shall be done in an approved manner as per the site conditions and instructions of field Engineer.

42.Schedule item no. A-68

Supply, installation, testing & commissioning of HDPE Pipe 110 mm Nominal Dia as per IS-4984-1995.

Supply, installation, testing & commissioning of HDPE Pipe 110 mm nominal dia & laying of HDPE (High Density Poly Ethylene polymers) pipe of Material Grade- PE 63 grade, IS 4984 Resistance to chemicals- Exceptional resistance to all external and internal corrosion. Resistant to electrolytic corrosion. Specified base density- 940 to 958kg/mtr³, Size-Supply of HDPE pipe outer diameter 63 mm, wall thick Min.3.0 mm & Max 3.5 mm.

Indian Standards - IS-4984, IS 14151, IS 14333, IS 14930 (part2), IS 14885, IS 16098 (part2).

43.Schedule item no. A-67

Supply & laying of GI pipe Class B, ISI marked under road /Clamping with erecting pole or wall as per technical specification & drawing for passing cable.

Supply & laying of GI pipe Class B, ISI marked under road /Clamping with erecting pole or wall as per technical specification & drawing for passing cable of dia 50-63mm.

This item shall be in conformity to IS 5613/Pt.I Sec. 1 & 2/1985 (Latest Version). GI pipe shall conform to IS 1239/Pt.I/1990 and fittings shall conform to IS 1239/Pt.II/1992(Latest Version).

44.Schedule item no. A-69

Supply and laying of RCC half round pipe 150 mm ID & 1 mtr length.

The contractor shall supply half Round RCC pipe of 150mm inner dia. and 1 Mtr in length as per given description. The internal surface shall have a smooth finish without any bulge or projections to avoid damage to the cable.

Internal dia.	External dia.	Thickness	Approx. Weight	Approx. Steel Weight
150mm	184 mm	25 mm	14.5 kg	240 gm

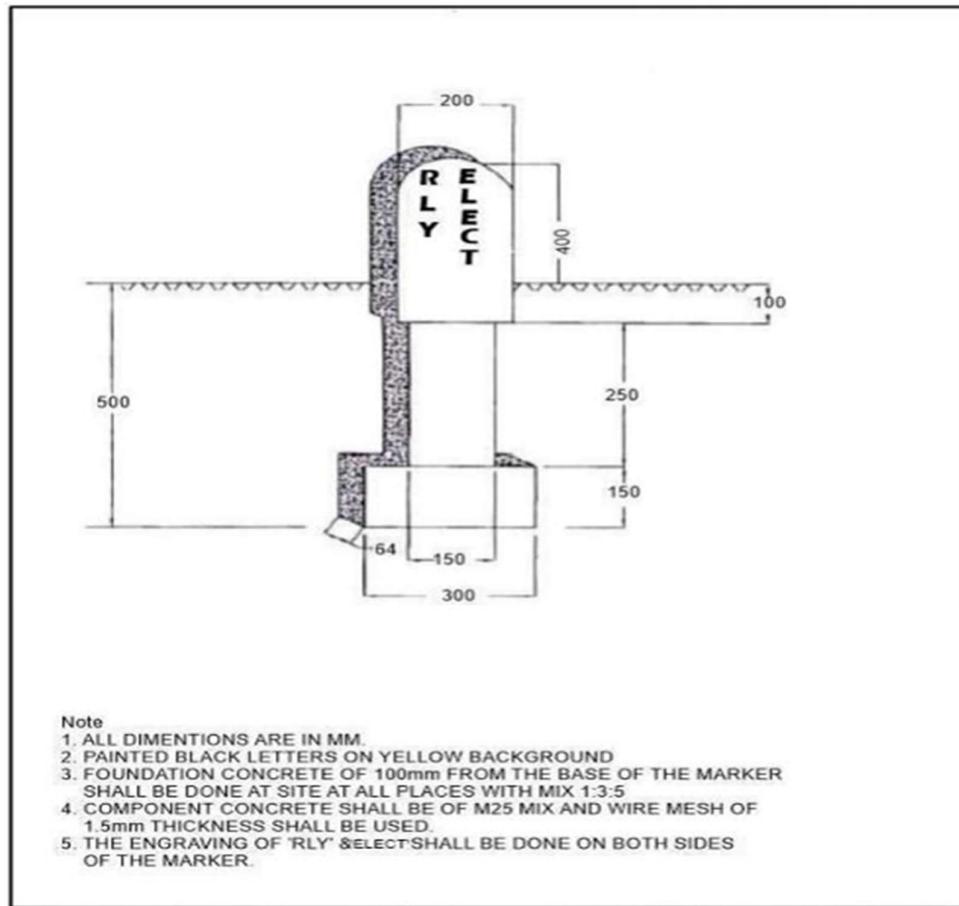
Laying of Pipe - Half round pipes shall be laid above cables for mechanical protection on laid cables in the existing trench. After doing this the trench can be filled up with soil available thereby.

If any damage done, contractor will make good the same on his own cost. The cost of damage will be decided by Railway.

45.Schedule item no. A-71

Supply, erection of RCC Type Cable route marker with cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) of size 60 cm X 60 cm at the bottom and 50 cm X 50 cm at the top with a thickness of 10cm including inscription duly engraved as required.

The rate includes casting and fixing of cable route marker as per drawing (attached below) at a distance of approx. 50 mtrs or as per site requirement along the trench and at places where the cable route has taken diversion as per instruction of site Engineer. This includes casting of foundation at site and fixing of the marker in the foundation made earlier at site as per railway directives and specifications. This also includes proper curing of the structure. All materials required for this like cement, sand, 15 mm chips and steel rod of ISI marks should be supplied by the tenderer.



46. Schedule item no. A-72

Supply & Erection of RCC Warning Cover and refilling the cable trench in an approved manner.

The price shall cover supply, erection testing commissioning of **RCC Warning Cover and refilling the cable trench** of size 450mm X 175mm X 37mm (18" X 7" X 1.5") completely. After that it shall be refilled properly upto the ground surface keeping a crown of 150mm (6") above the ground level.

47. Schedule item no. A-80

Providing & erecting Hot dipped Galvanised Perforated type cable tray manufactured from 16 SWG (1.6 mm thick) GI sheet of 300 mm width & 100 mm height comprising all required standard accessories.

The price shall cover cost of design, manufacturing, supply, transportation and unloading to site including erection of hot dipped galvanized (7 Tank Process) (Thickness of galvanization ≥ 75 microns) Perforated type cable tray manufactured from 16 SWG (1.6mm thick) GI sheet of 300 mm width & 100 mm height comprising all required standard accessories. Providing & erecting cable tray complete with necessary coupler plates & hardware shall be in approved manner.

The work involves the connecting and fixing arrangements with coupler plate, fasteners etc. as per site requirement. The perforated cable trays should be of standard length 2500 mm. The sample of cable tray shall be got approved by Sr. DEE (G) BSL before supply.

48.Schedule item no. A-73

Supply of Polyolefin cable channel of size width 240/340 mm, height 155/230 internal/external length 1 meter produced of polyolefin with fire protection class K-1 in accordance with DIN 53438 part II, channel attachable to each other with male female swallowtail connectors and having suitable detachable cover.

Supply and laying of Polyolefin cable channel of size width 240/340 mm, height 155/230 internal/external length 1 meter produced of polyolefin with fire protection class K-1 in accordance with DIN 53438 part II, channel attachable to each other with male female swallowtail connectors and having suitable detachable cover in an approved manner as per instruction of field engineer of following specifications-

- The Thermal characteristics - Continuous thermal stability from -10⁰C to 70⁰C as per IS 9000 – part 2 & part 3: 1977.
- The Electrical characteristics - Dielectric strength (In kV; Minimum breakdown voltage): 48 kV
- As per IEC 60243-1:2013
- The Mechanical characteristics - Load Bearing Capacity : Upto 12 KN

49.Schedule item no. A-21

Supply, erection, testing & commissioning of USB Power charger HUB/Device enclosed inside the frame on the top, 5.2V DC / 8 Amp, 8 Ports (vertical) with reversible compability. Input Voltage: 110-290V AC, 1.5 Mtrs. Cable length, Blue coloured LED display for Current & Voltage at each port & smart chip for calibrating the Current required on each power port. Metal Holder attached with USB device to keep 8 Mobile Phone. Size 580mm X 400 mm X 2 mm thick.

The cost includes supply erection, testing and commissioning of Supply, erection, testing & commissioning of USB Power charger HUB/Device enclosed inside the frame on the top, 5.2V DC / 8 Amp, 8 Ports (vertical) with reversible compability. Input Voltage: 110-290V AC, 1.5 Mtrs. Cable length, Blue coloured LED display for Current & Voltage at each port & smart chip for calibrating the Current required on each power port. Metal Holder attached with USB device to keep 8 Mobile Phone. Size 580mm X 400 mm X 2 mm thick.

50.Schedule item no. C-3

Supply, erection, testing and commissioning of Heavy duty Sluice Valve 50 mm dia as per IS specification.

Supply, erection, testing and commissioning of 50 mm dia, Sluice valve as per site condition of Cast iron double flanged with gun metal faced and gun metal nut, manganese forged/bronze spindle cast iron hand wheel to suit the delivery outlet of the pump. It shall comply to IS 780 of 1984 or latest.

51.Schedule item no. C-4

Supply, erection, testing and commissioning of Heavy duty Non Return Valve 50 mm dia as per IS specification.

Supply, erection, testing and commissioning of 50 mm dia Non-Return Valve as per site condition of Cast Iron double flanged with gun metal faced seating and flap, removable cast iron inspection cover to suit the delivery outlet of the pump together with bypass arrangement with suitable cock for priming the pump. It shall conforming to IS 5312 or latest.

52.Schedule item no. C-5

Supply and erecting ISI mark "C" Class (Heavy Duty) G.I. pipe of 50 mm dia and 75 / 80 mm with coupling/accessories.

Supply, erection, testing and commissioning of GI Pipe 50 mm dia 'C' Class (3 Mtr in length each) threaded at both ends with Heavy Duty Couplings fixed at one end, the heavy duty coupling should be of 75 mm long fully threaded as per I.S.1239. Erection of GI pipe shall be done in an approved manner as per the instructions of site Engineer.

53.Schedule item no. C-6

Supply, erection, testing and commissioning of GI C- class Bend 50 mm dia

Supply & erection of 50 mm dia GI Bend 'C' class as per instruction of field supervisor. GI Bend shall be with ISI mark and Hot dip galvanized.

54.Schedule item no. C-7

Supply, erection, testing and commissioning of M.S. supporting clamps for 50 mm dia G.I. pipe

Supply, erection, testing and commissioning of Heavy Duty M.S. Supporting clamps made from 50x6 mm MS flat for erection of GI pipe along with GI nut bolts, washer etc. as per instruction of field Engineer and shall be Hot dip galvanized.

55.Schedule item no C-8

Supply, erection, testing & commissioning of Flat Flexible Copper cable, 3 core X 4 sq.mm for submersible pump & starter connection.

Supply, erection, testing and commissioning of water proof PVC insulated and sheathed flat flexible 1100 V grade Copper Cable conforming to IS: 694/1990 for the motor supply connected through a water tight sealing device and suitably clamped at fixed intervals with column pipe assembly.

56.Schedule item no. C-9

Supply, erection, testing & commissioning of Pump guard Current operated type Should have protection against dry run, single phase, over load, over voltage, under voltage, reverse phase protection etc. (OR) pump up to 20 HP three phase suitable to operate in 415 volts 50 Hz AC supply.

Supply Voltage

System 100-120/220-240/380-440V AC $\pm 20\%$, 48-63 Hz

Auxiliary 100-120/220-240VAC $\pm 20\%$, 24V DC+10%-15%

Output Relay Contact

Output Relay Contact - 2 CO

Trip Setting

Phase to phase unbalance - 50% of Motor Current (Fixed)

Under current (Dryrunning) - 40% to 80% of set current

Overload - As per inverse time characteristics

Trip Time Delay

On phase failure - 4 Sec $\pm 1\%$ Sec (Fixed)

For overloading - As per Inverse Time Characteristics 2/5/10 Sec. (Selectable)

Resetting

Resetting - Auto / Manual

Note: 1) Wherever not specified Contact Rating: 5A @ 230 V AC (resistive)

2) Pump guard Current operated type Should have protection against dry run, single phase, over load, over voltage, under voltage, reverse phase protection etc.

57.Schedule Item No. A-91, A-92, C-2

Supply, erection, testing & commissioning of LT Outdoor type panel with double door powder coated with locking arrangements as per IEC 61439 consisting of 2 Nos x 630 4P ACB as I/C & 1 Nos x 630 A 4P Bus coupler ACB, 8 Nos x 250 A, 2 Nos x 400 A for O/G with 10" HMI, ELR with CBCT for each MCCB, Power quality analyser, DLMS Compliance 3 Ph KWH meter, 12 Nos x indicating lamp set (RYB), copper busbar, & other associate accessories. All MCCB are Microprocessor based (completely wired with suitable communication cable to fetch data from each compartment functional Unit (ACB/MCCB/SFU etc) / Multifunction Meter)

Supply, erection, testing & commissioning of Outdoor type LT panel as per IEC 61439 with powder coated with locking arrangement consisting of 2 Nos x 250 A 4P MCCB, 4 Nos x 125 A 4P MCCB, 20 Nos x 63 A 4P MCCB as O/G with 10" HMI, ELR with CBCT for each MCCB, Power quality analyzer, DLMS compliance 3 Ph KWH meter, copper bus bar, 26 Nos x Indicating lamp set (RYB), and other associate accessories complete. All MCCB are Microprocessor based (completely wired with suitable communication cable to fetch data from each compartment functional Unit (ACB/MCCB/SFU etc) / Multifunction Meter)

Supply, erection, testing & commissioning of Indoor type LT panel as per IEC 61439 with double door powder coated with locking arrangements consisting 1 Nos x 12.5 HP VFD and 1 Nos x 63 A 4P MCCB, with ELR & CBCT for each MCCB multifunction meter, indication lamp, copper busbar, & other associate accessories. All MCCB are Microprocessor based (completely wired with suitable communication cable to fetch data from each compartment functional Unit (ACB/MCCB/SFU etc) / Multifunction Meter)

This specification covers design, manufacture supply, erection, testing and commissioning of cubicle type sheet steel floor mounting, LT panel board for distribution of power.

SYSTEM PARTICULARS:-

RATED VOLTAGE	440 VOLT 3 PHASE 4 WIRE
RATED FREQUENCY	50 HZ.
MAX. AMBIENT TEMPERATURE	55° C
IP rating	Minimum IP 55
Compliance	IEC 61439

1. SCOPE

- This Specification covers the design, engineering, manufacture, testing at manufacturer's works before dispatch, packing, forwarding and delivery, supervision of erection, testing at site and commissioning of cubicle type indoor, floor mounted, dust and vermin proof main free standing 415V LT distribution panel / sub distribution panels as per the rating and configuration stated in BOQ complete with all accessories such as protection relays, control wiring, auxiliary contacts, indicating lamps etc.

2. STANDARDS

- In general, the equipment shall conform to all relevant IS/IEC standards. In case of any contradiction between the IS/IEC and this specification, the more stringent of the two shall apply.

STANDARD	DESCRIPTION
IEC 61439	Low-voltage switchgear and control gear assemblies
IEC 60228	Conductors of insulated cables
IEC 60255	Measuring relays and protection equipment
IEC 60529	Degrees of protection provided by enclosures (IP Code)
IEC 60831	Shunt power capacitors of the self-healing type for AC systems having a rated voltage up to and including 1000 V
IEC 60871	Shunt capacitors for AC power systems having a rated voltage above 1000 V
IEC 60898	Electrical accessories – Circuit-breakers for over current protection for household and similar installations
IEC 60947-6-1/EN 60947-6-1	low-voltage and control gear Multiple function equipment. Automatic transfer switching equipment.
IEC 60947-2/EN 60947-2	Specification for low-voltage switchgear and control gear circuit breakers
IEC 60947-1	Specification for low-voltage switchgear and control gear. Contactors and motor- starters. Electromechanical contactors and motor-starters.
IEC 61008	Residual current operated circuit-breakers without integral over current protection for household and similar uses (RCCBs)
IEC 62262	Degrees of protection provided by enclosures for electrical equipment against mechanical impacts(IK code)
IEC 61641	Enclosed low-voltage switchgear and control gear assemblies - Guide for testing under conditions of arcing due to internal fault.
IEC 61869/ BSEN 61869	Instrument transformers
IS 13779	ac Static Watt-hour Meters, Class 1 and 2
IS 13947-5-2	Low-Voltage Switchgear and Control gear, Part 5: Control Circuit Devices and Switching Elements, Section 2: Proximity Switches
IS 13947-5-1	Low-Voltage Switchgear and Control gear, Part 5: Control Circuit Devices and Switching Elements, Section 1: Electromechanical Control Circuit
IS 13947-4-1	Low-Voltage Switchgear and Control gear : Part 4 - Contactors and Motor-Starters
IS 13947-3	Low voltage switchgear and control gear, part 3: switches, disconnectors, switch-disconnectors and fuse combination units
IS 13947-2	Low-Voltage Switchgear and Control gear, Part 2: Circuit Breakers
IS 13947-1	Low-voltage switchgear and control gear, Part 1: General rules
IS 5553	Reactors – Specification

3. SWITCHBOARD CONSTRUCTIONAL FEATURES

- The LV switchboards should be certified for compliance with IEC 61439-1 and 2 standards. Their construction, including switchgear, control gear, busbar supports, busbar orientation, and busbar links, shall be identical to the assembly that has compliance tested as per standard.

- The LV switchboards shall be manufactured in accordance with switchgear OEM design guidelines, ensuring full compliance with IEC 61439 standards. The type test certification shall be done by OEM and franchisee shall carry out assembly as per type tested design. To ensure compatibility, both the panel design and the switchgear components (ACB/MCCB/Control gear etc) should be from same OEM. The type designation and certification label on the panel shall prominently feature the OEM's name.
- Manufacturing / Assembly should be done at authorized franchisee works proposed by the switchgear OEM and an authorization certificate must be submitted prior to order finalization.
- The General Arrangement (GA) prepared by the franchisee must be verified by the OEM, who will authenticate it with their signature and stamp.
- The OEM shall submit type test certificates/reports from an independent test lab (i.e., ASTA, ERDA, or CPRI) for design verification via methods and tests specified in Annexure D of IEC 61439, based on the feeder Incomer's rating, at the time of drawing approval.
- The Switchboards shall be metal clad totally enclosed, floor mounted freestanding, fully compartmentalized bolted type of modular extensible design suitable for indoor mounting.
- All covers and doors provided shall offer adequate safety to operating persons and provide ingress protection as per BOQ.
- Switchboard panels and cubicles shall be fabricated with load bearing members with not less than 2 mm and shall be folded and braced as necessary to provide a rigid support for all components. The doors and covers shall be fabricated from CRCA sheet steel of thickness not less than 1.6 mm.
- The front of the compartment shall feature a concealed hinged door with a key-operated metal camlock, providing secure locking facilities that enhance safety, improve aesthetics, and increase security.
- All doors and covers shall also be fully gasketed with EPDM gaskets to prevent any ingress of dust and vermin.
- Switchboards shall meet the minimum ingress protection (IP) requirements:
 - Indoor applications: IP42
 - Outdoor installations: Min IP55
- There should be generous availability of space for ease of installation and maintenance with adequate safety for working in one vertical section without encountering any live parts.

Note – 1) All incoming and outgoing MCCB should be 4 pole microprocessor based with adjustable short circuit, overload, ground fault and earth leakage protection.
2) All communication loop from meters & switchgears should be terminated in marshalling box with space to mount converter in future.

4. SWITCHBOARD COMPARTMENTALIZATION

- For compartmentalized switchboards, separate totally enclosed compartments shall be provided for horizontal bus bars, vertical bus bars, ACBs, MCCBs and cable alleys.
- Hinged lockable doors for each separate compartment shall be provided and duly interlocked with the breaker in "ON" and "OFF" position.

- For all Circuit Breakers separate and adequate compartments shall be provided for accommodating instruments, indicating lamps, control contactors and control MCB etc. These shall be accessible for testing and maintenance without any danger of accidental contact with live parts of the circuit breaker, bus bars and connections.
- Cable compartments shall be of adequate size for easy termination of all incoming and outgoing cables entering from bottom or top.

5. SWITCHBOARD BUS BARS

- The ratings and configuration of bus bars shall be as per type tested design of OEM.
- The bus bars shall be extensible on either side of the switchboard.
- The bus bars shall be supported on non-breakable, non-hygroscopic SMC insulated supports at regular intervals, to withstand the forces arising from a fault level as stipulated in schedule of quantities. They should have minimum Comparative Tracking Index (CTI) of 600V (as per IS 2824).
- All bus bars shall be color-coded.
- Minimum clearances between phases / live parts shall be 25mm and phases/ live parts/ neutral to ground shall be 19mm except on the equipment terminals.
- Busbar shall be of copper only. The current carrying capacity shall be as per IEC 61439.

6. EARTHING

- One earthing terminal shall be provided on each side of switchboard.
- An earth bar size must be at least 1: 6 x 50 sq mm Aluminium (same can be provided with GI or Cu also, if required). Provision for arrangement for 2: 6x50 sq mm shall be possible, if required.
- The earth bar shall be electrically continuous and shall run the full extent of each board.
- Door earthing shall be provided for all doors.

7. INSTRUMENT ACCOMODATION

- Instruments and indicating lamps shall not be mounted on the Air Circuit Breaker Compartment door. A separate and adequate compartment shall be provided, and the instrumentation shall be accessible for testing and maintenance without danger of accidental contact with live parts of the Switchboard.
- For MCCBs, instruments and indicating lamps can be provided on the compartment doors.
- The current transformers for metering and for protection shall be mounted on the solid aluminium bus bars/cables (for wire feeders) with proper supports.

8. WIRING

- All wiring for relays and meters shall be with PVC insulated copper conductor wires.
- The wiring shall be coded and labelled with approved ferrules for identification.
- Runs of wires shall be neatly bunched and suitably supported and clamped.
- Means shall be provided for easy identification of wires.
- Identification ferrules shall use at both end of wires.
- All control wires meant for external connections are to be brought out on a terminal board.

9. CABLE TERMINATION

- Knockout holes of appropriate size and number shall be provided in the Switchboard in conformity with the location of incoming and outgoing conduits/cables.
- The cable terminations of the Circuit Breakers shall be brought out to terminal cable sockets suitably located.
- The cable terminations for the MCCB's shall be brought out to the rear in the case of rear

access switchboards.

- Removable gland plates shall be provided for power and control cables. The gland plates shall be 3 mm thick and for single core cables shall be of non-magnetic material.

10. PAINTING AND FINISHING

- Sheet steel used in the fabrication of switchboards shall undergo a rigorous cleaning and surface treatment seven tank process comprising of alkaline degreasing, descaling in dilute sulphuric acid and a recognised phosphating process after which a coat of primer paint with the final paint shall be applied over the treated surface. Final paint coat of oven baked powder coating, of minimum 70-micron thickness shall then be provided.

11. NAME PLATES AND LABELS

- Suitable engraved black letters on white nameplates and identification labels of metal for all Switchboards and Circuits shall be provided. These shall indicate the feeder number and feeder designation.

12. TESTING AND INSPECTION

- The switchgear shall be completely assembled, wired, adjusted and all routine tests as specified by the applicable standard code shall be conducted.
- Visual Inspection and Dimensional Check.
- Verification of Bill of Material.
- Check of conformity with wiring diagrams and plans.
- Functional test for control circuits.
- Tightness of screwed/bolted connections.
- Electrical & mechanical operational checks.

Note –

- 1) A base channel of 50 mm x 50 mm fabricated out of 3 mm thick hot rolled sheet steel galvanized shall be provided to prevent corrosion of the sheet steel cubicles and facilitate cleaning of floors. All switches shall be operatable from front.
- 2) The LT panel shall be floor mounting type comprising of following items suitably on ½ ft. height foundation or Iron angle frame.

SWITCH FUSE UNITS :- Air-Brake, Heavy Duty SFU switch with HRC fuses for incoming and outgoing supply shall be provided Switch fuse unit shall be confirming to IS 13947 pt-3 1993 or latest and HRC fuse confirming to IS 13703 – PT-1&2 -1993 or latest. All SFU should be 4 pole. The panel board shall be provided with following Items:-

CHANGE OVER SWITCH- 4 pole, 415 volt onload changeover switch as per IS 13947 (Pt-I&III).

MCCB- MCCB- General Scope

- The circuit breakers shall comply with the requirement of IEC 60947, IS/IEC 60947-2. MCCBs shall be suitable for operational voltage of 3 phase 415 Volts AC 50/60 HZ supply.
- The circuit breaker shall comply with the isolation function requirement of IEC 60947-2, IS/IEC 60947-2
- MCCBs shall be suitable for 3 Phase 690 Volts AC 50 HZ supply. Rated insulation voltage (Ui) 800 V AC and rated Impulse voltage 8 KV.
- They shall be of utilization category A.
- Reference ambient temperature: 40°C.
- MCCB should not have any deration up to 50°C.
- No rating derations in MCCB till 2000-meter altitude.

- The circuit breaker shall provide IP 2X protection for insulation between the front cover and internal power circuits to avoid any accidental contact with the live main current carrying path with the front cover open.
- All products should have BIS certification.
- MCCBs should have $I_{cs}=I_{cu}$ with Minimum fault level as specified in SOQ.
- MCCBs should Microprocessor based releases with LSIG protection. MCCBs shall be suitable for 3 Phase 415 Volts AC 50/60 Hz supply with rated insulation voltage (U_i) of 800VAC and rated Impulse voltage (U_{imp}) of 8 kV.
- The MCCB shall have rated ultimate short circuit breaking capacity (I_{cu}) equal to rated service short circuit breaking capacity (I_{cs}) as per the attached table at 415 volts AC.

	Up to 100A	101- 160A	161-630A
I_{cu} (kA)	25	25	36/50
I_{cs} (kA)	25	25	36/50

- MCCBs shall be designed for both vertical and horizontal mounting, as per recommendation of manufacturer, without any adverse effect on electrical performance.
- True-RMS sensing should be present.
- It shall be possible to supply power either from the upstream or downstream side i.e. there should be no Load-line bias.
- MCCBs shall provide double insulation between the live power parts and the front part of MCCB.
- Manufacturer must furnish Type test certificates of all the models of MCCBs from acceptable, NABL accredited and reputed laboratories to prove the same, if so desired by Engineer.
- The double break mechanism should have Contact Locking Dead-Centre (D/C) mechanism.
- In case of 3 ph, 4 wire system, 4 pole MCCBs to be used.
- All microprocessor based MCCB, the release must have Thermal memory as a standard feature, and there should be provision to defeat Thermal Memory.

Construction & Operation

- MCCB should be supplied along with Extended Rotary handle for interlocking so that it should be possible to ON/OFF MCCB without opening the panel.
- All poles shall operate simultaneously for circuit breaker opening, closing, and tripping.
- MCCBs shall be actuated by a handle that clearly indicated the three positions: ON, OFF and TRIP.
- To ensure suitability for isolation complying with IEC 60947-2.
 - The operating mechanism shall be designed such that the handle can only be in OFF and TRIP position if the power contacts are all separated.
 - The MCCB knob should indicate the true position of the contacts.
 - The MCCB should be provided with disconnecting functions with positive isolation features in both OFF and TRIP position.
- MCCBs shall be equipped with a “push to trip” button in front to test operation and opening of the poles.
- The design & operating principal of MCCB should be of current limiting design with extremely low trip times under short circuit conditions and low thermal stress with compact size and independent manual operation.

- All MCCBs above 63A shall be provided with Silver Plated Copper Spreader Links for enhancing termination capacity.
- Operating mechanism of the MCCB shall be quick make, quick break and trip-free type.
- Protection setting can be adjusted from front.
- The release should be shrouded from the front to prevent unauthorized access.

Protection Functions for MCCBs

- Microprocessor-based release the O/L adjustment settings should be from 25% - 100 % and S/C for 1.5 to 12 times.
- Variable earth fault settings should be preferred as per manufacturer's claims.
- Electronic trip units shall comply with the requirements as specified in Appendix-F (EMC/EMI Compatibility) of IEC 60947-2 or EN 60947-2.
- There should be provision of Thermal Memory ON-OFF from the release front fascia itself.
- MCCBs shall be designed to enable safe on-site installation of auxiliaries such as voltage releases (shunt and under voltage releases) and indication switches as follows:
 - They shall be separated from power circuits.
 - All electrical auxiliaries shall be of the snap-in-type.
 - The addition of auxiliaries shall not increase the volume of the circuit breaker.
- The degree of protection of MCCBs should be IP54 (with extended Handle)
- MCCBs should have extended rotary operating handle for easy operation. Door interlock & door defeat feature should be available with extended rotary handles.
- Phase barriers should be an integral part of the MCCBs.
- MCCBs of 63A and above shall be provided with Spreader Links for enhancing termination capacity.
- The MCCB feeder should be equipped with adjustable earth leakage sensing device 0.3A -30A & CBCT and Shunt trip.

Note – (1)All incoming and outgoing MCCB should be 4 pole microprocessor based with adjustable short circuit, overload, ground fault (LSIG) and earth leakage protection (ELR with CBCT for each MCCB required).

(2) Electrical interlocking between MCCB to be done.

MCB:- Miniature circuit breaker 'C' Class of 10 kA breaking cap. for outgoing supply. MCB as per IEC60947-2.

Contactor :- 4 Pole power contactor, AC1 Rating 440 Volt AC 50 Hz. Conform to IS /IEC 60947-4-1

MCB DB- MCB Distribution board consisting with various capacity of MCB's as in schedule. MCB shall be 'C' Class, of 10 kA breaking capacity and conforming to IEC609+47-2 with latest amendments. MCB shall be with ON/OFF indication, IP 20 degree protection,. MCB shall be having bi-connect terminals, load-line reversibility and with energy limitation class –III features.

The MCB Distribution board should conforms to IEC61439-3 standard. It shall be provided with cements spill protection and side locking DIN bar interchangeable door.

ACB- ACB shall be microprocessor based EDO type having breaking capacity 50 kA with following features.

- 4 pole conforming to IS/IEC- 60947 (Part 1 & 2)
- High short time withstand capacity. $I_{cu}=I_{cs}=I_{cw}$ for 1 sec total selectivity.
- High mechanical and electrical operating life.
- Advanced micro-processor based protection release with LSING protection & type of fault indication.
- 50% and 200% neutral protection solution
- RoHS compliant.
- Inbuilt Electrical and Mechanical Anti-Pumping prevent multiple breaker closures due to persistent closing command
- CE marking.
- Arc-chute interlocking prevents the closure of breaker if arc-chute is missing or not properly installed.
- Smart-racking shutter interlock ensures breaker is switched off before racking out the breaker.
- Conforms to Glow wire Testing.
- .ACB Release should provide overload / Short Circuit/Instantaneous/Ground fault & Neutral current protection
IS/IEC 60947-2 & IEC 60947-2.
- Electrical Interlocking between ACB/Switchgears to be done.
- ACB release should give last 10 fault history.

Bus Coupler - It shall be similar to incomer switchgears and should be electrically and mechanically interlocked.

Protection - over load protection (phase wise) short circuit protection, reverse power over / under voltage & current, under / over frequency, earth fault protection with type of fault indication.

ELCB/ RCCB- It shall be 2 pole RCCB 16/25/40/63 A, electromagnetic type with 30 mA sensitivity with earth leakage trip indication complete as per specification with Metal enclosure It shall be Conforming to IS 12640-1/2000. It shall be erected in an approved manner as per site condition and instructions of field supervisor.

Residual Current Circuit Breakers: - The RCCB shall have conformance to IS 12640-1 / IEC 61008-1

- The RCCB shall be truly current operated and shall operate on Core Balance Current Transformer (CBCT) mechanism
- The RCCB shall have advanced neutral mechanism
- The RCCB shall have pollution degree 3
- The RCCB shall have minimum electric life of 10,000 electric operations
- The RCCB shall have terminal capacity of 35 sq. mm up to 63A, 50 sq. mm up to 100A
- The RCCB shall have IP20
- The RCCB shall have operating temperature -5 °C to +60 °C.
- The RCCB shall have a test button to check health of RCCB by creating artificial fault
- The RCCB shall have rated impulse withstand up to 6 kV
- The RCCB shall have no line load bias.
- The RCCB shall have bi-connect terminals for both bus bar and cable termination
- The RCCB shall give an indication for leakage fault when tripping
- The RCCB shall have rated conditional short circuit current of 10kA
- The RCCB shall have rated residual making and breaking capacity of 1kA

- The RCCB shall have flag indication for Earth Leakage Faults - The RCCB shall have a provision for padlock to prevent unauthorized access
- The RCCB shall have provision for mounting of accessories – Auxiliary Contact, Trip Alarm Contact, UV, OV, Shunt Release
- The RCCB shall be suitable for isolation
- The RCCB shall have safety shutter to avoid any wrong insertion of cable
- The RCCB shall have DIN clip on both the sides for easy removal of an RCCB from the DIN rail.

RCBO –

RCBO shall have conformance to IS 12640-2 / IEC 61009-1.

RCBO shall be of breaking capacity of 10kA.

RCBO shall not be line load biased.

RCBO shall have minimum electric life of 10,000 electric operations.

Single Phase RCBO of 6A-40A to be in 2 Modules size with a breaking capacity of 10kA.

The RCBO shall have separate indications for short circuit fault and earth leakage fault.

The RCBO shall trip on leakage fault of AC waveform consisting of pulsating DC along with transients and harmonics.

The RCBO shall have pollution degree 3.

The RCBO shall have rated impulse withstand of 6 kV.

The RCBO shall have IP20.

The RCBO shall have a test button to check health of RCBO by creating artificial fault.

The RCBO shall be suitable for isolation.

The RCBO shall have bi-connect terminals for both bus bar and cable termination.

The RCBO, up to 63A, shall have cable termination capacity of 35 sq mm for rigid cable & 25 sq mm for flexible.

The RCBO shall have safety shutter to avoid any wrong insertion of cable.

The RCBO shall have operating temperature -5 °C to +60 °C.

The RCBO shall have a provision for padlock to prevent unauthorized access.

The RCBO shall have provision for mounting of accessories – Auxiliary Contact, Trip Alarm Contact, UV, OV, Shunt Release.

The RCBO shall have DIN clip on both the sides for easy removal of an RCBO from the DIN rail.

ELECTRONIC KWH METER:- Electronic KWH meter, 3 phase, 4 wire, CT operated with unbalanced load and reverse protection for AC 415 Volt, 50 Hz supply This shall comply with Is 13779 Pt. I of 1972 and following features –

Instantaneous start, low power consumption, Meter shall record correct energy with same accuracy under reverse current connection. LED indication for current reversal tampering shall be provided. Phase available indication to be provided.

AMMETER- Digital type Ammeter 3 1/2 Digit LED display CT operated cap. as per panel requirement with necessary wiring and fixing accessories with selector switch.

VOLTMETER: Digital type Voltmeter 3 1/2 Digit LED display 0-750 volts with necessary wiring and fixing accessories with selector switch.

Multifunction Meter –

Features

- Accuracy Class 1.0, 0.5
- Input voltage measurement range 50-520 VAC
- Aux supply 80-300 VAC/DC
- CT secondary site selectable 1A / 5A
- Flush mounting 96 x 96 mm

- CT/PT site programmable
- V, A, F, PF, kW, kVA, Old energy, On and Run hours, site selectable kWh/ kVAh
- True PF or Displacement PF site selectable
- 3 line LED display
- With communication port RS485

Power Quality Analyzer –

- Bidirectional MFM with Datalog, LCD Display, RS485, 128 samples/cycle
- Class of accuracy : 0.5s
- Parameters : V, A, F, kW, KVA, kVA_r, kWh, kVA_h, kVA_r_h, PF(True & Displacement) , Run hr, On hr, Interrupts, Phase angle, Total Harmonic Distortion, Neutral current, Max Demand (with RTC) K Factor
- Export / Import
- Events with high-low Time stamp
- Individual Harmonics upto 31st order

INDICATING LAMPS :- LED type for outgoing and incoming supply separately.

WIRING -The internal control wiring of panel shall be done by FRLS 2.5 sqmm copper wire as per IS 694 as per ratings of connected switchgear in an approved manner. The internal connections shall be easily accessible during inspection and maintenance of the panel board. Sufficient space shall be provided for cable entering hole and cable gland plate at the bottom.

CABLE ENTRY: Provision of suitable cable entry through brass glands to connect the equipment to incoming and outgoing cables shall be made. The cable entry to terminal of transformer shall be provided with suitable glands to avoid mechanical damage to the cable insulation. The cable shall be easily accessible.

Distribution board -Distribution board shall be made of high quality CRCA steel sheet with surface finish power coated mat finish broken white distribution board double door & neutral link with box type terminal tin plated Electrolyte grade copper bus bar & phase link tin plated brass earthing link and wire set for internal wiring DB shall be with IP 65 protection.

ERECTION- The panel board shall be installed on cement concrete foundation and cement mortar ratio of 1:2:4 or fabricated stand of Iron angle frame as per site condition & requirement. Height of cement concrete foundation / angle frame shall be 1 feet.(1/2 ft below ground level and ½ ft above ground level). Fabricated Iron angle frame shall be of 40mm x 40mm x 4 mm size angle. In Outdoor type panel board top sheet shall be provided such as to protect the panel board from entering the rainy water as per the instructions of field Engineer. Panel board shall be charged with existing power supply arrangement. The work shall be carried out under the supervision of field Engineer.

Successful tenderer shall submit the General Arrangement Drawing of panel board and get it approved before execution of the work at site.

58.Schedule item no. A-40

Supply & erection of FRP junction box of suitable size having terminals and 1x16 A Cut out with Two Nos of entry glands.

Supply & erection of FRP junction box of suitable size having terminals and 1x16 A Cut out with Two Nos of entry glands.

The junction box should be water tight made of FRP of size 300 x 200 x 125 mm, 2.7 mm thick with electrically insulated body shock proof, connector leads and control equipped with 1

nos.16 amps cutout and rewirable fuse. The box should be of front door opening with rubber gasket to make it water tight. The junction box shall be vermin proof having rubber bushes at cable entry. The junction box shall be mounted on pole/ wall etc at the height of 1.50 mtrs or as per site condition by providing MS clamps of suitable size. Colour of junction box shall be got approved before erection. The junction box shall be erected in an approved manner as per the site condition and instructions of field Engineer.

Applicable standards by feature :

SR. No.	Feature	Relevant standards
1	General electrical enclosures	IS/ IEC 60947 -1 : 2004 (tested by CPRI)
2	Flameproof and explosion proof	IS 2148-2004 (for explosion protection)
3	Ingress protection (IP rating)	IS/IEC 60529-201 (for IP 65 protection)

59.Schedule item no. A-75

SETC of B Type earthing complete

Earthing shall be carried out as per IE Rules & conforming to IS 3043 or latest.

G.I pipe of 50 mm bore, 3.65 mm thickness, weight 5.17 kg/mtr length minimum, **2500 mm length** shall be used and buried vertically in ground 150 mm length should be kept above the ground level. G.I. pipe surrounding shall be filled with broken pieces of coal/charcoal and common salt layer alternatively of standard thickness. Earth resistance shall be less than 5.0 ohm.

G.I. Strip shall be connected to GI pipe with GI nut and bolt, washer etc. and another end shall be connected to main board/metallic body of installation in an approved manner.

G.I. pipe shall be drilled /chipped at suitable interval for watering arrangement. Sufficient water should be poured in earthing. The result should be taken in presence of railway representative and should be painted on board.

The G.I Pipe electrode shall be kept free from paint, enamel and grease. The GI strip of 25 x 3 mm size shall be provided from the main earth pit to main board/metallic body of installation in approved manner to carry faulty current safely.

The work shall be done in an approved manner as per site conditions as per the instructions of field Engineer.

1. Earthing shall confirm to following specification. For other details not covered in this specification. Indian Standard IS – 3043:1987 or latest shall be referred.

➤ Type: - Pipe earth electrode shall be provided for earthing.

➤ Arrangement: GI pipe shall be of medium class 50 mm dia not less than 4.0 Mtrs. in length confirming to relevant Indian Standard specification. GI pipe electrodes shall be cut tapered at the bottom and provided with holes of 12 mm dia drilled not less than 7.5 cm. from each other up to 3 mtrs. of length from the bottom. The top of pipe electrode shall be housed in a PCC (1:4:8) enclosure of size mentioned in drawing. The pipe electrode shall be buried in the ground vertically, with its tap nearly 15 cm below top of enclosure.

➤ Cast Iron cover hinged to a Cast iron frame having lifting arrangement shall be provided to cover the PCC enclosure as per attached drawing.

2. Location for earth electrode- Normally an earth electrode shall not be situated less than 1.5 mtrs. from any building. Care shall be taken that the excavation for earth electrode may not affect the column footings or foundation of the buildings. In such cases electrodes may be further away from the building. The location of the earth electrode will be such where the soil has reasonable change of

remaining moist as far as possible. Entrances, pavements and roadways are defiantly avoided for locating the earth electrode.

3. Artificial treatment of soil: - The earth electrode resistance shall be reduced, wherever required by artificial chemical treatment of soil. For this purpose, earth enhancing materials like most commonly used substances are sodium chloride (Common salt) mixed with soft cokes or charcoal in suitable proportion. When this treatment is resorted, the electrode shall be surrounded by charcoal /coke & salt. Arrangement for this treatment, wherever if required, should be as per drawing attached with this spec.

4. Size of earthing lead - Minimum size of main earthing lead shall not be less than 8 SWG / 25mm x 4mm G.I strip. The normal minimum cross-sectional area of an earth continuity conductor not contained within a cable or flexible cord shall be 12 SWG GI strip of 4 sqmm wire.

4.1 Method for connecting earthing lead to Earth Electrode: Earthing lead shall be connected to pipe earth electrode by connecting GI strip to a GI Strip Bus-Bar of size 6x25x150mm which is exothermically welded to the earth electrode. Arrangement for which is provided in drawing. All materials used for connecting the earth lead with electrode shall be of GI.

4.1.1 The earthing lead shall be securely connected at the other end to the main heard.

4.1.2 Funnel with wire mesh should be provided.

4.1.3 Loop earthing shall be provided for all mountings of main board or other metal clad Switches and distribution fuse board with not less than 12 SWG GI or 4 sqmm Alu. wire.

5. Precautions

5.1.1 The neutral conductor shall not be used as earth wire or vice versa.

5.1.2 Water pipes shall not under any circumstances to be used as earth continuity conductors.

6. Protection of earthing lead: The earthing lead from electrode onwards shall be suitable protected, wherever required, from mechanical injury by a 15 mm dia. GI, pipe in case of wire and by 10 mm dia medium class GI pipe in of strips portion of this protection pipe within ground shall be buried at least 30 cms. deep (to be increased to 60 cms. in case of road crossing and pavements). The portion within the building shall be recessed in walls and floors to adequate depth. No earth electrode shall have a greater ohmic resistance than 5 ohms.

7. Every individual earth shall be allotted a serial number. Following information shall be suitably written with white or yellow paint.

- a) Earth No. _____
- b) Individual earth resistance _____ ohms
- c) Overall earth resistance _____ ohms
- d) Date of test _____

Test report of earthing system (To be connected by earth Tester)

i) Individual Earth Resistance

Earth Electrode No 1 _____ ohm

Earth Electrode No 2 _____ ohms

Earth Electrode No 3 _____ ohms

ii) Overall Earth Resistance:

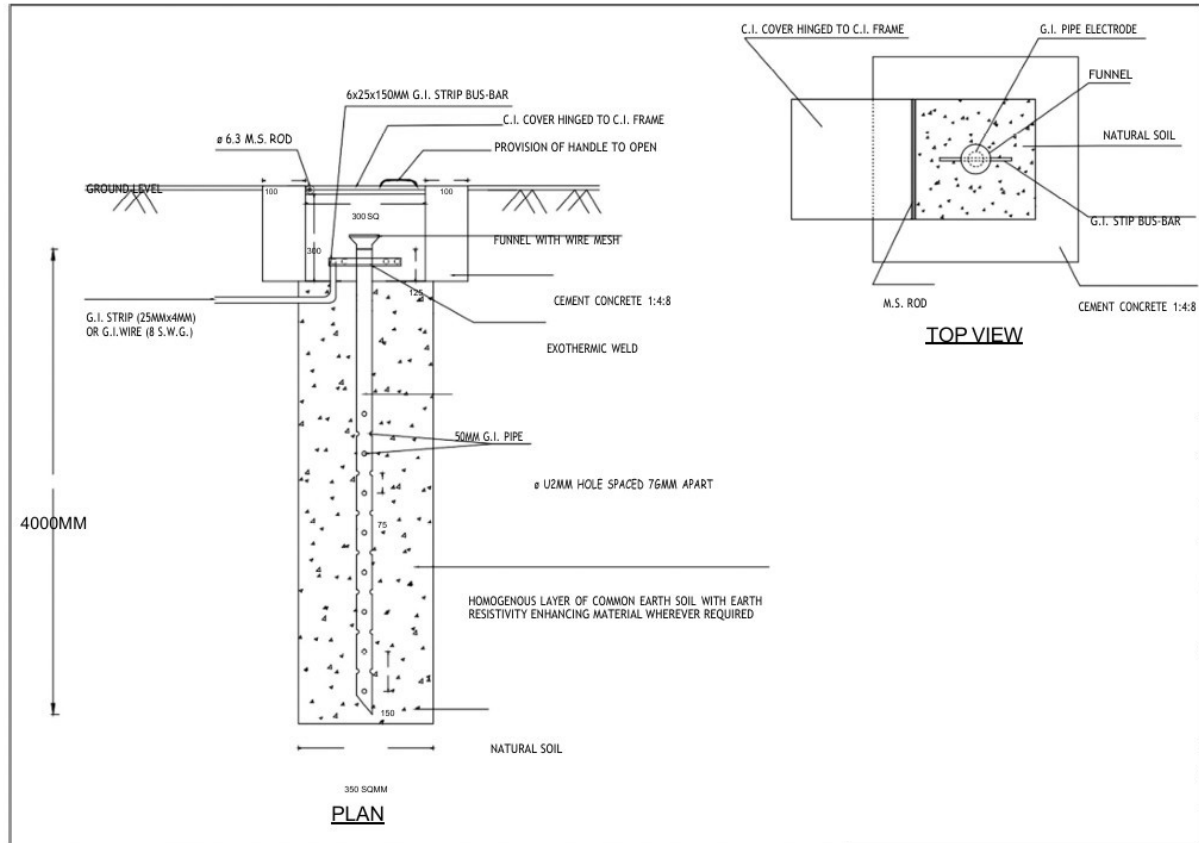
a) HT earth electrode _____ ohms

b) LT earth electrode _____ ohms

c) Neutral earth electrode _____ ohms

Note: Before energization of installation earthing system will have to be checked by contractor in presence of Sr. DEE/G/BSL's authorized representative/Site in charge and test report be submitted to Sr. DEE/G/BSL for his approval on above prescribed Performa.

Signature of Tenderer



60.Schedule item no. A-76

SETC of maintenance free earth as per RDSO specification no. RDSO/PE/SPEC/PS/0109-008 (REV'0') with approved earthing enhancing compound and exothermic welding.

The maintenance free earthing arrangement shall be done in accordance with RDSO specification no. RDSO/ PE/ SPEC/ PS/ 0109-2008 (REV'0'). For transformers, substation earthing, LT line equipment (**40 kA**), The IR value shall be less than 1 ohm., in normal soil resistivity upto 50 ohm-mtr, single electrode type earth system.

The earthing system includes earth electrode, installation of earth electrode in suitable pit size, construction of earth pit with cover for the installation, connection of earth electrode with equipotential earth bus and connection of equipment to equipotential earth bus. The work shall be done in an approved manner as per site conditions as per the instructions of field Engineer.

Concentric pipe earth electrode : (Current capacity 40 kA)

Primary conductor -

MS pipe with 40 mm diameter, class B, ISI mark as per IS-1239, length 3000 mm.

Secondary conductor -

MS pipe with 80 mm diameter, class B, ISI mark as per IS-1239, Length 3000 mm.

Current carrying capacity : The design of the electrode should be such as to have current carrying capacity in 40 kA (for 1 second).

S.N.	Current Capacity	Primary Conductor diameter	Electrode dimensions (dia. X length)
1	40 kA	40 mm	80 mm x 3000 mm

Dimensions and Nominal Mass of Steel Tubes — Medium (as per IS 1239)

Nominal Bore	Outside Diameter		Thickness	Mass of Tube
(mm)	Maximum (mm)	Minimum (mm)	(mm)	Plain End (kg/m)
40	48.8	47.9	3.2	3.56
80	89.5	88.0	4.0	8.36

Conductive mixture

- 1) For hermetically filling inside the cavity i.e. between secondary conductor and primary conductor, crystalline compound is to be injected in the electrode assembly. It is a combination of high conductivity metal alloys, copper and aluminium powder, conductive carbon/cement and bonding material etc. mixed in different portion. The mixture is forced (pressurized) filled inside the earth electrode in the paste form and after solidification of the same, the end caps are welded. The metal alloys shall help in conducting the current and conductive carbon gives anti corrosive property. Bonding material should provide strength to the mixture. Resistivity of the mixture shall be less than 0.2 ohm-meter. Resistivity shall be tested by making a 20 cm cube of the material and checking resistance across the opposite face of the cube.
- 2) Complete electrode shall be molecularly bonded by 99.99% pure, high conductivity copper on outer surface with copper coating thickness 300 micron or more.
- 3) Its surface shall be clean and free from any visible oxide layer or foreign material.
- 4) Copper bus bar of size 250 mm x 50 mm x 6 mm having electrical conductivity of 101% IACS, minimum 99.9% copper content shall preferably be exothermically welded to earth electrode or connected with the help of two number stainless steel nut bolts of appropriate size having 4 holes of 12 mm dia. (2 on each side) for connecting earthing conductor.

Minimum quantity of earth enhancement material to be supplies :

For 5'x5'x10' earth pit – min 75 kgs per pit

For 300 mm bore type earth pit – min 50 kgs per pit

The earth enhancement material shall be supplied in sealed, moisture proof bags. These bags shall be marked with manufacturers name or trade name, quantity, batch no & date of manufacture.

Warranty : 05 year against earth electrode for copper plating. If found faded or corrosive whole earthing is to be replaced by tenderer.

Note : Earthing Pit Box should be supplied & erected by contractor. Also necessary cementing work to be done by contractor to make site as original.

R.C.C. earth pit box

R.C.C. earth pit box of size 450 X 450 X 50mm including cover of size 450 X 450 X 4.5mm along with white wash. The work shall be done in an approved manner as per the instructions of field supervisor.

PVC Large Earth Pit

PVC Large Earth Pit Cover (10 inches) At Top (Dia) -252 mm At Bottom (Dia) – 334 mm Height – 260 mm (IS-3043).

Special Features -

- A durable round valve box ideal for commercial and residential installation.
- Round Valve box extra support for strong load
- Twist lock design cover
- UV Resistant
- Pipe cutouts for quick and easy installation
- Damper proof

➤ **Every individual earth shall be allotted a serial number. Following information shall be suitably written with white or yellow paint.**

- a) Earth No. _____
- b) Individual earth resistance _____ ohms
- c) Overall earth resistance _____ ohms
- d) Date of test _____

Test report of earthing system (To be connected by earth Tester)**i) Individual Earth Resistance**

Earth Electrode No 1 _____ ohm

Earth Electrode No 2 _____ ohms

Earth Electrode No 3 _____ ohms

ii) Overall Earth Resistance:

- a) HT earth electrode _____ ohms
- b) LT earth electrode _____ ohms
- c) Neutral earth electrode _____ ohms

Note: Before energization of installation earthing system will have to be checked by contractor in presence of Sr. DEE/G/BSL's authorized representative/Site in charge and test report be submitted to Sr. DEE/G/BSL for his approval on above prescribed Performa.

Signature of Tenderer

61.Schedule item no. A-74

Supply, fabrication, fixing and erection of MS work of miscellaneous size and for cable tray etc. including painting complete.

The price shall cover the cost of Work includes fabricating and erecting MS work, riveted, bolted or welded in built up sections including cutting, grinding and straightening, drilling, riveting, handling, hoisting and fixing in position etc. including applying a priming coat of approved steel primer etc. and duly painted with fine finish with contractors steel and materials. The work shall be done as per the site requirement in an approved manner and as per the instructions of field supervisor.

62.Schedule item no. A-77

Supply, fabrication, laying welding and connection of GI Flat of size 25x3 mm from earth pit with GI nut Bolt suitable size.

The work for Supply, fabrication, laying welding and connection of GI Flat/ strip of size 25x3 mm from earth pit with GI nut Bolt suitable size from main earth pit to main board/metallic body of installation. The work shall be done in an approved manner as per site conditions as per the instructions of field engineer. GI flat shall conform to IS-2062 & its latest amendments for steel & Galvanization as per IS-4759/1996 and its latest amendments.

63.Schedule item no. B-1

Dismantling the existing light, fan, bell, clock, independent plug point, wiring including circuit mains of all types along with accessories etc.complete.

The work involves the dismantling of existing light, fan, bell, clock, independent plug point, wiring including circuit mains of all types along with accessories etc. complete with fittings and other accessories including of all types with associate accessories from the site and depositing the same at the concerned depot by the contractor with necessary transportation for the shifting of material. The work should be carried out in an approved manner.

64.Schedule item no. B-2, B-3

Dismantling of cables with accessories.

Dismantling of existing old Cables of size 25 sqmm to 120 sqmm and handing over to depot incharge at their depot.

The work involves the dismantling the cables with accessories, cutting of rail /tubular poles with existing pole with brackets, clamps, insulators, stay from the cement concrete foundation and making the site clear by refilling the pits with excavated materials and bringing it to the ground level and RSJ, Tabular, Rail Pole provided on road. The dismantled Pole/Material shall be deposited in concern SSE(M) Depot with necessary transportation for shifting of material.

65.Schedule item no. B-4

Provision of dismantling of overhead tapping / OH power supply arrangement & transportation to depot.

Dismantling of Overhead tapping /OH power supply arrangement with accessories complete. The work involves dismantling of existing overhead tapping including GI wires of all sizes without damaging and making the coils in suitable sizes with all accessories and transportation/handing over to concern SSE(EM) depot.

66.Schedule item no. B-6

Dismantling of existing main Boards, wires, cables etc addition and alteration in existing arrangement with associated accessories.

The work involves the dismantling of existing main Boards, wires, cables etc addition and alteration in existing arrangement with associated accessories. The dismantled Pole/Material shall be deposited in concern SSE(EM) Depot with necessary transportation for shifting of material.

67.Schedule item no. B-8

Dismantling and Cutting the existing RSJ, Tubular, Rail Pole provided on road along with transportation of released pole to nearest OSM depot.

The work involves the dismantling the materials, electric pole /pipe with cables/wires/ Overhead lines, fittings with brackets, clamps, insulators, stay from the cement concrete foundation and making the site clear by refilling the pits with excavated materials and bringing it to the ground level. The dismantled Pole/Material shall be deposited in concern SSE(M) Depot with necessary transportation for shifting of material.

68.Schedule item no. B-5

Dismantling the existing pole above 6 m height with brackets, clamps, insulators, stay from the cement concrete foundation and making the site clear by refilling the pits with excavated materials and bringing it to the ground level along with transportation of released pole to nearest OSM depot.

The work involves the Dismantling the existing pole above 6 m height with brackets, clamps, insulators, stay from the cement concrete foundation and making the site clear by refilling the pits with excavated materials and bringing it to the ground level along with transportation of released pole to nearest OSM depot.

69.Schedule item no. B-7

Dismantling of outdoor/Indoor unit of 1.5/2 TR Split AC

The price covers all the work shall include dismantling of outdoor/Indoor unit of 1.5/2 TR Split AC with shifting all accessories in concern depot. The work shall be done in approved manner as per the instructions of field Engineer. All wire/cables, drain pipes and other accessories from existing AC should be removed before dismantling and making the site clear.

Dismantling should be done with the help of the proper material so that there should be no any damage to equipment. AC should be re-erected as per standard and in concern in SSE(M).

The dismantled Pole/Material shall be deposited in concern SSE(M) Depot with necessary transportation for shifting of material.

70.Schedule item no. A-41

Supply of all required material excavation and casting of cement concrete foundation/concreting in ratio 1:3:6 for above work.

Supply of all the required material for concreting, excavation of pit of required size in all type soils. Casting of cement concrete foundation in ratio 1:3:6 in accordance with the standard. The excess soil / material excavated shall be removed to safe place as per the directives of Railway representative. Work includes grouting of pole, casting of muffing to poles transformer plinth and foundation of various panel shall be done in 1:3:6 ratio. The cost of work also include, painting of muffing and plinth with cement paint of black color. The work shall be done under joint supervision of Railways representative.

71.Schedule item no. A-81

Design, manufacture,display, erection and installation of wall/hanging/floor mounting type LED illuminated sign/direction boards in half elliptical shape. The display sheet shall be of unbreakable 040 translucent polycarbonate sheet of 2 mm thickness. The text/graphics matter visibility shall not be less than 160 deg. The approved colour text and graphics shall be printed/router cut on monomeric calendered vinyl of 70 um thickness and shall be firmly pasted on display sheets. The mounting arrangement shall be hanging, wall mounting, ceiling mounting, pole mounting or floor mounting and as per site requirement. The signange shall have the integral mounting arrangements with sturdy structural frame and ACP cladding on the back side of the signage to avoid rusting and entry of dust. The LED board shall have uniform illumination with 4-8 W/sq.ft and brightness more than ambient light. suitable size end cap of 1.5 mm thick SS 304 should be provided. (The matter as per Rly requirements)

Elliptical Glow Signage End Cap

The End-Caps, whether full or half, shall be fabricated using injection moulded polycarbonate granules of 2mm thickness. The End-Caps will have a curved top side and a reflective

internal surface within an internal hollow, elliptical base on the bottom side. The shape of the end caps shall be either elliptical or parabolic. These end caps will be completely opaque to prevent the passage of light.

Half Elliptical Caps – PC

69mm x 210mmx14mm, R150mm corner R39mm & R10mm/
 84mm x 278mmx14mm, R194mm corner R39mm & R10mm/
 95mm x 350mmx14mm, R257mm corner R39mm & R10mm/
 107mm x 425mmx16mm, R318mm corner R39mm & R10mm/
 128mm x 563mmx16mm, R449mm corner R39mm & R10mm/

The internal face of the polycarbonate cap shall be cross ribbed with dimensions of 2mm x 3mm. Ribs of dimensions 2mm x 5mm, approximately 20mm inside and parallel to the external periphery shall be provided.

Eight locating pins shall be provided near the internal periphery of the end cap. These pins shall taper towards the collar of the end cap and should be used to firmly hold the 3mm translucent polycarbonate sheet in a parabolic/ elliptical curvature.

The cap is provided with 10mm high locating pins pointed projections of 4mm width and 2mm thickness placed at 4mm distance from the 25mm height collar along curvature on either side to support PC sheet after assembly. Ribs of 2mm thickness and 3mm height are projected from the internal face of the cap to provide structural strength on the span up-to 609mm length and up-to 331mm width.

A circular cut-out of diameter approximately 80mm shall be provided for illuminated branding. In case of non-branding, an opaque cap shall be provided.

Translucent material fitting provision shall be provided without any shadow on branding.

An oblong cut-out with a collar shall be provided for provision of projecting the image of desired text and graphics on the floor below.

In case of non-projecting, an opaque cap shall be provided. A capsule hole of 25mm x 16mm diameter is provided with a 5mm projection wall offset at a 5mm distance at the bottom of the concentric parabolic shape. The capsule hole is used to project the monogram through a projector (provisional accessory).

Riser buttons shall be provided along the internal ribs to block the cut-outs using an opaque sheet screwed through these buttons. These buttons may also be used to mount the LED projector when required.

Bottom internal end features a 25mm cylindrical projection with a centre hole of 4.5mm diameter, two vertical triangular bracings of 2mm thickness to fit the screws during assembly with aluminium extruded section. 3mm diameter, 5mm height projections at the top of cylindrical projections are provided to engage inside the aluminium extruded section and fix the bottom end of the cap. Similar cylindrical projections with four vertical triangular bracings of 2mm thickness are provided at the top internal end of the cap. A circular step cap of flange OD 15mm x 1.5 mm thick and cylindrical skirt OD 10mm x 8 mm is used to hide the outer cap screws.

A 2mm thick parabolic-shaped concentric 5mm height projection wall is provided at 34.79mm from both side parabolic curvatures and 56.4mm from the top flat face of the projected

collar .10 cylindrical projections with 8mm OD and 5mm ID are provided at a 5.99mm centre distance from the concentric parabolic shape wall along its perimeter.

A circular hole of 139.7mm diameter is provided at the top end of the concentric parabolic shape, which will be covered by a circular step cap of OD 142mm and step OD 139.7mm representing the client logo. Four rectangular openings of 18mmx2.5mm provided at the flat face of the cap.

Polycarbonate Cap with 246.2 x 163.7 mm outer dimension. With a 15mm x 1.5 mm collar around its periphery is fitted on both ends for interlocking of the parabolic section there should be three holes of dia 3mm x 15mm with tapered extrusion.

Die Casted Aluminium Cap full & half elliptical

The end caps, available in full elliptical, shall be manufactured using 8mm thick aluminium die casting. The top side of the end cap shall have a curve, and the bottom side shall have an internal hollow with an elliptical base that has a reflective internal surface. The end caps shall be completely covered with reflective vinyl to improve illumination.

425mm x 175mm x 20mm, R 316mm corner R 39mm /
 563mm x 215mm x 20mm, R 449mm corner 39mm /
 425mm x 106.7mm x 20mm, R 318mm corner R 39mm /
 563mm x 126.7mm x 20mm, R 449mm corner R 39mm /
 425mm x 150mm x 50mm, R 305mm corner 39mm /
 600mm x 110mm x 50mm, R 445mm corner R39mm /
 425mm x 190mm x 50mm, R 315mm corner R30mm /
 573mm x 230mm x 57mm, R 450mm corner R30mm /
 529mm x 308mm x 99mm, R 371mm Corner R40mm/
 862mm x 167mm x 60mm, R 707mm corner R39mm /
 859mm x 308mm x 67mm, R 734mm corner R30mm /
 889mm x 263mm x 25mm, R 775mm corner R 17.5mm/
 169mm x 915mm x 30mm, R 1246mm corner R17mm

Aluminium casted ellipsoidal top cap 5mm thick of height 57mm of curve radius R1124mm, cap width 190mm of curve radius R314mm, both ends with smooth curve radius of R23.5mm, 24.5mm wide 13mm deep projections to fit inside extruded aluminium sections at both ends of cap & at centre dia 6mm holes spaces at centre on 138 x 58mm area for fixing purpose. Aluminium casted 5mm thick ellipsoidal 529mm long bottom cap of height 99.2mm curve radius R78.4mm on both ends of 76mm height skirt, cap width 308mm of curve radius R370.6mm at skirt bottom & ends with smooth curve radius of R40mm, 13mm projected elliptical skirt top of radius R314.5mm & ends with smooth curve radius of R29.5mm, 24.5mm wide 13mm deep projections to fit inside extruded aluminium sections at both ends of cap & at centre dia 6mm holes spaces at centre on 138 x 58mm area for fixing purpose. Aluminium casted ellipsoidal top cap 5mm thick of height 57mm of curve radius R1124mm, cap width 230mm of curve radius R450mm, both ends with smooth curve radius of R23.68mm, 17.5mm wide 13mm deep projections to fit inside extruded aluminium sections at both ends of cap & at centre dia 6mm holes spaces at centre on 138 x 58mm area for fixing purpose. Aluminium casted 5mm thick ellipsoidal 692mm long bottom cap of height 98mm curve radius R78.4mm on both ends of 76mm height skirt, cap width 308mm of curve radius R528mm at skirt bottom & ends with smooth curve radius of R53mm, 13mm projected elliptical skirt top of radius R449mm & ends with smooth curve radius of R29.5mm, 17.5mm wide 13mm deep projections to fit inside extruded aluminium sections at both ends of cap & at centre dia 6mm holes spaces at centre on 138 x 58mm area for fixing purpose. /Aluminium casted ellipsoidal top cap 8mm thick of height 75mm of curve radius R1686mm, cap width 308mm of curve radius R735mm, both ends with

smooth curve radius of R29.5mm, 24.5mm wide 13mm deep projections to fit inside extruded aluminium sections at both ends of cap & at centre dia 6mm holes spaces at 50mm centre distance on 140 x 210mm area for fixing purpose. Aluminium casted 8mm thick ellipsoidal 1063mm long bottom cap of height 126mm curve radius R112.8mm on both ends of 101mm height skirt, cap width 415mm of curve radius R943mm at skirt bottom & ends with smooth curve radius of R80mm, 12mm projected elliptical skirt top of radius R735mm & ends with smooth curve radius of R29.5mm, 24.5mm wide 13mm deep projections to fit inside extruded aluminium sections at both ends of cap & at centre dia 6mm holes spaces at 50mm centre distance on 140 x 210mm area for fixing purpose. Aluminium die Casted cap top should have curvature of R 1123-1125 mm and internal hollow with wall thickness of 6-8mm with polished and premiered with metallic PU gloss lacquer coated. Internal 2 nos. cap holding socket shall be casted at both corners of cap to interlock with side profile. Bottom casted cap should have side curvature of - R78-79 / 112-113 mm and hollow of approx. 100 mm with internal 2 nos. cap holding socket shall be casted at both the corners of cap to interlock with side profile. Vertical rib should provide interlock polycarbonate sheet with inner pins support should be flushed with side aluminium profile. Cap should have a hole with dia 12mm to meet to pass the main supply wire.

Stainless Steel End Caps (Heavy Duty)

The end caps, available in both full and half sizes, shall be manufactured using 1.2 mm thick SS 304 material with an elliptical and parabolic shape. The top side of the end caps shall have a curved shape, while the bottom side shall feature an elliptical base with a reflective internal surface and internal hollow. The end caps shall provide complete opacity.

Half Elliptical Caps – SS

887mm x 158mm x 42mm, R 754mm corner R16mm /
 1173 mm x 203mm x 42mm, R 1003mm corner R16mm /
 1459 mm x 249mm x 42mm, R 1254mm corner R16mm /
 1748mm x 294mm x 42mm, R 1505mm corner R16mm /
 2032mm x 334mm x 42mm, R 1756mm corner R16mm /
 862mm x 167mm x 60mm, R 707mm corner R39mm /

SS 304 elliptical or parabolic cap should have approx. 20 mm vertical collar at comers of suitable hole to interlock with profile and structure. Square bracket at the bottom cap should provide an interlocking vertical square structure pipe and the top cap should be cut out to thoroughly pass the structure pipe with the provision of ventilation. All the above mentioned Caps shall be of Signage & Graphics / Kasturi Display / Verve Creation and Internal reflective Surfaces shall be provided.

Aluminum Profile

The top profile of the Elliptical Glow signage shall be constructed using extruded aluminium alloy (6063-T6) with a nominal wall thickness of 2mm and a width of approximately 170mm, 137mm, and 268mm. The profile shall be anodized to a thickness of 15 µm +/- 3 µm and have rounded edges. A reflective metallic silver PU particle coated granule layer shall be provided on the internal face of the profile.

The profile shall include slots of approximately 4.8mm and 15mm in width on one side to hold 2, 3 and 4mm thick polycarbonate sheets at an angle of 84° with corner radius R16mm to ensure a firm hold in elliptical and parabolic curvature. The inherent flexural tension property of the polycarbonate sheet shall maintain the Elliptical / Parabolic curvature. Circular slots for M6 self-tapping cheese head screws shall be included to fix the end caps.

The profile shall include slots of approximately 4.8mm and 15mm in width on both sides to hold 2, 3 and 4mm thick polycarbonate sheets at an angle of 84° with corner radius R11.75mm to ensure a firm hold in elliptical and parabolic curvature. A 10mm x 3mm slot shall be provided along the centre line of the top of the profile for press fitting the heat sink holding brackets with a circular

slot available for M6 self-tapping screws. A nut extension of 12mm to the rectangular slot shall also be included for additional support/fixing screws to firmly hold the heat sink holding bracket in place. The total height of the central projection shall be minimized to reduce obstruction to light illumination.

The Aluminium extruded ERMP (Easy to remove Mechanism Profile) consists of two sections. The first section is a frame with dimensions of 106/157/254 x 51.5 x 2.2mm, while the second section is an ERMP with dimensions of 19.2 x 51.9 x 1.5mm. The two sections interlock with a 25 x 25 x 0.4mm spring steel section. The ERMP is designed to hold hard, soft, media in place. The shape and curvature of the ERMP are designed to interlock with appropriate tension to hold the media securely. The design also makes it easy to remove the media when necessary.

The section consists of diameter 4.8mm holes spaced at 117.4 mm for fixing the cap at two ends. Left bottom corner has 4 x 14.8mm space kept for backside closure. Step slot of 3.5 x 13.1mm is kept for the corner plate to join horizontal & vertical members on both right & left sides. Right side bottom has a 1.5mm step groove & slot of 14 x 4mm. Right top corner is for the operation of an easy to remove mechanism profile of assembly/section.

A curved slot of R6 x 3.2mm thickness, C-slot 1.7 mm to attach spring steel for ERMP is provided. Top inner side on the left & right corner has a 9.2 x 4.5mm, 11.5 x 4.5mm slot respectively, kept for inserting corner plates for joining horizontal & vertical members in case of frame. All sharp edges or corners are provided with R0.25 mm fillet.

The Easy to Remove Mechanism Profile (ERMP) is equipped with a 3.0mm curvature at its bottom and an extended portion measuring 13.3mm, with a 2.6 x 0.5 mm slot located at a height of 22.6mm. At the top, there is a R2.2 mm groove that allows for hinging with the frame section post-assembly. The ERMP section incorporates various radii, namely R4.1, R7.9 and R8.1, to ensure curvature. All sharp edges and corners are provided with a R0.25 mm fillet for safety purposes. A spring steel section with dimensions of 25 x 25 x 0.4mm is employed for the operation of the Easy to Remove Mechanism Profile (ERMP). One end of the spring steel section is placed in contact with the frame section, while the other end is placed in contact with the ERMP.

The H-section measures 12.5 x 8 x 1mm with outer radiuses of R0.7mm and inner radiuses of R0.25mm. It has a central thickness of 3.5mm and rectangular slots measuring 4.5 x 6mm on both sides of the central thickness.

There is a V-groove with an R0.3mm width and R1.5 mm radius on each side of the central thickness. Extruded Elliptical both side ERMP section of 96mm x 56mm x 2mm with pipe fitting arrangement Dia 4.8mm holes should be provided for cap fitting with tapered screws.

The bottom, top, and side profiles of the Elliptical Glow Board can be made from extruded anodized hollow profiles of Aluminium Alloy (6063-T6) with a wall thickness ranging from 2mm to 5mm. The profiles should feature internal ribs with approximately 1.5mm and 2.5mm thickness, and a 4.5mm and 4.2mm wide slot to secure the polycarbonate sheet in the Parabolic and Elliptical curvatures using flexural tension. A circular slot with a diameter of approximately 4.5mm should be provided at the centre of the profile to fix a self-tapping cheese head screw for the end cap.

The external dimensions of the bottom, top, and side profiles of the Elliptical Glow Signage should not exceed 34mm x 48mm with an 11.7mm radius, or 42mm x 50mm with a 24.3mm radius, or 42mm x 80mm with a 16mm radius, or 84mm x 80mm with a 16mm radius. The profiles should maintain their strength while providing unobstructed light and maximum viewing area. The bottom

corner should have a curvature of approximately 1.7mm, 24.3mm, and 16mm, respectively, to ensure a continuous flow of elliptical curvature for the polycarbonate sheet.

The half elliptical section is made of extruded hollow aluminium with dimensions of 36.6 x 30.2 x 2mm. It includes 3 x 15mm spaces on the left corner for attaching a backside enclosure to a 4.8mm circular hole at a centre height of 20.6mm. The right bottom corner has a R11.7mm curvature and four rectangular slots measuring 14.9mm each, which are attached to a centre hole for interlocking with media. U-PVC Parabolic Section 243.2 x 160.7 x 2mm in any colour. The shape has one flat side & two curved sides with radius R201mm and 6 x 6mm pie internal groove at centre. The Two T-grooves of 16 x 7 x 8 mm placed 80mm centrally apart with Four rectangular slots of 3 x 10mm with R1.5 mm radius for holding media. Hole provided at upper centre with dia 3mm Holes of dia 3mm x 15mm with tapered extrusion provided for interlocking.

C shaped aluminium 6063 extruded 65 x 15 x 1.5 mm thick meandering profile R 8.9mm, is formed into circular shapes of dia. 533.4 mm. 914.4 mm, 1219.2 mm and 1828.8 mm. Indestructible Polycarbonate sheet of 3mm thick at a tapered depth of 50mm is Thermoformed and is fitted to the inner flange of the profile. (Signage & Graphics / Kasturi Display / Verve Creation)

Heat Sink

The Heat Sink for the Elliptical Glow Board shall be a 25-26 mm hollow profile made of anodized Aluminium Alloy (6063-T6) with a thickness of 2mm. The corners of the Heat Sink shall be flattened to form a square across flat to hold the Heat Sink diagonally, and it shall be press fit horizontally and diagonally from all 8 sides. The four sides of the Heat Sink shall have dovetail slots, and circular slots of diameter 2 mm shall be provided at all four internal corners to ensure a tight fit for the pins of the Heat Sink connector. The Heat Sink shall have a set of three ribs of approximately 1.5mm thickness, located centrally at a height of approximately 5mm, and two ribs of approximately 2 mm height located on either side. These ribs shall maximise the surface area for faster cooling and provide additional strength to the hollow square profile. The heat sink section should be made of an extruded aluminium half-section with a symmetrical profile about the vertical axis. It has a half hexagonal dome measuring 8.28mm with a 1.9mm diameter circular groove at the centre. The section also features tapered arms that are angled at 135 degrees to each other, with 1mm corner grooves at the top surface. Each tapered arm has a Z-shaped extended portion measuring 2.45mm x 3.5mm x 2mm, located 10.2mm away from the centre. (Signage & Graphics / Kasturi Display / Verve Creation)

Heat Sink Connector

The Heat Sink connector shall be made of a polycarbonate profile with the same cross-sectional dimensions as the Heat Sink. It will have a thickness of approximately 5 mm. There will be two semicircular slots on each face, and provision shall be made for hot air to exit from the Heat Sink. The connector will have four pins moulded on each face at the four corners to be press-fitted into the Heat Sink profile. (Signage & Graphics / Kasturi Display / Verve Creation)

Heat Sink Holding Bracket (HSHB)

The Heat Sink Holding Bracket is a component consisting of a series of injection-moulded Nylon 6 brackets with lengths of 194mm, 258mm, 261mm, 332mm, 408mm and 545mm. The 'I' cross-sectional shape of the bracket are of dimensions nylon- 102mm x 15mm x 10mm, SS -1080mm x 25mm x 5mm, 1156 mm x 50mm x 5mm, and 861 mm x 50mm x 5mm at the mid-portion, and gradually tapers towards the ends, with thicknesses of 6mm for nylon and 5mm for SS. SS bracket of size 3ft and above has to be as per the cap size. To ensure both strength and flexibility, the SS components are machine-formed and powder-coated. The 'I' cross-section of the nylon components

features internal ribs. The ends of the HSH brackets have press-fit, flexible locking clasps. The mid-portion of the bracket features an offset of 14mm for nylon and 12mm for SS. Which ensures there is no obstruction to the light while maintaining the strength of the assembly.

The Heat Sink Holding (HSH) bracket shall include a centrally located clasp that will securely hold the Heat Sink in place along the longitudinal axis of the Elliptical Glow Board. The central clasp will have two sets of prongs that can be used to hold the Heat Sink diagonally or along its sides as needed. No of prongs (1-8) will increase as per the HSH .Additionally, two holes should be provided near the end clasps for securing the bracket as required. For fixing the HSH bracket to both profiles, two holes should be present on both sides of the central clasp for both nylon and SS. In the case of a longer bracket requirement, the mid portion of the HSH bracket will include an 3mm thick x 10mm wide aluminium strip, and two holes on both sides of the central clasp will be provided for fixing the mid portion of the bracket to the strip. (Signage & Graphics / Kasturi Display / Verve Creation)

Elliptical Glow Sign Frame

The Frame shall be constructed from an extruded hollow aluminium profile with a minimum thickness of 1.2 mm. The profile shall be anodized to a minimum thickness of 15µm (Grade AC-15) in either bronze, silver, or any other colour approved by the relevant authorities. The anodizing process shall conform to the IS: 1868 standard or the latest amendment thereof.

The Frame is Provided with a full-length square stainless steel powder-coated pipe/L-Angle, attached to the bottom cap square bracket with a level adjustment provision through riveting, without welding. The pipe/L-Angle should pass through the top cap interlock with a clamp and sliding level adjustment provision without compromising the structural strength of the elliptical glow signages.

The Aluminium frame should be powder coated formed horizontally or vertically as per requirement. A heat sink bracket should be provided to hold the top and bottom aluminium profile with press fit and bolting provision. The top, bottom, and/or side cap should be flush fixed at the profile to the outer side, holding all structural elements together.

The Aluminium extruded corner section is 75.54 x 75.54 x 2.6mm in size and has two perpendicular arms and a centre corner with a radius of R15mm. There are three circular grooves of diameter 5mm, one at the centre and two at the ends of each arm, spaced at 68.54mm from the centre groove. A T- groove of 16 x 7 x 8mm is provided internally at a distance of 48.34mm from the corner, and V-grooves of 0.25 x 0.25mm are present on the outer surface of each arm.

A pipe made of SS with an elliptical pipe measuring 203.2 mm x 609.6 mm x 4mm mounted vertically on the ground. The height of the pipe should be up to 2.70m and should have an internal structure. At the top 203.2 mm x 609.6 mm x 4mm cap and at bottom of the pipe, an elliptical flange measuring 254 mm x 711 mm x 6mm, should be welded and also provided with a double flange for easy alignment. Eight triangular supports measuring 70 x 70 x 10mm should be welded between the flange and pipe surface at the bottom. Single curved SS brackets of 2100mm x 75mm x 6mm are attached to the centre pipe and interlocked with the end section at various positions to reinforce the elliptical structure. (Signage & Graphics / Kasturi Display / Verve Creation)

Bracket / Clamp

The structure will consist of "I" beams from size 76.2mm up-to 685.8mm and "C" beams from size 152.4mm up-to 203.2mm height and width of 127 mm , as well as round pipes of 50.8 mm -152.4 mm . The beams and pipes will hold machine-bent, seven-tank processed powder-coated clamps with SS 304 nut bolts and spring washers. The clamps should have provision for level, size, and alignment adjustment, and can be shaped like 'T', 'S', or round with a centre slot that interlocks with top beams, girders, or pipes in a variety of orientations. Beam-to-beam connected brackets

should be provided to hold the sign perpendicular or horizontal. The bottom side of the clamp will interlock with a pipe of Elliptical Glow signage using SS nut-bolt and spring washer.

The high-strength round mounting clamp comprises an inner and outer clamp designed for installation on a round pipe with a diameter of 50.8 mm or 76.2 mm. These clamps are press-formed with exclusively designed die-mould. A 2 mm thick SS 304 grade sheet, with a 2mm rib deep formed along the periphery to provide additional strength. The inner clamp is intended for use with two holes to anchor it to a wall. The universal mounting clamp is 70mm x 31mm x 22mm in size, and is composed of a sliding clamp, holding clamp, crimping lock, and flexible strip. This clamp is press-formed in SS 304 grade sheet of 1.2mm thickness and is intended to be slid inside the mounting channels fixed to substrates. A 0.8mm strip is passed through this clamp and around the structure on which the sign is to be installed, and is crimped firmly by the crimping clamp. The clamp should be able to be fixed to any structure.

For installation purposes, M10 Square Head Bolts made of SS 304 with 4 side chamfers shall be used. Additionally, M10 Hexagonal Head Shear Nuts, which are permanent fasteners.

A die-moulded elliptical clamp should be made of aluminium with dimensions of 108mm x 60mm x 100mm and a thickness of 3mm is designed with curved edges and a curvature of R66 along the elliptical clamp skirt, joining the upper and bottom elliptical shapes of the clamp. The clamp features a square slot of 29mm x 1.5mm thickness through the centre and hidden fittings of M6 x 30mm long screws, with dia. 6mm holes on the top and bottom ends. The top and bottom corners of the clamp should have a radius of R 2mm. The clamp is fixed using either a Phillips head M8 x 50mm long bolt or SS-304 T-bolts M8 x 50mm with nuts.

The multi-clamp profile is made of extruded aluminium with a square H-section measuring 24.5 x 24.5 x 2mm. The four corners of the profile have R 4.3mm curvatures, and a central strip measuring 16 x 2mm. The top slot measures 16 x 11.3mm and a circular slot of diameter of 2.4mm. 1 x 2mm rectangular grooves are symmetrically provided on both side corners of the profile. Adjustable 'U' shaped threaded end clamp with inward bend for hidden fitting, fitted on pillar or girder with washer-lock nut. Provides secure and hidden mounting for signage All round ribbed 2mm thick W shape clamp with 4 holes along 228mm length and 32mm relief between the wall and signage for easy maintenance and cleaning. The hidden inward mounted fixtures such as lock nut/anti-theft shear nuts are used for wall mounting. W clamp should be a High strength SS-304 all-round ribbed 2mm thick with 4 holes along 228mm length and 28mm x 108mm x 2mm thick C shape strip for pole or adjacent back to back mounting. Fixed on collar tray using lug welded M6 stud with 8.5mm inward bent Channel of 58mm X 16.5mm X 1.5mm thick on back face of collar sign, with mounting channels fixed on the backside of the board by M6 SS-304 studs welded to back of the board.

SS-304 Spring-steel 0.8 thick x 18.5mm 'W' adjustable strip, clamp with 4 part locking system and extruded aluminium anodized channels 6063/T6 of 58mm height x 16.5mm width x 1.5mm, 30 mm L to 71mm L x 32mm W x 24mm H x 2mm thickness for different sizes of pole by using special tool, with inward bend of 8.5mm for clamping bolts. Mounted on a girder or pillar with mounting channels fixed on the backside of the board by M6 SS-304 studs welded to the back face of the board. SS-304 M3 grub screw with SS-304 50mm X 20mm X 3mm C or L shape block. Wall mounted Collar sign board with key slots on inward bend for fastener insertion and protection from theft. SS-304 M3 grub screw. Wall Mounted Collar sign board with rectangular slots on inward bend for L shape block insertion on two opposite parallel edges. 8mm dia conical shape one direction Heat resistance expansion nylon bushes. Hole on inward bend for bush insertion and locking for secure wall mounting.

Lollipop 533.4 mm bracket for wall mounting size 360mmx160mmx35mm made out of 2mm thick SS die moulded, bottom strip 270x35x2mm with mounting holes of dia 10mm at 115mm distance from centre on each end, ‘Y’ shape bend 300mmx140mmx15mm with 45 ° bend at 25mm from bottom edge on either side with step end of 25mm joining with half curve R600mm x 22mm wide strip having 10mm dia 3 number holes position at 45 ° from centre of strip for fixing with lolly pop glow signage. Lollipop 914.4 mm bracket for wall mounting size 510mmx240mmx60mm are made out of 4mm thick SS die mould, bottom strip 480 x60x4mm with mounting holes of dia 10mm at 225mm distance from centre on each end, ‘Y’ shape bend 450mmx240mmx60mm with 45 ° bend at 75mm from bottom edge on either side with step end of 75mm joining with half curve R910mm x 60mm wide strip having 10mm dia 3 holes position at 45 ° from center of strip for fixing with lollipop glow signage. Lollipop 1219.2 mm bracket for wall mounting size. 540mmx270mmx100mm made out of 4mm thick SS die moulded, bottom strip 510 x100x4mm with mounting holes of dia 10mm at 240mm distance from centre on each end, ‘Y’ shape bend 540mmx270mmx100mm with 45° bend at 75mm from bottom edge on either side with step end of 75mm joining with half curve R1220mm x 100mm wide strip having 10mm dia 3 holes positioned at 45 ° from centre of strip for fixing with lolly pop glow signage. (Signage & Graphics / Kasturi Display / Verve Creation)

Podium

An Elliptical shape, made of SS 304 with a thickness of 3mm on the top and bottom, should be cut into one piece. It should have dimensions of 1170mm x 512 mm x 508mm at R914mm at the corner R 117mm / 1643 mm x 575 mm x 508 mm at R 1652mm at corner R 2.5mm. An Elliptical shape, with a diameter of 8mm, should be cut at the centre. Two holes should be located on top to match the bottom cap of the Elliptical Glow Sign for fixing and interlocking without welding. The bottom should be approximately 12mm thick and should have 4 holes for foundation fitting. The top should include approximately 9 holes of 4 mm for ventilation, and a backside openable door system with a lock and key should be incorporated. The podium should be covered with an SS 304 sheet that is 1.2mm thick and powder-coated in an elliptical shape that matches the machine-formed SS 304 grade frame structure. The frame structure should have a size of 25mm x 50mm x 1.2mm rectangular pipes with vertical and horizontal supports.

ACP Cladding

The design, fabrication, and installation of exterior grade PVDF coated Aluminium composite panels with specific standard colour, 3mm core material, and chemically treated 0.5mm thick aluminium sheet (back sheet) bent with 5mm uniform machine grooves as per requirement, shall be carried out. The panels shall be fitted on anodized aluminium angles/ SS grid with PU Primer Coat. The grid supporting the ACP shall be of size approximately 38mm x 38mm x 1.5mm and placed at a distance of Heat sink fixed in Elliptical Glow Sign, accurately matching the existing structure on-site horizontally and vertically.

All hardware, fixtures, brackets, anchors, and fasteners of SS 304 grade shall be used and sealed with weathering silicon (DOW / GE) for circular columns and curved beams etc. SS clamp/ bracket provision shall be made for fixing with existing structure vertically, horizontally or slanted without welding and with level size alignment adjustment and interlocking provision without compromising strength and structural stability of the frame.

Mounting

Signages shall be integrated with the mounting arrangement using powder-coated pipes to FOB /Subway/ Platform structure / walls. The mounting arrangement shall be supplied with appropriate tension rope made of SS 304 and supplied with a minimum 5-metre 2.5 sq.mm FRLS multi-stranded copper flexible cable as per IS: 694 with the latest amendment and socket pin for

connecting to the power supply system. The signages with suitable clamping arrangement with SS nut, bolts, washers, square shear nut, nut-bolts, screw, T bolt, Check nut, shear nut or welding etc. The clamps shall be powder coated and enamel paint of approved colour.

The installation process involves mounting SS/ALU poles measuring 80 x 80 x 3mm /100 x 100 x 2.5mm /120 x 120 x 2.5mm with SS/ALU base plates measuring 200 x 200 x 8mm, which are welded at the bottom and bolted to the frame using bolts with SS M12 nuts, dome nuts M12, and SS spring washers that are 2mm thick. 125 x 125 x 2 mm x 0.6m long aluminium extruded square section vertical pole with a 125 x 125 x 4 mm SS304 top plate. The square pole features 20x12 mm axial pi-shaped grooves with three on two sides and one on the other two adjacent sides of the pole. The pole also has rounded circular corners with tapped holes measuring 5 mm in diameter and curvatures at the corners with R6 mm to make it multipurpose.

The process of mounting TEKU seats involves utilizing an aluminium pole and vertically mounting a MS channel welded on an MS base plate, which is inserted inside the pole. The TEKU seat is then mounted on an SS pole measuring 80 x 80 x 3mm on both sides, utilizing a single SS pipe with a diameter of 40 x 3 x 900 mm which is welded onto a 'C' bend/Straight fixture of 270 x 30 x 4mm at a height of 585 mm from the floor surface. There is a provision of a slot 60 x 100mm for installing a IS 1293 3-pin 6A and 16A socket. The base frame is constructed using 25 x 50 x 2mm SS/MS rectangular pipes, with horizontal and vertical members welded at each corner. Two 25 x 50 x 2mm SS/MS rectangular pipes are centrally located and welded to the outer frame. The base plate is bolted onto the central pipes using SS304 M12 bolts, dome nuts, and spring washers. An enclosure is provided around the base frame, with four legs screwed onto the four corners of the base frame.

The SS TEKU seat is specially designed and should be deep-drawn with appropriate TEKU die-mould. TEKU is a single-piece seat made of SS304, featuring a brushed satin hairline texture and an eccentric load-bearing capacity of 200 kg. The TEKU seat is 400 x 200 x 80 x .2mm with 20mm projection or 350 x 175 x 60 x 1.2 mm with 10mm projection on the backside to prevent rear (wrong) seating by commuters, with a protruded curvy shape. The fittings are made of SS304 to achieve maximum strength and a deep-drawn 60mm depth skirt is provided. The projection is 5 degrees in the middle and 6mm high at both ends. All four corners are provided with radiuses, with one corner having a radius of 45mm and the other three corners having a radius of 15mm. All top edges are made with a curvature of 6mm radius to provide smooth edges for injury-free seating. The front top edge is provided with a curvature of 893mm radius. The TEKU top has a little curve by providing degrees from all sides. From top to bottom, TEKU skirts are given 6-degree angles on two sides. The TEKU seats are welded at a height of 23 inches from the floor. At the top of the TEKU seat, the name 'TEKU' is chemically etched or engraved. The TEKU seats are available in both left and right side models; with opposite orientations of the above-mentioned curvatures, degree of projection, corner radiuses, etc. The SS304 left and right TEKU are mounted on the central pole with hidden fittings. The power cables used would be of cross-sectional area of 2.5 sq.mm and the connection wires would be of cross-sectional area of 0.75 sq.mm up-to 1.5sq.mm. Rubber grommets are inserted to reinforce power cables and wires.

Text/ Graphics

Vinyl Sheet

Monomeric calendered Vinyl matt sheet

100% blackout Vinyl provided inside 040 pc sheet.

Thickness: 80 µm

Colour Shades

Pantone shades: 227C, 1 65C, 260C, Cool grey 8C, Black, 7408C

Computer cut/printed

Printing should accurately match the specified Pantone shades

Texts, symbols, arrows, font size, colour scheme should be with reference to CSMT signages.

Led light Illumination

Light shall be of waterproof SMD 2835. The width of the light shall be 12 +/- 1 mm. This shall be slid into the dovetail grooves of the heat sink & firmly pasted on all four sides of the heat sink. Any obstruction or low brightness at the edges of the beam should be taken care of. Uniform illumination Average 4W-8W/ Sq.ft.

LED

Linear LED requirements

LED density: 120 LEDs per metre.

Quality of LED: Proven make such as CREE/ OSRAM/ NICHIA/ SEOUL Semiconductor / Bridgelux

Certifications: OEM certificate of LED should be provided.

LED Specifications :

LED Wattage	0.08 W to 0.1 W per LED
LED Driver	Constant current waterproof LED driver of approved brand with separate surge protection
LED Colour	Cool White
Colour temperature	5500 K/6500 K
Viewing angle	Text/Graphics/matter visibility shall not be less than 160*
Nominal Voltage	230V, AC, 50 Hz
Operating Voltage Range	150V-260V AC With SMPS supply.
Index of protection	IP 54

Sizes of the Signages

The size of the Signage shall be of different sizes, as per the site requirement.

Sign Substrate

It Shall be of Eco Friendly, High impact strength, shatter proof, UV resistant, Translucent, non-flammable White polycarbonate solid sheet as per IS14448 of 1mm, 1.5mm, 1.8mm, 3mm of reputed make. Light transmission shall be in the range of 60% - 90%. Provide U shaped 7mm x 1mm / 4mm x 1mm / 8mm x 2mm gasket for tight holding and interlocking polycarbonate sheet in aluminium profile.

Note : - Technical Details applicable for all kind of signages as above.

Specifications for glow sign boards and signages (Guidelines on Standard Signages at Stations on Indian Railways, 2023) are attached herewith as separate document. Please refer to this attached document.

This document has been divided into four parts.

- **Section 1, Design Principles for Wayfinding and Signages:** This chapter deals with the salient design principles that govern wayfinding strategies at Railway stations. It provides guidance on how to present information in an easy and effective manner such that it is accessible to the first time and frequent visitors as well as elderly and Divyangjan visitors.
- **Section 2, Design Recommendation:** This chapter covers the design recommendation of signages to be provided at Indian Railway stations. The graphics standards covered in this chapter have been designed to address station users' requirements. It covers standard graphics, information layout and

hierarchy, fonts style, colour scheme, pictograms, text spacing, placement height and illumination to bring in as much uniformity across the entire Railway system as possible and desirable.

• **Section 3, Standard Types of Signages:** This chapter covers the various standard types of signages categorized based on their shapes. The shape of any signage shall be selected judiciously by the Zonal Railways based on its positioning and orientation with respect to flow of passenger/vehicular movement. The graphical signages and their shapes shown in this section are for guidance purpose only and may not be replicated exactly.

• **Section 4, Technical Specification:** This chapter covers the technical specifications for material and general aid to procurement of signages. The specifications given here are for illustrative purposes and meant to provide a baseline only. Technologies and materials evolve continuously and the actual technical specifications may be different or more detailed based on Good Industry Practices and shall be meticulously framed.

• **Annexure A:** It covers the Do's and Don'ts while designing the wayfinding signage.

• **Annexure B:** It covers the list of standard pictograms to be used across all Indian Railways.

• **Annexure C:** It covers illustrations of signage to be used at Small/Medium size stations with their location and sizes.

• **Annexure D:** It covers the signages used at CSMT station for wayfinding. The reference provided is only for guidance and Railways are required to provide signage board based on station specific requirement.

• **Annexure E:** It covers the technical specification of signages that have been used at CSMT station. These are for reference purpose only.

• In case of ambiguities or discrepancies within these guidelines, the following shall apply:

- i. Between Annexure attached in this document and the provisions mentioned in Section 1, 2, 3 & 4, the provisions mentioned in concerned Sections shall prevail;
- ii. Between Section 1 and Section 2, the clause mentioned in Section 1, Design Principles for Wayfinding and Signages shall prevail;
- iii. Between two or more clauses within this document under Section 1, 2, 3 & 4, the provisions of a specific clause relevant to the matter under consideration shall prevail over those in other clauses;
- iv. Between the pictograms specified in Annexure B and any other illustrations, the pictograms mentioned in Annexure B shall prevail; and
- v. Between the dimension scaled from the Drawing/Graphics and its specific written dimension, the later shall prevail.

Ref : - Railway Board Letter No. 2023/SD-II/22/07/02 dtd. 15/05/2023.

72.Schedule item no. A-82

Supply, erection, designing, providing & fixing vinyl both way LED illuminated Signage for display of passengers utility items at Stations complete with Allu. Sheet metal powder coated sign case of size 16x72 inches & 3 inch in width. The matter of display shall be as per Railways requirement.

The price shall cover for Designing, providing & fixing vinyl both way LED illuminated Signage for display of passengers utility items at Stations complete with Allu. Sheet metal powder coated sign case of size 16x72 inches & 3-4 inch in width. The matter of display shall be as per Railways requirement. The board shall be designed as per the Railways specifications mentioned in the tender document to meet the requirement & considering aesthetic view in co-ordination with railways. Also the signage is to be fixed with Railways structure robustly using the necessary & adequate hardware's & fixing arrangement etc. to ensure safety for passengers on platform.

Technical specification for backlit type LED based signages.

1.	Type of Display	Both Side
2.	Size of Signage Box	16 x 72 x 3-4 inches
3.	Aluminium frame	1 x 3 inches square pipe powder coated
4.	Case material	Aluminium sheet 1.5 mm thick
5.	Mounting Provision	Wall mounting / hanging with clamps / vertical support made of Aluminum 1 x 3 inch square pipe of suitable length as per site condition.
6.	Front Acrylic sheet thickness	3mm imported milky transparent acrylic sheet with dual cut vinyl display of reputed make i.e. LG or similar.
7.	Type of LED	Modular LED with viewing angle of 70° with CCT 5600/6500 Lux with adequate quantity as per text matter. Make – Reputed make similar to Samsung.
8.	Operating voltage range	AC input -190 to 260 Volts, SMPS based control power supply.
9.	Capacity of Controller	As per requirement approx. 300 Watts with warrantee of 1 year
10.	No. of lines per board	As per requirement
11.	Protection	IP 65
12.	Details of display items	Will be provided by Railway.
13.	Colors of signages	As per Railway requirement
14.	Guarantee period	5 years.

Ref : - Railway Board Letter No. 2023/SD-II/22/07/02 dtd. 15/05/2023.

73.Schedule item no. A-83, A-84

Supply, fixing, testing and connecting of LED based name board for station with RGB name color complete with all accessories as per specification. For Hindi / Marathi letters.

Supply, fixing, testing and connecting of LED based name board for station with RGB name color complete with all accessories as per specification. For English letters.

The price shall cover cost of design, development and Supply, Fixing, testing and commissioning of LED Based station Name board in Marathi, Hindi & English languages complete with all accessories as per site requirement and instruction of site engineer in an approved manner at required stations. Location of the board shall be given by Railway In charge Supervisor. The complete LED name board shall be installed commissioned by the contractor using the necessary hardware, connectors from the nearest power supply. Location and Quantity breakup mentioned in attached in Annexure (1) Technical specification / salient features given below:

1. Power supply System:- It should be as under. Input: 230 Volt single phase A.C \pm 5%
Output : 12 Volt D.C

2. Letters in Marathi, Hindi & English languages :

- Letters for station name board shall be made in Marathi, Hindi & English at required Station
- Length and width of letter should be proportionate.
- Depth of each letter should not be less than 3"
- Back of letter should not be less than 28 SWG powder coated SS sheet enclosure.
- Front & Back of letters should be assembled in such a fashion that it remains water tight, dust proof.
- Front & Back of letters should be jointed / tighten with steel screw and washers, so that it may be opened in case of failure or for maintenance.

- g) All letters of each location should be fitted suitably on 3mm thick ALUMINUM COMPOSIT PANEL Sheet, if required and this sheet to be fixed suitably on above M.S. Structure.
- h) Complete name board should be fixed on a M.S. Iron frame structure suitable size to with stand the atmospheric weather wind pressure etc.
- i) M.S. Structure should be grouted well with appropriated cement, concrete mixture at given location.

3. L.E.D (Water proof 3-Diode Module) Each letter to be fitted with these modules on the inside of back cover of letter in such a fashion so that module may be removed / replaced if required / pasted and should be following characteristics. FOR COLOUR CHANGING LED BASED BOARDS. The alphabets will have to be back-lit using LED modular arrays Comprising Red, Green, Blue LEDs Module/ LED STRIP used should be for Multi colour type mean one LED change different colour.

- Module / STRIP will have a 4-wire bus.
- LED module will be mounted in a plastic mounting enclosure.
- LED used in the module should be of the approved make having the good reliability factor.
- LEDs driver will have to be 3 channel microprocessors based RGB controller with PWM (Pulse Width Modulation) output providing synchronous colour changing programme control.
- The RGB master controller cum driver and the switch mode power supply (SMPS) console will have to be an interdependent panel for easy of maintenance. The signage panel will contain only the LED module arrays.
- The master controller cum driver should be programmed to provide colour changing in Red, Green and Blue and their derivatives in sequence synchronously in all the alphabets.
- The master controller should also have the function to provide any single colour in constant mode through a function switch which can be manually set in the master control panel.
- The master control panel should have the appropriate switchgear for protection and isolation in the eventuality of electrical fault or manual shout down.
- The master control panel should also have a timer switch for programmable Auto ON – OFF Operation.
- The master control panel should be made using 18 SWG CRCA Sheet steel duly powder coated and designed for outdoor operation.
- All ICs shall be of industrial grade.
- Electrolytic capacitor shall be rated for max temperature of 105 degree C.
- Paper polyester capacitors to be rated for max temperature of 85 degree C.
- All resistances shall preferably be metal film of adequate rating.
- All Switching devices such as transistors, MOSFET's IGBT shall have junction temperature of 150 degree C.
- All Devices shall be adequate thermal margin at ambient of 55 degree C.
- All Protective cum adhesive coating used on PCBs should be clean and transparent and should not effect colour code of electronic component of the product code of the component.

4. Switch Mode Power supply.

- a) The power supply system (SMPS) along with transformer etc for complete station name board should be of standard company made.
- b) It should be in accordance to requirement.
- c) It should be housed in a M.S. Box which should be vermin, dust and water proof.
- d) This box should be lockable. And fixed at proper place from safety point of view.

Ref : - Railway Board Letter No. 2023/SD-II/22/07/02 dtd. 15/05/2023.

74.Schedule item no. A-85

SETC of self-contained drinking water cooler unit energy efficient compressor IS mark suitable for operation on 230 V +10 % 50 cycle single phase Ac supply storage capacity 150 Ltr cooling capacity 150 Ltr/Hr complete in place of old one as per specification.

The description of Schedule Item is self-explanatory. The Contractor will have to make own arrangement for transportation up to work site. The erection is to be done at nominated place, the work also include electrical connections, painting of CR number with stencil and commissioning of water cooler.

The water cooler shall have following function.

1) Water tank sheet material – Stainless Steel (SS 304)

Water tank sheet thickness – minimum 0.5 mm

2) Drip Tray - Stainless Steel (SS 304)

3) Faucet material – Brass (Cr Plated)

4) Condenser tubing – Grooved copper.

5) Legs – PP (B120mA)

6) Water inlet- hose & overflow pipe shall be provided.

7) Compressor Energy efficient – Hermetically Sealed Type with overload protector, Relay & other accessories make Kirloskar, Denfoss confirming to IS 10617 (Part - I) 1983 with amendments 1 & 2.

8) Refrigerant – R 134a or latest ecofriendly gas.

9) Power input – 1550 W

10) Final water temperature shall be from 13°C to 18°C $\pm 2^{\circ}\text{C}$

11) Plastic used in storage tank or any part coming in contact with water shall be of food grade.

12) Water cooler storage shall be suitable insulated to keep the water cool for longer period.

13) Thermostat – Automatically controls temperature.

14) Lock – Locking facility on tank door for safety.

15) Anti corrosive – Blue fins on condenser for longer life.

16) ISI mark.

17) Warranty on machine – 1 yrs.

18) Warranty on Compressor – 1 yrs.

19) Water tank cover & lid bottom sheet material – Epoxy painted Galvanized Iron Sheet.

20) Water tank cover & lid bottom sheet thickness – 2 mm

21) Cooler Cabinet – sheet material – Stainless steel – 0.80 mm

22) Cooler Cabinet sheet thickness – minimum 0.80 mm

75.Schedule item no. A-86

Supply and installation of 2 TR split AC unit as per specification attached.

The cost includes supply erection, testing and commissioning of 2 TR split AC unit.

CAPACITY / GENERIC	
Type of Air conditioner	High wall Split AC
Technology of AC	Inverter (Variable Speed)
Nominal cooling capacity in Ton	2 Ton
cooling capacity in Watts	7033 Watts
Coil Material	100% Copper
Eco-friendly refrigerant	R 32
Minimum length of copper pipe and suitable connecting electrical cable for installation and commissioning	6 meter
Swing	4 way
CONFORMITY / CERTIFICATION	
BEE Star Rating	Energy efficiency 5 star or more
Conformity to Indian Standard	ISI marked (IS 1391 Part 2. 1992 or latest))

Stabiliser free operation – voltage range	160V-280V
WARRANTY	
Warranty on Machine	1 year
Warranty on Compressor	10 years
ISSER	As per BEE 5 star rating and details should be available at BEE website.

➤ **AC Pipe to be covered by UPVC ducts, details as below :**

1. Anti-Rat bite
2. UV Protection
3. Professional look
4. All Weather Proof
5. Maintains Heat Insulation
6. Easy To Install/Remove
7. Long Lasting
1. Ducts are made up of high Quality Fresh UPVC, Fresh UPVC is the original molecule granules (Unplasticized).
2. Smart guard cover to maintain heat insulation which ensures overall efficiency of the AC
3. Should Fit larger AC pipes, covering up to 4.5 inches in width especially for heavy ton ACs
4. Ultra-Durable, Lightweight, Easy to Install, Paintable, Anti-Heat/UV & Weatherproof, made up of High-quality UPVC materials, especially for AC
5. Made up of High Quality Original & Fresh PVC granules, ensuring exceptional weather resistance (Rain & Anti-UV).
6. Smart Guard cover as AC pipeline hider which leads to beautification of your interior/exterior walls
7. Duct wall hole cover, Diversion elbow & 360° Flexible pipe are key when overcoming installation obstacles

Included Parts -

T-Joint - It facilitates the horizontal passing of pipelines installed between T-joint connections.(for VRV/VRF)

Wall Cap - It provides a secure, polished finish for pipelines passing through wall cap Installations.

Bridge Joint - It enables the seamless transition of Pipelines across bridge joint connections.

Stand	Wall Mount for 2 ton AC
Model Number	100% High quality Metal Wall Mounted Heavy Duty Air Conditioner Outdoor Unit Mounting Brackets Ac outdoor stand 500mm x 160mm Shelf Bracket
Type	Wall Mount
Shape	L Shape
Material	Iron
Finish	Chrome Finish
Length of Arms	0.8 Ton to 2.0 Ton
Compatible With	Free Fitting Material Inside
Adjustable	Yes
Color	White
Maximum Supported Weight	35 Kg
Weight	2000 g

76.Schedule item no. A-87

Supply, installation and commissioning of 1.5 Ton Split Air conditioner of Green AC -With 5 BEE Star Rating inverter, copper coil, ISEER : 5.8 or above with connected accessories etc.

The cost includes supply erection, testing and commissioning of Split Air Conditioner 1.5 Ton capacity inverter type with Remote & AC bracket.

CAPACITY / GENERIC	
Type of Air conditioner	High wall Split AC
Technology of AC	Inverter (Variable Speed)
Nominal cooling capacity in Ton	1.5 Ton
cooling capacity in Watts	5275 Watts
Coil Material	Copper
Eco-friendly refrigerant	R-32
Minimum length of copper pipe and suitable connecting electrical cable for installation and commissioning	3 metre
Swing	4 way
CONFORMITY / CERTIFICATION	
BEE Star Rating	As per BEE 5 star rating and details should be available at BEE website.
ISEER	5.8 or above
Conformity to Indian Standard	IS 1391 or latest (ISI marked)
Stabiliser free operation – voltage range	160V-280V
WARRANTY	
Warranty on Machine	1 year
Warranty on Compressor	10 years
Warranty on PCB	5 years

➤ **AC Pipe to be covered by UPVC ducts, details as below :**

1. Anti-Rat bite
2. UV Protection
3. Professional look
4. All Weather Proof
5. Maintains Heat Insulation
6. Easy To Install/Remove
7. Long Lasting

1. Ducts are made up of high Quality Fresh UPVC, Fresh UPVC is the original molecule granules (Unplasticized).
2. Smart guard cover to maintain heat insulation which ensures overall efficiency of the AC
3. Should Fit larger AC pipes, covering up to 4.5 inches in width especially for heavy ton ACs
4. Ultra-Durable, Lightweight, Easy to Install, Paintable, Anti-Heat/UV & Weatherproof, made up of High-quality UPVC materials, especially for AC
5. Made up of High Quality Original & Fresh PVC granules, ensuring exceptional weather resistance (Rain & Anti-UV).
6. Smart Guard cover as AC pipeline hider which leads to beautification of your interior/exterior walls
7. Duct wall hole cover, Diversion elbow & 360° Flexible pipe are key when overcoming installation obstacles

Included Parts –

T-Joint - It facilitates the horizontal passing of pipelines installed between T-joint connections. (for VRV/VRF)

Wall Cap - It provides a secure, polished finish for pipelines passing through wall cap Installations.

Bridge Joint - It enables the seamless transition of Pipelines across bridge joint connections.

Stand	Wall Mount for 1.5 ton AC
Model Number	100% High quality Metal Wall Mounted Heavy Duty Air Conditioner Outdoor Unit Mounting Brackets Ac outdoor stand 500mm x 160mm Shelf Bracket
Type	Wall Mount
Shape	L Shape
Material	Iron
Finish	Chrome Finish
Length of Arms	0.8 Ton to 2.0 Ton
Compatible With	Free Fitting Material Inside
Adjustable	Yes
Color	White
Maximum Supported Weight	35 Kg
Weight	2000 g

77.Schedule item no. A-88

Supply, erection, testing & commissioning of Lighting Circuit Board, Double Door Powder coated with locking arrangement consisting 32 A DP RCBO as I/C and 6 Nos x 6 A SPMCB and 2 Nos x 20A O/G SPMCB Complete.

The price shall cover cost of supply, loading, transportation and unloading of material at site, erection testing and commissioning of single phase/ 3 phase distribution board as above. The DB shall be double metallic door type with earthing terminal, bus bars, neutral link, etc. housed in 16 SWG CRCA sheet enclosure powder coated type with all accessories with IP 65 **protection**. The minimum breaking capacity of MCB shall be 10 KA.

MCB DB- MCB Distribution board consisting with various capacity of MCB's as in schedule. MCB shall be 'C' Class, of 10 kA breaking capacity and conforming to IS 8828 –78 with latest amendments. MCB shall be with ON/OFF indication, IP 65-degree protection, showing mid trip position in case of overload or short circuit conditions. MCB shall be having bi-connect terminals, load-line reversibility and with energy limitation class –III features.

Distribution board shall be made of high quality CRCA steel sheet with surface finish powder coated mat finish broken white distribution board double door & neutral link with box type terminal tin plated Electrolyte grade copper bus bar & phase link tin plated brass earthing link and wire set for internal wiring. DB shall be with IP 65 protection. It shall be provided with cements skill protection and side locking DIN bar interchangeable door.

RCBO –

RCBO shall have conformance to IS 12640-2 / IEC 61009-1.

RCBO shall be of breaking capacity of 10kA.

RCBO shall not be line load biased.

RCBO shall have minimum electric life of 10,000 electric operations.

Single Phase RCBO of 6A-40A to be in 2 Modules size with a breaking capacity of 10kA.

The RCBO shall have separate indications for short circuit fault and earth leakage fault.

The RCBO shall trip on leakage fault of AC waveform consisting of pulsating DC along with transients and harmonics.

The RCBO shall have pollution degree 3.

The RCBO shall have rated impulse withstand of 6 kV.

The RCBO shall have IP20.

The RCBO shall have a test button to check health of RCBO by creating artificial fault.

The RCBO shall be suitable for isolation.

The RCBO shall have bi-connect terminals for both bus bar and cable termination.

The RCBO, up to 63A, shall have cable termination capacity of 35 sq mm for rigid cable & 25 sq mm for flexible.

The RCBO shall have safety shutter to avoid any wrong insertion of cable.

The RCBO shall have operating temperature -5 °C to +60 °C.

The RCBO shall have a provision for padlock to prevent unauthorized access.

The RCBO shall have provision for mounting of accessories – Auxiliary Contact, Trip Alarm Contact, UV, OV, Shunt Release.

The RCBO shall have DIN clip on both the sides for easy removal of an RCBO from the DIN rail.

78.Schedule item no. A-90

Supply, erection, testing & commissioning of electric water heater/ geyser Cap- 15 Liters 230 V 50 Hz AC Input-2 KW (Glass Coated Heating Element, inner tank made up of mild steel with blue diamond glass lining tank, Temperature range :- 25-75 Deg Cent., BEE 5 STAR RATING, with wireless remote control.

The price shall cover the cost of supply, loading, transportation and unloading to site, erection, testing and commissioning of electric water heater/ geyser Cap- 15 Liters 230 V 50 Hz, AC Input-2 KW(Glass Coated Heating Element, inner tank made up of mild steel with blue diamond glass lining tank, Temperature range:- 25-75 Deg Cent., BEE 5 STAR RATING, with wireless remote control.

Features -

- 1) Anode Rod - The tank has an anode rod with a stainless-steel core that is designed to protect the tank from corrosive elements.
- 2) PUF Insulation - CFC free thicker PUF insulation offers complete protection against radiant heat loss, reduces energy consumption and provides higher energy efficiency
- 3) Whirl flow Technology - It avoids direct contact between cold and hot water flow for a faster heating.
- 4) 0.8 MPa high working pressure - Suitable for high rise buildings. The multi-function valve prevents pressure to increase beyond 8 bar
- 5) Water Resistance and Splash Proof (IPX 4) - Ensure high level of protection for electrical parts from water splashing.
- 6) Adjustable Knob - Adjustable knob for setting the temperature conveniently
- 7) Feroglas Technology
- 8) Incoloy Glass Coated Heating Element
- 9) RCCB for earth leakage protection
- 10) Shock resistant and rust-proof engineering thermoplastic body
- 11) MULTIPLE SAFETY SYSTEMS Helps in avoiding any operational hazard, ensuring more safety
- 12) HIGH GRADE STAINLESS STEEL TANK Corrosion resistant base material for longer life
- 13) FLAME FAILURE PROTECTION If the flame gets extinguished, the gas flow will be stopped automatically
- 14) AUTO SHUT OFF The Water Heater goes into Standby Mode if the water is not used within 90 minutes. This enhances safety and saves energy

1	Rated Capacity (L)	15 L
2	Wattage	2000 W or as per OEM
3	Star Rating	5 Star
4	Rated Voltage & Frequency	230 V, 1 Phase, 50 Hz AC
9	Inner Tank Warranty	10 Years
10	Body and Electrical Components Warranty	2 Years
11	Heating Element Warranty	6 Years
12	product	4 years
13	Thermostat	Yes
14	Thermal cut off	Yes
15	Net Contents	1 N storage electric water heater, 1 N user manual, 1 N multi-function safety valve, 2 N fasteners 2 N flexi pipes

79.Schedule item no. A-93

Supply, Fixing, testing and commissioning of Bus duct trunking system of 40 A (4+2) conductors, 3 PH, 4 Wire, IP 55 with Center feed unit, 16 A tap off box (every 1 meter), plug outlet covers, 16 A, 1 PH selection plugs suitable for glass fuse, Ceiling bracket holder, suspension accessories shall be either galvanized or powder coated.

The scope consists of Supply, Fixing, testing and commissioning of Bus duct trunking system of 40 A (4+2) conductors, 3 PH, 4 Wire, IP 55 with Center feed unit, **16 A tap off box (every 1 meter)**, plug outlet covers, 16 A, 1 PH selection plugs suitable for glass fuse, Ceiling bracket holder, suspension accessories shall be either galvanized or powder coated.

The work consists for

- Lightning distribution
- Power socket distribution
- **Technical characteristics**
 - Length of busbar trunking components: as per the requirement of different length.
 - Rated service current: **40 A**
 - Rated tap off units current: **16 Amp**
 - Rated insulating voltage: 690V
 - Number of circuits: **2 circuits (4 conductors)**
 - Protection index: IP 55
 - Surface treatment: galvanized or white Ral 9010
 - Regulations: compliant with European RoHS regulations
 - The scope consists of fixing brackets, tap-off outlet spaced along the trunking, End Cover, End feed units, Tap-Off units to connects luminaries load to trunking, Elbow unit etc. complete.
 - Full type tested as per IEC61439-6 by ASEFA, 100% routine test before ex-factor
 - Fire Resistant
 - Impact Resistant
 - Tap-off unit (box) should be available every 0.5/1 meters, easy to remove/add/expansion, upgradeability.
 - compact, space saving, easy to trace

- Integral in-build earth continuity
- Continuous operation, Easy Maintenance
- End Feed Unit – Double circuit

1	Busbar description	Straight length
2	Busbar trunking polarity	L+N+PE
3	No of circuits	2
4	No of tap off outlets	5
5	Control type	Without
6	Earth circuit	Isolated earth
7	Standards	EN/IEC 61439
Main		
1	Product of component type	Busbar trunking
Complementary		
1	Device application	Power socket distribution lighting
2	Radiated magnetic field	2 pT
3	(Ue) rated operation voltage	230 to 400 V
4	(Uimp) rated impulse withstand voltage	4kV
5	(Ui) rated insulation voltage	690 V
6	(Ie) rated operational current	40A at 35°C
7	Network frequency	50/60 Hz
8	(Icw) rated short time withstand current	0.94 kA
9	(Ipk) rated peak withstand current	As per EN/IEC 61439
10	Conductor	Copper
11	Warranty	5 years

Note :- Connection to light, fan etc from tap off box along with required material (wire, pipe) will be responsibility of contractor.

80.Schedule item no. C-1

Supply, erection, testing and commissioning of Borewell Submersible pump set alongwith wet type squirrel cage induction motor of 10 HP for discharge cap. 6000 LPH at 160 - 170 mtr head with all accessories.

BEE 5 or more star rated Borewell Submersible pump set:-

Technical Specification for borewell submersible pump :

BOREWELL TYPE SUBMERSIBLE PUMP :- Submersible pump Set comprising of multistage Vertical type submersible pump directly coupled to wet type water submersible squirrel cage induction type Electrical motor Speed 2900/3000 RPM designed for continuous operation under water, of compact design and sturdy construction, vibration free and noise less operation. The pump shall be constructed with casing of high grade cast iron of sufficient strength, hardness and long lasting The pump shall be provided with electro-dynamically balanced impellers of stainless steel. Pump shaft of stainless steel, water lubricated bearing complete with sturdy brass strainer on the pump suction side, Non-return valve at the discharge outlets, thrust bearing assembly pressure equalizing device etc. The pump shall be ISI marked, conform to IS 8034/2002 or (latest).

WET TYPE MOTOR - Electrical wet type motor suitable for operation on A.C.415 V +/-5% ,3 phase 50 Hz supply **Copper wound** with Design For Continuous Working - motor designs with Rotor made from 99.9% EC grade Copper, “S1” duty motors with “F” class insulation make them suitable for continuous working without any adverse effect on the pump life, ISI marked, conforming to IS 9283/1995 or latest suitable for above pump. Pump model shall be got approved by Sr. DEE(G)BSL before execution of the work. The erection of the pump shall be done in an approved manner as per site conditions as per the instructions of field Engineer. Contractor will have to supply copy of the required maintenance manual for the subject pump set

provided by them along with characteristic curve. International standard NEMA coupling with lesser transmission losses, lesser wear and tear and efficient hydraulics design performances last longer. Longer Life And Minimal Maintenance Cost - Inexpensive on cost of maintenance, motors are prefilled with oil having better lubrication and heat transfer properties, which reduces friction and ensures substantial savings from maintenance costs. Higher Efficiencies and Lower Power Consumption. Inefficiencies on health, all the motors are prefilled with non-toxic, non-hazardous purified paraffin oil, which has no fear of health hazard.

Motor Body	SS-202
Pump Shaft	SS 410
Sealing	MECH. SEAL
Warranty	24-month warranty

GENERAL CONDITIONS FOR SUPPLY AND ERECTION

1. The work is to be done as per tender technical specification. In case of any doubt etc. the details as given in tender technical specifications will prevail.
2. All the supply and erection work shall be done in accordance with relevant IS.
3. Contractor shall supply the material duly inspected by Railway representative or agency as per inspection clause mentioned below.
4. Any kind of testing required to confirm suitability of material either at manufacturers premises or at Rly. Stores before material is accepted by consignee shall be the responsibility of contractor. All testing charges shall be borne by the contractor.
5. Due care has been taken while framing technical specification, however if any deviation from prevailing standard norms is noticed at the time of execution the same shall be rectified and made good by the contractor. Contractor shall also bring such things if ever noticed by them to the knowledge of this office and to field Engineer.
6. Site survey shall be carried out by the contractor and Rly. Representative on award of LOA and before starting the work. Targeted Action Plan with material delivery schedule based on above survey shall be prepared by the contractor. One copy of the same shall be submitted to Engineer for monitoring the progress.
7. All material to be used for work shall be duly supported with test/inspection reports shall be deposited with SSE in charge of execution for ensuing quality before fitment. Only after clearance and satisfaction of quality the material shall be taken to site for erection and commissioning. Contractor shall therefore supply material in bulk lots to avoid repetitions of inspections/ testing.
8. **INSPECTION and TESTING:-**
 - (i) The stores material shall be inspected by Railway Representative nominated by Sr.DEE (G) BSL. All the inspection and testing charges shall be borne by the contractor. The contractor shall submit details of the material being offered before inspection schedule date at manufactures premises/ consignee premises. Where RITES or any third party is nominated as inspection agency, the inspection fee charged to the agency shall be borne by Contractor.
 - (ii) Material having value above Rs.5 lakhs shall be inspected by RITES. Inspection of other materials shall be done by Railway's representative.
9. **Successful bidder/tenderer shall survey the site and submit action plan within 15 days immediately after issuing of LOA to this office.**
10. All released material to be deposited to concern field In-charge office/depot.
11. There may be minor variation in rating / other parameters from make to make. The variation in positive side and beneficial to Railway is acceptable. However, prior approval of Sr.DEE(G)BSL shall be required before delivery of material to Railways.
12. In case, any contradiction in schedule of rate and specification; final decision of Railway authority will be final as per railway requirement.
13. LED fittings shall be guaranteed for 5 years.

CHAPTER –IV

SCHEDULE OF QUANTITIES

AND

RATES

CENTRAL RAILWAY

ELECT (G) BRANCH

BHUSAWAL DIVISION

TENDER No. BSL-L-W-T-50-2026

Schedule of work, rates and quantities for the work of Electrification work in connection with Redevelopment of Amravati Railway station.

	S N	Description	QTY.	Unit	Sup. Rate	Erec. Rate	Total cost of sup.	Total cost of erec.	Grand Total
A		Part A :Wiring & Electrification							
A	1	Supply, erection, testing and commissioning of Point wiring for light, fan, exhaust fan in PVC casing capping with 2x2.5 sq. mm. FRLS multistranded PVC copper wire alongwith all accessories, running earth etc.	50	Nos	356	110	17800	5500	23300
A	2	Supply, erection, testing and commissioning of 6 Amp. 3 pin universal plug socket complete with switch and point wiring in PVC casing capping with 2x2.5 sq mm FRLS multistranded PVC copper wire alongwith all accessories, running earth etc. on Separate Switch board.	10	Nos	495	176	4950	1760	6710
A	3	Supply, erection, testing & commissioning of 6 A 3 Pin universal plug socket complete with switch, wiring and earth connection, to be provided in Existing light/fan board.	10	Nos	66	54	660	540	1200
A	4	Supply, erection, testing and commissioning of 6 A 3 Pin Plug socket complete with switches and point wiring with 2x2.5 sq.mm FRLS copper conductor and copper earthing wire- 4 Nos plug in each board complete.	10	Nos	561	102	5610	1020	6630
A	5	Supply, erection, testing and commissioning of 15 A 3 pin universal plug socket with switch alongwith independent point wiring in PVC casing capping with 2x4 sq. mm. FRLS multistranded PVC copper wire alongwith all accessories, running earth etc.	10	Nos	413	67	4130	670	4800
A	6	Supply, erection, testing & commissioning of submain from switch board to single phase DP switch / DP one circuit meter comprising of submain with 2x4 sq.mm. PVC insulated FRLS 1.1KV multistranded wire & one running earth of 2.5 sq.mm. copper conducting PVC insulation green colour of 1.1 KV grade on rigid PVC casing capping with all accessories.	50	Ckt Mtr	156	24	7800	1200	9000
A	7	S.E T.C. of Submain with 2x6 sqmm FRLS copper wire inside PVC Casing capping with running	50	Ckt Mtr	168	23	8400	1150	9550

		earth etc complete. (1 m length of submain consists one cktmtr including all accessories & 2 wire of 6 sqmm with one wire of 2.5 sqmm for earth conn).							
A	8	Supply, erection, testing and commissioning of Submain with 2x10 sqmm FRLS copper wire inside PVC Casing caping with running earth etc complete.(1 m length of submain consists one cktmtr including all accessories & 2 wire of 10 sqmm with one wire of 2.5 sqmm for earth conn.) and finishing of the surface after rewiring.	50	Ckt Mtr	206	17	10300	850	11150
A	9	Wiring of the concealed Light / fan Point with all accessories and running earthing copper conductor as per standard practise. The switches shall be of modular type.(along with the all accessories and including cutting the wall / ceiling / chipping and re plastering, distempered / painted as the case may be, the same as good condition as directed by Engineer in charge at site.)	1000	Nos	529	144	529000	144000	673000
A	10	Supply, erection, testing & commissioning of Mini MCB modular type 6A-32 A.	125	Nos	271	0	33875	0	33875
A	11	Supply of material and fixing and concealed wiring for (3 Plug & 3 switch on separate board) 6 A 3 pin universal socket outlet complete with 6 Sqmm PVC insulated copper conductor wires along with 14 SWG tinned copper earth wire in 25mm/ 32mm dia PVC conduit pipe flush type 5A socket outlet and 5A piano type switch in GI box with PVC topsheet 5mm thick..(along with the all accessories and including cutting the wall / ceiling / chipping and re plastering, distempered / painted as the case may be, the same as good condition as directed by Engineer in charge at site)	50	Nos	542	125	27100	6250	33350
A	12	Supply, erection, testing & commissioning of 6A & 3 Pin Universal Modular Type Plug Socket with switch & concealed type point wiring with 2x2.5 sq mm FRLS Multistranded PVC Copper wire with all accessories and running earth on seprate board.(along with the all accessories and including cutting the wall / ceiling / chipping and re plastering, distempered / painted as the case may be, the same as good	200	Nos	459	125	91800	25000	116800

		<i>condition as directed by Engineer in charge at site)</i>							
A	13	Wiring of the concealed 6A /3 Pin Universal Plug Point on switch board with all accessories and running Earthing copper conductor as per standard practice. The switches shall be of Modular Type.	200	Nos	67	67	13400	13400	26800
A	14	Wiring of Concealed 15 A 3 Pin Wall Socket Point complete with 4 Sqmm Wiring all accessories and running earthing copper conductor as per standard practice. The switches shall be of modular type for Gyser, Kettle & Fridge. <i>(along with the all accessories and including cutting the wall / ceiling / chipping and re plastering, distempered / painted as the case may be, the same as good condition as directed by Engineer in charge at site)</i>	100	Nos	960	125	96000	12500	108500
A	15	Supply and concealing of rigid PVC conduits of 20 mm Dia (IVORY colour) confirming to IS 9537/P3/1983 or latest (ISI marked) with wall thickness not less than 2.0 mm along with the all accessories and including cutting the wall / ceiling / chipping and re plastering distempered / painted as the case may be, the same in good condition as directed by Engineer in charge at site.	300	Mtr	50	0	15000	0	15000
A	16	Supply of all materials required and single phase wiring by using 2 Nos. of 4.0 sq.mm PVC insulated FRLS type flexible copper cable conforming to IS.No:694, 1100 V grade with 1 No. of 4.0 sq.mm flexible copper cable through the PVC pipe already laid. Color coding shall be followed as directed by Engineering charge at site (3 Nos. of 4.0 Sq.mm Copper cable wire shall be taken as 1 Mtr. for measurement purpose).	300	Mtr	160	0	48000	0	48000
A	17	Supply and concealing of rigid PVC conduits of 25 mm Dia (IVORY colour) confirming to IS 9537/P3/1983 or latest (ISI marked) with wall thickness not less than 2.0 mm along with the all accessories and including cutting the wall / ceiling / chipping and re plastering the same as good condition as directed by Engineer in charge at site.	150	Mtr	60	0	9000	0	9000
A	18	Supply and wiring including termination by 3 nos. of 6 sq mm PVC insulated flexible copper cable conforming to IS.No: 694,	150	Mtr	217	0	32550	0	32550

		1100 V grade through the existing PVC pipe already laid, Color coding shall be followed as directed by Engineer in charge at site (3 nos. of 6 sqmm copper cable wire shall be taken as 1 m for measurement purpose)							
A	19	Supply and concealing of rigid PVC conduits of 32 mm Dia (IVORY colour) confirming to IS 9537/P3/1983 or latest (ISI marked) with wall thickness not less than 2.0 mm along with the all accessories and including cutting the wall / ceiling / chipping and re plastering the same in good condition as directed by Engineer in charge at site.	80	Mtr	110	0	8800	0	8800
A	20	Supply and wiring (3 Phase) including termination by 4 nos of 10.0 sqmm PVC insulated fire retardant low smoke (FRLS) flexible copper cable conforming to IS No: 694, 1100V grade with 1 no of 14 SWG tinned copper wire through existing PVC pipes already laid. Color coding shall be followed as directed by Engineer in charge at site.(4 nos of 10.0 sqmm copper cable and 1 no of 14 SWG tinned copper wire shall be taken as 1 m for measurement purpose.)	80	Mtr	600	0	48000	0	48000
A	21	Supply, erection, testing & commissioning of USB Power charger HUB/Device enclosed inside the frame on the top, 5.2V DC / 8 Amp, 8 Ports (vertical) with reversible compability. Input Voltage: 110-290V AC, 1.5 Mtrs. Cable length, Blue coloured LED display for Current & Voltage at each port & smart chip for calibrating the Current required on each power port. Metal Holder attached with USB device to keep 8 Mobile Phone. Size 580mm X 400 mm X 2 mm thick.	20	Nos	8648	821	172960	16420	189380
A	22	Supply, erection, testing & commissioning of Mains with 2x1.5 Sq.MM FR Copper PVC insulated wire laid in provided conduit/ Trunking/ inside pole/Bus-bars or any other places.	200	Mtr	42	17	8400	3400	11800
A	23	Supply, erection, testing & commissioning of PVC Flexible pipe 1/2 Inch	505	Mtr	21	0	10605	0	10605
A	24	Supply, erection, testing and commissioning of teakwood /PVC Main Board with electronic KWH	10	Nos	1576	113	15760	1130	16890

		meter 5-30 A cap.230 V,50 hz. Single phase duly wired with FRLS multistranded PVC copper wire with MCB,cutout, neon indication & earth connection etc.							
A	25	Supply, erection, testing & commissioning of Occupancy / Movement Sensor with contactor for Lighting Circuit.	10	Nos	6992	777	69920	7770	77690
A	26	Supplying LED concealed type foot / step light with aluminium body for indoor application suitable for upto 5 W LED including driver and erecting by making necessary arrangement/ recess in wall to make it flush with surface.	20	Nos	432	153	8640	3060	11700
A	27	Supply,fixing, testing & commissioning of indoor type LED luminaires 20W maximum, 4 ft long,having inbuilt auto dimming driver and sensor, System efficacy 110 lm/W, Luminaires must be capable of delivering minimum 2200 lumens, luminaires complete with all accessories	260	Nos	900	0	234000	0	234000
A	28	Supply, erection, testing & commissioning of 2x20 Watts LED surface/suspended water proof industrial luminaries with polycarbonate housing and diffuser	102	Nos	1327	26	135354	2652	138006
A	29	Supply, erection, testing & commissioning of 2Ft 10 watt LED tube 4000 k all in one fixtures for Dressing, mirror and kitchen.	30	Nos	556	151	16680	4530	21210
A	30	Supply, erection, testing & commissioning of LED Post top 65 Watt with spun aluminium housing for lamp and reflector assembly with clear polycarbonate cover and IP 65 protection.	20	No	16040	123	320800	2460	323260
A	31	Supply, erection, testing & commissioning of Chandeliers with LED Bulbs complete	1	Nos	19220	1922	19220	1922	21142
A	32	SETC LED Panel Light 39 to 42 Watt 6500K : 595x595x60 MM, 230 Volt, 50 HZ, AC similar to Philips product description RC370B LED 28S6500 L60W60 PSU or as per Make list of Annexure-I.	100	Nos	4711	138	471100	13800	484900
A	33	Supply, erection, testing & commissioning of 15/18 Watt Warm White SLD Sqare / Round LED downlight fitting of size 6"x6" complete with all accessories.	100	Nos	1472	134	147200	13400	160600
A	34	Supply, erection, testing and commissioning of BLDC Super efficient electrical Ceiling Fan 1400 mm sweep (56') 260-280 RPM, Services value 7.7 input voltage 140-285 V. Power consumption 26 W to 30 W. Air	200	Nos	3674	169	734800	33800	768600

		delivery 270 CMM or more, 3 blades with double ball bearing with regulator of electronic step type and down rod 300-600 mm as per requirement, canopies, shackle.							
A	35	Supply, fixing, testing & commissioning of energy efficient BLDC motor industrial exhaust fan of size 300 mm (12") sweep and standard accessories, as per specifications (Minimum Warrantee - 2 years)	30	No	6591	0	197730	0	197730
A	36	Providing and erecting air circulator 600 mm sweep oscillating type, wall mounting 1440 RPM without speed regulator, overheat protection unit, totally enclosed, flame proof motor suitable for 230/250 Volts single phase, 50 cycles A.C. supply, core lead wire and with moisture proof treatment to winding and with 'E' class insulation complete.	30	Nos	7012	152	210360	4560	214920
A	37	Supply, erection, testing & commissioning of 7 m high (clear height) galvanised octagonal pole with foundation bolts having bottom of 130 mm A/F, top 70 mm A/F on provided foundation. (Along with 2 pole RCBO 6A, with 30 mA sensitivity).	2	Nos	14228	1046	28456	2092	30548
A	38	Supply, erection, testing & commissioning of LED street Light Roadway fittings in aluminium PDC housing, toughened glass cover with IP66 protection, Wattage-72 watts, input voltage-240 volts ac, 50Hz. Complete.	4	Nos	3102	310	12408	1240	13648
A	39	Supply, erection, testing and commissioning of astronomical street light control panel outdoortype CRCA sheet steel powder coated capacity- 6 kW single phase consisting digital 24 Hr timer, 32 A TP contactor, 40 A SPN (DP) MCB, auto/manual switch with complete wiring suitable to be mounted on channel/angle fixed on electrical pole IP-32	1	Nos	11026	767	11026	767	11793
A	40	Supply & erection of FRP junction box of suitable size having terminals and 1x16 A Cut out with Two Nos of entry glands.	20	Nos	833	139	16660	2780	19440
A	41	Supply of all material, excavation and casting of cement concrete foundation/concreting in ratio 1:3:6 for above work.	5	cum	6128	0	30640	0	30640
A	42	Supplying & erecting mains with 4x10 sq.mm. and earth wire 6 sq.mm FR PVC copper wire, in rigid PVC conduit 32mm dia as per	500	Mtr	593	64	296500	32000	328500

		specification							
A	43	Supply, erection, testing and commissioning of 11 kV HT outdoor heat shrinkable cable jointing/ terminating Kit suitable for 3 core 70/95/120/185 Sq.mm Aluminium armoured XLPE cable.	5	Metre	11712	1442	58560	7210	65770
A	44	Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 2.5 to 16 sq mm., with necessary material as per specification	5	Nos	2448	0	12240	0	12240
A	45	Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 25 to 50 sq mm., with necessary material as per specification	5	Nos	3272	0	16360	0	16360
A	46	Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 70 to 95 sq mm., with necessary material as per specification	5	Nos	4523	0	22615	0	22615
A	47	Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 120 to 185 sq. mm., with necessary material as per specification	5	Nos	4736	0	23680	0	23680
A	48	Providing & erecting epoxy straight through joint outdoor/indoor for LT XLPE armoured cable 300 sq mm., with necessary material as per specification	5	Nos	9034	0	45170	0	45170
A	49	Providing & erecting epoxy outdoor / indoor end termination kit for LT XLPE armoured cable 2.5 to 16 sq mm., with necessary material as per specification	5	Nos	1920	0	9600	0	9600
A	50	Providing & erecting epoxy outdoor / indoor end termination kit for LT XLPE armoured cable 25 to 50 sq mm., with necessary material as per specification	5	Nos	2708	0	13540	0	13540
A	51	Providing & erecting epoxy outdoor / indoor end termination kit for LT XLPE armoured cable 70 to 120 sq mm., with necessary material as per specification	5	Nos	3048	0	15240	0	15240
A	52	Providing & erecting epoxy outdoor / indoor end termination kit for LT XLPE armoured cable 150 to 185 sq mm., with necessary material as per specification	5	Nos	3628	0	18140	0	18140
A	53	Providing & erecting epoxy outdoor / indoor end termination kit for LT XLPE armoured cable 240 to 300 sq mm., with necessary material as per specification	5	Nos	4117	0	20585	0	20585
A	54	Supply of 4 Core x10 Sqmm Copper Unarmoured Cable.	500	Mtrs.	285	0	142500	0	142500
A	55	Supply of 4 core 16 sqmm armoured XLPE Cable.	500	Mtr.	153	0	76500	0	76500
A	56	Supply of 4 core 25 sqmm	1000	Mtr.	208	0	208000	0	208000

		armoured XLPE Cable.							
A	57	Supply of 4 Core 70 sqmm armoured LT XLPE Cable.	1000	Mtr.	620	0	620000	0	620000
A	58	Supply of 4 Core 95 sqmm armoured LT XLPE Cable.	500	Mtr.	726	0	363000	0	363000
A	59	Supply of 4 core 120 sqmm armoured LT XLPE cable ISI mark.	400	Mtr.	1001	0	400400	0	400400
A	60	Supply of 11 kV 3 core 120 sqmm HT Aluminium armoured cable conforming to IS: 7098-Part 2 :2011	100	Mtrs.	1545	0	154500	0	154500
A	61	Supply of 4 core 185 sqmm armoured XLPE Cable.	1600	Mtr.	1024	0	1638400	0	1638400
A	62	Supply of 4 core 300 sqmm armoured LT XLPE cable ISI mark.	50	Mtr.	1108	0	55400	0	55400
A	63	Trenching & refilling of LT/HT/ Various sizes of PVC / XLPE cables- Along the Road (Size - 900mm x 300mm)	3500	Mtr.	0	189	0	661500	661500
A	64	Digging of cable trench 300/450 mm x 1000 mm in RCC/PCC/hard soil & refilling as per specification and requirement at the site.	1000	Mtr.	0	328	0	328000	328000
A	65	Transportation, Laying, Installation, terminating, testing and commissioning of LT/HT cable of sizes 10 sqmm to 300 sqmm in existing trench, pipe or on structure.	4500	Mtr.	0	25	0	112500	112500
A	66	Erection,testing and commissioning of cables other than trench i.e.Wall/Truss including clamp, GI wire and hardware	1150	Mtr.	0	65	0	74750	74750
A	67	Supply & laying of GI pipe Class B, ISI marked under road /Clamping with erecting pole or wall as per technical specification & drawing for passing cable.	115	Mtr.	180	0	20700	0	20700
A	68	Supply,installation, testing & commissioning of HDPE Pipe 110 mm Nominal Dia as per IS-4984-1995.	150	Mtr.	445	0	66750	0	66750
A	69	Supply and laying of RCC half round pipe 150 mm ID & 1 mtr length.	3000	Nos.	93	0	279000	0	279000
A	70	Supply and laying of RCC Hume Pipe of size 6"(150mm) dia 2 mtr. Length.	23	Nos.	589	89	13547	2047	15594
A	71	Supply, erection of RCC Type cable route marker with cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) of size 60 cm X 60 cm at the bottom and 50 cm X 50 cm at the top with a thickness of 10cm including inscription duly engraved as required.	90	Nos	499	0	44910	0	44910
A	72	Supply & Erection of RCC Warning Cover and refilling the cable trench in an approved	90	Nos	223	100	20070	9000	29070

		manner.							
A	73	Supply of Polyolefin cable channel of size width 240/340 mm,height 155/230 internal/external length 1 meter produced of polyolefin with fire protection class K-1 in accordance with DIN 53438 Sch. II channel attachable to each other with male female swallowtail connectors and having suitable detachable cover.	20	Nos	3260	326	65200	6520	71720
A	74	Supply, fabrication, fixing and erection of MS Work of miscellaneous size and for cable tray etc. including painting complete.	1000	Kg	85	15	85000	15000	100000
A	75	Supply, erection, testing & commissioning of B Type earthing complete.	22	Nos	2919	730	64218	16060	80278
A	76	Supply, erection, testing & commissioning of maintenance free earth as per RDSO specification no. RDSO/PE/SPEC/ PS/0109-008(REV '0') with improved earthing enhancing compound and exothermic welding	50	Nos	12965	2048	648250	102400	750650
A	77	Supply, fabrication, laying welding and connection of GI Flat/Strip of size 25x3 mm from earth pit with GI nut Bolt suitable size.	382	Kg	113	36	43166	13752	56918
A	78	Supply, erection, testing & commissioning of GI Wire 8/10 SWG	503	mtr	86	28	43258	14084	57342
A	79	Supply of single phase RCBO of 32A capacity, 30 mA sensitivity with metal enclosure	50	Nos	3410	0	170500	0	170500
A	80	Providing & erecting Hot dipped Galvanised Perforated type cable tray manufactured from 16 SWG (1.6 mm thick) GI sheet of 300 mm width & 100 mm height comprising all required standard accessories.	503	Mtr	948	118	476844	59354	536198
A	81	Design, manufacture,display, erection and installation of wall/hanging/floor mounting type LED illuminated sign/direction boards in half elliptical shape. The display sheet shall be of unbreakable 040 translucent polycarbonate sheet of 2 mm thickness. The text/graphics matter visibility shall not be less than 160 deg. The approved colour text and graphics shall be printed/router cut on monomeric calendered vinyl of 70 um thickness and shall be firmly pasted on display sheets. The mounting arrangement shall be hanging, wall mounting, ceiling mounting, pole mounting or floor mounting and as per site requirement. The signange shall	30	Sq.ft	1750	265	52500	7950	60450

		have the integral mounting arrangements with sturdy structural frame and ACP cladding on the back side of the signage to avoid rusting and entry of dust. The LED board shall have uniform illumination with 4-8 W/sq.ft and brightness more than ambient light. suitable size end cap of 1.5 mm thick SS 304 should be provided.							
A	82	Supply, Erection, Designing, providing & fixing vinyl both way LED illuminated Signage for display of passengers utility items at Stations complete with Allu. Sheet metal powder coated sign case of size 16X72 inches & 3 inch in width. The matter of display shall be as per Railways requirement.	10	Nos	12613	0	126130	0	126130
A	83	Supply, fixing, testing and connecting of LED based name board for station with RGB name color complete with all accessories as per specification. For Hindi / Marathi letters.	20	Nos	4793	533	95860	10660	106520
A	84	Supply, fixing, testing and connecting of LED based name board for station with RGB name color complete with all accessories as per specification. For English letters.	20	Nos	4316	480	86320	9600	95920
A	85	Supply, erection, testing & commissioning of self contained drinking water cooler unit energy efficient compressor IS mark suitable for operation on 230 V +10 % 50 cycle single phase Ac supply storage capacity 150 Ltr cooling capacity 150 Ltr/Hr complete in place of old one as per specification.	2	Nos	66251	1324	132502	2648	135150
A	86	Supply and installation of 2 TR split AC unit as per specification attached.	10	Nos	66924	0	669240	0	669240
A	87	Supply, installation and commissioning of 1.5 Ton Split Air conditioner of Green AC -With 5 BEE Star Rating inverter,copper coil, ISEER : 5.8 or above with connected accessories etc.	10	No	66014	0	660140	0	660140
A	88	Supply, erection, testing & commissioning of Lighting Circuit Board, Double Door Powder coated with locking arrangement consisting 32 A DP RCBO as I/C and 6 Nos x 6 A SPMCB and 2 Nos x 20A O/G SPMCB Complete.	40	Nos	5609	636	224360	25440	249800
A	89	Supply, erection, testing & commissioning of Shock safe PRCD plug , 16 A plug with in-built RCD, 16 A, 30 mA, IEC	50	Nos	915	0	45750	0	45750

		61540, 230 V 50 Hz, IP 40, with 3 No of terminals, Earth leakage protection,Auto trip & visual indication of Power, Power indicator for on / off status,Built in TEST & RESET Buttons							
A	90	Supply, erection, testing & commissioning of electric water heater/ geyser Cap- 15 Liters 230 V 50 Hz AC Input-2 KW(Glass Coated Heating Element, inner tank made up of mild steel with blue diamond glass lining tank,Temprature range:- 25-75 Deg Cent., BEE 5 STAR RATING, with wireless remote control.	10	Nos	7830	291	78300	2910	81210
A	91	Supply, erection, testing & commissioning of LT Outdoor type panel with double door powder coated with locking arrangements <i>as per IEC 61439</i> consisting of 2 Nos x 630 4P ACB as I/C & 1 Nos x 630 A 4P Bus coupler ACB, 8 Nos x 250 A, 2 Nos x 400 A for O/G with 10" HMI, ELR with CBCT for each MCCB, Power quality analyser, DLMS Compliance 3 Ph KWH meter, 12 Nos x indicating lamp set (RYB), copper busbar, & other associate acceories. <i>All MCCB are Microprocessor based (completely wired with suitable communication cable to fetch data from each compartment functional Unit (ACB/MCCB/SFU etc) / Multifunction Meter)</i>	1	Nos	1425730	13682	1425730	13682	1439412
A	92	Supply, erection, testing & commissioning of Outdoor type LT panel as per IEC 61439 with powder coated with locking arrangement consisting of 2 Nos x 250 A 4P MCCB, 4 Nos x 125 A 4P MCCB, 20 Nos x 63 A 4P MCCB as O/G with 10" HMI, ELR with CBCT for each MCCB, Power qaulity analyzer, DLMS compliance 3 Ph KWH meter, copper bus bar, 26 Nos x Indiacating lamp set (RYB), and other associate accessories complete. All MCCB are Microprocessor based (completely wired with suitable communication cable to fetch data from each compartment functional Unit (ACB/MCCB/SFU etc) / Multifunction Meter)	1	Nos	1319304	13682	1319304	13682	1332986
A	93	Supply, Fixing, testing and commissioning of Bus duct trunking system of 40 A (4+2) conducters, 3PH, 4 Wire, IP 55	1850	Mtr	2424	0	4484400	0	4484400

		with Center feed unit, 16 A lap off box, plug outlet covers, 16 A, 1 PH selectionplugs suitable for glass fuse, Ceiling bracket holder, suspension accessories shall be either galvanizedor power coated							
A		Sub Total Part A							21408145
B		Part B: Dismantling							
B	1	Dismantling the existing light, fan, bell, clock, independent plug point, wiring including circuit mains of all types along with accessories etc.complete.	509	Points	0	9	0	4581	4581
B	2	Dismantling of cables with accessories.	10	Job	0	7181	0	71810	71810
B	3	Dismantling of existing old Cables of size 25 sqmm to 120 sqmm and handing over to depot incharge at their depot.	1000	Mtr	0	18	0	18000	18000
B	4	Provision dismantling of overhead tapping /OH power supply arrangement & transportation to depot.	5	Job	0	1186	0	5930	5930
B	5	Dismantling the existing pole above 6 m height with brackets, clamps, insulators, stay from the cement concrete foundation and making the site clear by refilling the pits with excavated materials and bringing it to the ground level along with transportation of released pole to nearest OSM depot.	50	Nos	0	1409	0	70450	70450
B	6	Dismantling of existing main Boards, wires, cables etc addition and alteration in existing arrangement with associated accessories.	4	Job	0	26493	0	105972	105972
B	7	Dismantling of outdoor/Indoor unit of 1.5/2 TR Split AC	4	Nos	0	1303	0	5212	5212
B	8	Dismantling and Cutting the existing RSJ, Tabular, Rail Pole provided on road along with transportation of released pole to nearest OSM depot.	10	Nos	0	674	0	6740	6740
B		Sub Total Part B							288695
C		Part C: Pumps							
C	1	Supply, erection, testing and commissioning of Borewell Submersible pump set alongwith wet type squirrel cage induction motor of 10 HP for discharge cap. 6000 LPH at 160 - 170 mtr head with allaccessories	2	Nos	68982	0	137964	0	137964
C	2	Supply, erection, testing & commissioning of Indoor type LT panel as per IEC 61439 with double door powder coated with locking arrangements consisting 1 Nos x 12.5 HP VFD and 1 Nos x 63 A 4P MCCB, with ELR & CBCT for each MCCB	2	Nos	168512	10142	337024	20284	357308

		multifunctionmeter, indication lamp, copper busbar, & other associate accessories. <i>All MCCB are Microprocessor based (completely wired with suitable communication cable to fetch data from each compartment functional Unit (ACB/MCCB/SFU etc) / Multifunction Meter)</i>							
C	3	Supply, erection, testing & commissioning of Heavy duty Sluice Valve 50 mm dia. as per IS specification.	2	Nos	4694	111	9388	222	9610
C	4	Supply, erection, testing & commissioning of Heavy duty Non Return Valve 50 mm dia. as per IS specification.	2	Nos	4658	111	9316	222	9538
C	5	Supply and erecting ISI mark " C " Class (Heavy Duty) GI pipe of 50 mm dia. with coupling/accessories.	300	Mtr	874	100	262200	30000	292200
C	6	Supply, erection, testing & commissioning of GI C- class Bend 50mm dia.	4	Nos	680	54	2720	216	2936
C	7	Supply, erection, testing & commissioning of M.S. supporting clamps for 50 mm dia GI pipe	4	Nos	217	71	868	284	1152
C	8	Supply, erection, testing & commissioning of Flat Flexible Copper cable, 3 core X 4 sq.mm for submersible pump & starter connection.	600	Mtr	163	16	97800	9600	107400
C	9	Supply, erection, testing & commissioning of Pump guard Current operated type Should have protection against dry run, single phase, over load, over voltage, under voltage, reverse phase protection etc. (OR) pump up to 20 HP three phase suitable to operate in 415 volts 50 HZ AC supply.	2	Nos	2402	0	4804	0	4804
		Sub Total Part C							922912
		Sub Total A+B+C							22619752

S= Supply, E= Erection/laying, T= Testing, & C= Commissioning, Nos.= numbers, D=Dismantling.

1) The tender schedule shall be read in conjunction with scope of work and technical specification of the work for various items included therein

2) Tenderer / should Quote his / their own single & common percentage rates in offer sheet i.e. above /At Par / below the estimated rates of Railways schedule.

3) I/We agreed to execute the above work at -----% (In figure) ----- (in words) above /At Par / below of the Railways schedule of rates.

NOTE:-

(i) The above rates are inclusive all taxes and duties including GST.

(ii) The tenderer shall quote the all-inclusive rates i.e. Labour, Material, tools / repair maintenance including **GST and income tax** etc. No additional payment shall be paid by railway other than accepted offer.

Signature**Address and seal of Contractor****The List of Makes to be used in works.****Sr DEE(G)Bhusawal****Annexure-I**

SN	Item description	Accepted Makes
1	Switch, Socket, industrial socket, Batton/Angle holder Ceiling rose, SDB	Lauritz Knudsen (L&T), Havells, Legrand, Cona, Crabtree, C&S, Press Fit, Anchor, Benlo
2	Time Switches / Astronomical timer	Lauritz Knudsen (L&T), Siemens, Legrand, Havells, GE
3	DP Switch	Lauritz Knudsen (L&T), Havells, Legrand Siemens, GE, ABB, Cona, Crabtree, HPL
4	MCB /RCCB/RCBO/PRCD	Havells, Lauritz Knudsen (L&T), Legrand, Siemens, ABB, Schneider, Benlo
5	SFU /ACB / VCB / MCCB / ATS	Lauritz Knudsen (L&T), Siemens, Legrand, ABB, Schneider, Hager, Havells, Benlo
6	FRMUE/ EFS/ RMU/ Indoor compact switchgear / VCB Panel	ABB, L&T, Schneider, GE, Siemens
7	Switchgear for AMF/APFC panel	Lauritz Knudsen (L&T), Legrand, GE, Siemens, ABB, Hager, Schneider, Havells.
8	Thyrister, Contactors, Reactors	Lauritz Knudsen (L&T), Legrand, GE, Siemens, ABB, Hager, Schneider, Havells.
9	LT Panels (IEC 61439)	Siemens, ABB, Schneider, Lauritz Knudsen (L&T), Havells, Legrand
10	Ray roll plug socket	Legrand, Anchor, GE, Havells and Standard
11	Luminaries fittings/ Facade lighting	Philips, Havells, Jaquar, Wipro, Bajaj, Panasonic, Surya, Orient, Crompton
12	Sensor based Luminaries fittings	Philips, GE, Havells, Wipro, Bajaj, Tata Power.
13	PIR sensors	L&T, Philips, Legrand, Crompton, Havells, Jaquar, Wipro, Bajaj, Orient, Atomberg
14	LED	NICHIA / CREE / OSRAM / SEOUL / PHILIPS /LUMILEDS / Samsung
15	LED Pit Light	Philips, GE, Havells, Syska, Jaquar, Wipro, LED 4 India, Shakti.
16	LED indicators for panel.	Lauritz Knudsen (L&T), Siemens, ABB, Schneider.
17	Solar Standalone street light	Philips, Havells, Exide, Surya, Bajaj, Wipro, Jain Irrigation
18	Torch Light (1.5 -3 Kms range)	Nei, Ascentech, kinnav, Havells, Eveready, GE, Jaquar, Wipro, Yashika
19	High Masts, Flag mast, Poles	Bajaj, Utkarsh, Valmont, Havells, Wipro
20	FRP cable looping boxes	Sintex, Ercon, Bravo, National
21	Junction Boxes	Hensel, Cape Electric, National, Sintex.
22	Cable- HT, UG/Aerial Bunched Cable	Havells, Polycab, RR Kabel, KEI, Finolex
23	Cable/wire- LT, PVC/XLPE, UG/ Aerial Bunched Cable/ flexible, armoured/ unarmoured, domestic cables/wires.	Havells, Polycab, RR Kabel, KEI, Finolex, Vishal
24	Cable/Bus Duct, Bus trunking	Schneider Electric India Ltd. Legrand, Lauritz Knudsen (L&T), ABB, EAE
25	Cable joint and termination kit	M-seal, Dowells, Kaycee, Jainson, Cabseal, 3M, Mahindra & Mahindra.
26	BLDC Ceiling Fan / Pedestal fan / Exhaust Fan, Electronic Fan Regulator	Havells, Orient, Usha, Atomberg, Crompton, Bajaj
27	Wall Bracket fan/Air Circulator	Bajaj, Havells, Usha, Crompton, Orient, Almonard.
28	Casing Capping / PVC conduit	Prestoplast, Precision, Modi, Press Fit
29	Multi-Function meter & Electrical measuring instruments	Lauritz Knudsen (L&T), Siemens, Secure, ABB, Schneider, Set & De, trinity, MECO
30	Megger, Anemometer, Digital Multifunction (Loop Impedance Meter) Tester	Megger, Fluke, Stanlay
31	Earth tester	Meco, Nippen, Stanlay
32	Digital Clamp on Meter (Tong Tester).	Meco, Stanlay, Fluke
33	BDV Testing Kit	Stanley, Motwane
34	Digital lux meter	Fluke / Stanley / meco /Rishabh
35	Digital clamp on earth tester	Motwane, kusum-meco, Megger, Fluke, Stanlay
36	Digital Vernier caliper, Digital screw gauge	Baker, Freemans, Insize, MITUTOYO, TESA
37	Cable Fault Locator	Megger, Stanlay, Kusum-meco, Radiodetection, Fluke
38	Surge Suppressor	Legrand, Rider, Costain, Havells, Schneider, ABB, GE
39	Pumps (Make of Motor for Pump shall be acceptable as per OEM of the Pump)	Kirloskar, Crompton, KSB Pumps, Deccan, Jyoti, Wilo, Flowmore, Goodwin. Mather Platt, CRI, Worthington.
40	Pump Guard	Minilec, Lauritz Knudsen (L&T), Crompton, Siemens, C&S
41	Motor Starter	Lauritz Knudsen (L&T), Kirloskar, Schneider, GE, Siemens, CG, BCH, C&S
42	VFD Drive / Soft Starter	ABB, Siemens, Lauritz Knudsen (L&T), Schneider.
43	Valves all types & Butterfly	C&R / Audco / Castel / Leader / Honeywell / Kirloskar
44	GI Pipes	Tata, Zenith, Jindal, Bansal, Surya Prakash, Swastik, Apollo
45	PVC Pipe/ Column Pipe	Finolex, Supreme, Astral, Ashirvad, Prince, Apollo
46	HDPE Pipe	Supreme, Utkarsh, Jain Pipes, CRI Pipes
47	Polyolefin Cable channel	Finolex, Supreme, Astral, Ashirvad, Prince, Apollo
48	M.S. Pipes	Jindal / Tata / Zenith / GST / Malhotra
49	TMC Pipe	IT Combo, Palak, Sagar, Mahavir

50	UPS Battery	AMARARAJA, EXIDE, CBS, PANASONIC, HITACHI, HBL, OKAYA
51	UPS/ Inverter	Numeric Power Systems Ltd, APC, Schneider, Legrand, Emerson (Siemens), Luminous Power Technologies Pvt. Ltd. Luminous, Su-Kam, Microtek, Uniline
52	Standard Lead Acid Battery	Amararaja, Exide, Okaya, HBL
53	Geysers, Water Heater	Bajaj, Havells, Crompton Greaves, Jaquar, Racold, Morphy Richards
54	Flex for Glow Sign Board	LG 3m penaflex
55	Vinyl for Glow Sign Board	LG 3m penaflex
56	Cement	Ultratech, ACC, Ambuja, JK, Birla
57	Paints	Asian, Nerolac, Dulux, Shalimar, Berger
58	Sleeve Insulation	The Supreme Industries Ltd. / K Flex / Armaflex / A Flex
59	GI sheet	Jindal / Sail / Essar / Tata / Zenith
60	Fly Catcher Fitting	Fly, Kill lite, PCI, Avro, Orchids
61	Window AC / Split AC / AC Plant/ Cassette AC	Blue Star, Voltas, LG, Fedders Lloyd, Hitachi, Samsung, Daikin, O' General, Mitsubishi, Panasonic, Carrier, Godrej, IFB
62	VRF/VRV Units & Ductable split unit inverter type	Blue star / Samsung / Hitachi / Mistubishi / Daikin / O General/ Voltas, Panasonic/ LG
63	Duct Insulation	The Supreme Industries Ltd. / K Flex / Armaflex / A Flex
64	Air diffuser / Grill	Cosmos / Dynacraft / Carrier
65	Volume Control Damper	Cosmos / Dynacraft / Carrier
66	Ventilation Fans	Carrier / Systemair / Kruger / Nicotra/ Almonard
67	AC Compressor	Emersion Copeland/ Kirloskar/ Bluestar/ Carrier/ Daikin/ Tecumseh
68	AC Condenser	Blue Star / Carrier / Hitachi / Daikin
69	Motors	CG, Bharat Bijlee, ABB, Siemens, Kirloskar
70	AHU / IDU	Neutech / Blue Star / Ethos / Voltas / Systemair / Flaktwood / VTS / Trane / York / Blue star / Samsung / Hitachi / Mistubishi / Daikin / O General/ Voltas, Panasonic/ LG
71	Cooling Tower	Paharpur / National / Perfect / Omkar / Choksi Group
72	Chiller line Insulating	Thermoshell / Beardsell Ltd./ Armaflax / Superlone / Century /ECOFLACK
73	Package unit	Blue Star / Hitachi / Daikin / Carrier / Voltas
74	Water Cooler	USHA, Blue Star, Voltas, Sidwal
75	Refrigerator	LG, Voltas, Whirlpool, Haier, Godrej, Samsung, Panasonic
76	Diesel Generating Set	Kirloskar Oil Engines Limited, Mahindra, Cummins, GCL, Ashok Leyland.
77	APFC RELAY / Power capacitor	EPCOS, SELEC, L&T, Schneider, Havells, C&S
78	Transformers	ABB, Siemens, BHEL, GEC, Bharat Bijlee, Crompton, Schneider/ Areva, transdelta, Highvolt, Fairdeal, Tesla, Kirloskar, Power star, Transformer & Rectifier.
78	Oil filtration plant	Spera, CEE DEE, CBS, Minimac, Kristorr
79	Voltage stabilizer	Melcon, servokon, V-guard, Microtek, Jindal, Servomax, Power control systems,GE, Apex
80	IFD	ABB, Motorola, Siemens, JAISuS, Honeywell, L&T
81	ULT	Endress & Hauser, Siemens, Honeywell, Pepperl & Fuchs, Nivelco, Rosemount
82	AB switch	Kiran/ Pactil / ABB
83	Hammer Drill machine	Bosch, Stanley, Dewalt, Hilti
84	Hydraulic crimping tools	Bosch, Stanley, Dowel
85	Thermal image camera	Bosch, TIPL, Fluke, Meco
86	Electric air blower	Bosch, Dewalt
87	Tools & Plant, Chain Pipe Wrenches	Taparia, Tata, Freemans, Fluke, Bosch, Stanley
88	Furniture's, Almirah, BOOK SHELF	Godrej or equivalent.
89	Binoculars	Nikon, ZEISS, Canon, Celestron
90	Day light pipe	Skyshade/ E- VIEW Global/ SKY PIPE/ EGO LIGHT/ EKOOL PLUS
91	Earthing pit Box cover	Sintex, True power, National
92	Ball Bearing	SKF / NBC / FAG
93	Capacitors for fan	Tibcon / Epcos / Syscap / Jimcap / Keltron / Havells
94	Solar Panel	Tata, Waaree, Havells, ABB, Adani, Vikram
95	Solar inverter	Tata, Waaree, Havells, ABB, Adani, Sungrow, Solis, Microtek
96	Solar water heater	V-Guard, Jain Irrigation, Sudarshan, Havells, Racold, Green sense
97	Computer	HP, Dell
98	Printer	HP, Brother
99	Air Cooler /Industrial Cooler	Symphony, Breezeair, Greencon, Arctic
100	Storage Tank	Sintex, Plasto
101	Telescopic Ladder	Corvids, Gorilla
102	Voltage stabilizer for AC	V-guard, IFB, Microtek.
103	BESS	Su-vastika, Lotus, Waaree, Tata, Exide, Amararaja, Panasonic, Schneider, Cummins
104	Portable Generator(Petrol/Kerosene)	Honda, Birla
105	Maintenance free earthing	Cube earthing

Note – i) Only ISI / BIS marked items shall be accepted. If ISI / BIS marked materials are not available in market then prior approval shall be taken from Sr. DEE(G)BSL before supply.

ii) The above makes are acceptable subject to fulfillment of technical specification requirement.

Indian Standard codes/IEC List

Annexure-II

<i>S.No</i>	<i>Standard</i>	<i>Title</i>	<i>Reaffirm Date</i>	<i>Amdt.</i>
(1)	IEC 61439	The standards for low voltage switchgear and control gear assemblies		
(2)	IS 732:1989	Code of practice for electrical wiring installations (third revision)	March 2010	
(3)	IS 4648:1968	Guide for electrical layout in residential buildings	August 2012	
(4)	IS 8061:1976	Code of practice for design, installation and maintenance of service lines upto and including 650 V	March 2011	
(5)	IS 8884:1978	Code of practice for the installation of electric bells and call systems	August 2012	
(6)	IS 5578:1984/ IEC 60391 (1972)	Guide for marking of insulated conductors (first revision)	March 2011	
(7)	IS 1353:1985/ IEC 60445 (1973)	Guide for uniform system of marking and identification of conductors and apparatus terminals	July 2012	
(8)	IS 3234:1991/ IEC 60909: 1988	Guide for short circuit current calculations in three-phase ac systems (superseding IS 5728)	August 2012	
(9)	IS 7752 (Part 1):1975	Guide for improvement of power factor in consumer installation: Part 1 Low and medium supply voltages	March 2011	
(10)	IS 3646 (Part 1):1992	Code of practice for interior illumination: Part 1 General requirements and recommendations for working interiors (first revision)	March 2008	
(11)	IS 3646 (Part 2):1966	Code of practice for interior illumination: Part 2 Schedule of illumination and glare index	March 2008	
(12)	IS 3646 (Part 3):1968	Code of practice for interior illumination: Part 3 Calculation of coefficients of utilization by the BZ method	March 2008	
(13)	IS 4347:1967	Code of practice for hospital lighting	May 2010	
(14)	IS 6665:1972	Code of practice for industrial lighting	May 2010	
(15)	IS 2672:1966	Code of practice for library lighting	May 2010	
(16)	IS 10118 (Part 1):1982	Code of practice for selection, installation and maintenance of switchgear and controlgear : Part 1 General	March 2011	
(17)	IS 10118 (Part 2):1982	Code of practice for selection, installation and maintenance of Switchgear and controlgear : Part 2 Selection	March 2011	
(18)	IS 10118 (Part 3):1982	Code of practice for selection, installation and maintenance of switchgear and controlgear : Part 3 Installation	March 2011	
(19)	IS 10118 (Part 4):1982	Code of practice for selection, installation and maintenance of switchgear and controlgear : Part 4 Maintenance	March 2011	

(20)	IS 4146:1983	Application guide for voltage transformers (first revision)	September 2011	
(21)	IS 4201:1983	Application guide for current transformers (first revision)	September 2011	
(22)	IS 5547:1983	Application guide for capacitor voltage transformers (first revision)	September 2011	
(23)	IS 2309:1989	Code of practice for protection of buildings and allied structures against lightning (second revision)	March 2010	1
(24)	IS 3043:1987	Code of practice for earthing	March 2011	2
(25)	IS 5216 (Part 1):1982	Recommendations on safety procedures and practices in electrical work: Part 1 General (first revision)	March 2010	
(26)	IS 5216 (Part 2):1982	Recommendations on safety procedures and practices in electrical work: Part 2 Life saving techniques (first revision)	March 2010	
ELECTRIC FANS				
(1)	IS 555:1979	Electric table type fans and regulators (third revision)	July 2010	2
(2)	IS 1169:1967	Electric pedestal type fans and regulators (first revision)	Mar 2009	6
(3)	IS 374:1979	Electric ceiling type fans and regulators (third revision)	September 2010	6
(4)	IS 2997:1964	Air circulator type electric fans and regulators	July 2010	8
(5)	IEC: 60665 (1981) IS 2312:1967	Propeller type ac ventilating fans (first revision) Draft Standard issued in wide circulation	July 2010	8
(6)	IS 3588:1987	Electric axial flow fans (first revision)	August 2009	1
(7)	IS 3963:1987	Roof extractor units (first revision)	August 2009	3
(8)	IS 4283:1981	Hot air fans (first revision)	August 2009	3
(9)	IS 6272:1987	Industrial cooling fans (man coolers) (first revision)	August 2009	2
(10)	IS 4894:1987	Centrifugal fans (first revision)	August 2009	3
(11)	IS 11037:1984	Electronic type fan regulators	August 2010	3
(12)	IS 12155:1987	General and safety requirements for fans and regulators for household and similar purposes		
LOW VOLTAGE SWITCH GEAR AND CONTROL GEAR				
(1)	IS 4237:1982	General requirements for switchgear and controlgear for voltages not exceeding 1000 volts ac or 1200 volts dc (first revision) [superseded by IS 13947 (Part 1):1993]		
(2)	IS 6875 (Part 1):1973	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages upto and including 1000 V ac & 1200 V dc: Part 1 General requirements [superseded by IS 13947 (Part 5/Section 1)]		
(3)	IS 6875 (Part 2):1973	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages upto and including 1000 V ac and 1200 V dc: Part 2 Push- buttons and related control switches [Superseded by IS 13947 (Part 5/Section1)]		
(4)	IS 6875 (Part 3):1980	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages upto and including 1000 V ac and 1200 V dc : Part 3 Rotary control switches [superseded by IS 13947 (Part 5/ Section 1)]		
(5)	IS 10027:2000	Composite units of air-break switches and rewirable type fuses for voltages not exceeding 650 volt ac - Specification (first revision)	March 2010	
(6)	IS 4064	Air-break switches, air break disconnectors, air-break		

	(Part 1):1978	switch disconnectors and fuse-combination units for voltages not exceeding 1000 V ac or 1200 V dc: Part 1 General requirements (revised) [superseded by IS 13947 (Part 3): 1993]		
(7)	IS 2675:1983	Enclosed Distribution Fuse Boards and Cut Outs for voltages not exceeding 1000 V A.C. or 1200 V D.C.	March 2011	
(8)	IS 8828:1996	Circuit-breakers for over current protection for household and similar installations (second revision)		
(9)	IS 13032:1991	Miniature circuit breaker boards for voltage upto and including 1 000 Volt ac	March 2011	1
(10)	IS 12640 (Part 1):2008	Residual current operated circuit-breakers for household and similar uses : Part 1 circuit-breakers without integral over current protection (RCCBs) (First Revision)		
(11)	IS 12640 (Part 2):2008	Residual current operated circuit-breakers for household and similar uses: Part 2 circuit breakers with integral over current protection (RCBOs) (First Revision)		
(12)	IS 2959:1985	Contactors for voltages not exceeding 1000 V ac or 1200 V dc (first revision) [superseded by IS 13947 (Part 4/ Section 1)]		
(13)	IS 12021:1987	Specification for control transformers for switchgear and controlgear for voltages not exceeding 1000 Volt AC	March 2010	2
(14)	IS 5039:1983	Distribution pillars for voltages not exceeding 1000 volts (first revision)	March 2011	2
(15)	IS 8623 (Part 1): 1993/ IEC 60439-1 (1985)	Specification for low voltage switchgear and controlgear assemblies: Part 1 Requirements for type-tested and partially type tested assemblies (first revision).	March 2008	2
(16)	IS 8623 (Part 2):1993/ IEC 60439-2 (1987)	Specification for low voltage switchgear and controlgear assemblies: Part 2 Particular requirements for busbar trunking systems (busways)-(first revision)	March 2008	2
(17)	IS 8544 (Part 1):1977	Motor starters for voltages not exceeding 1000 V: Part Direction line ac starters [superseded by IS 13947 (Part 4/Section 1): 1993]		2
(18)	IS 8544 (Part 2):1977	Motor starters for voltages not exceeding 1000 V : Part 2 Star-delta starters [superseded by IS 13947 (Part 4/ Section 1): 1993]		
(19)	IS 8544 (Part 3/ Sec 1): 1979	Motor starters for voltages not exceeding 1000 V : Part 3 Rheostatic motor starters, Section 1 General requirements [superseded by IS 13947 (Part 4/Section 1): 1993]		
(20)	IS 8544 (Part 4):1979	Motor starters for voltages not exceeding 1000 V: Part 4 Reduced voltage ac starters: two step auto-transformer starters [superseded by IS 13947 (Part 4/Section 1): 1993]		
POWER CABLE				
(1)	IS 94:1990/ IEC 60227-1 to 5 (1979)	PVC Insulated cables for working voltages upto and including 1100 V	February 2010	5
(2)	IS 694: 2010	Polyvinyl chloride insulated sheathed and unsheathed cables with rigid and flexible conductor for rated		1

		voltages upto and including 450/750 V : Part 1 General requirements (fourth revision)		
(3)	IS 1554 (Part 1): 1988/ IEC 60502 (1983)	PVC insulated (heavy duty) electric cables: Part 2 For working voltages upto and including 1100 V (Third revision)		
(4)	IS 3961 (Part 1): 1967	Recommended current ratings for cables: Part 1 Paper insulated lead sheathed cables	November 2011	
(5)	IS 4288:1988	PVC insulated (heavy duty) electric cables with solid aluminium conductors for voltages upto and including 1100 V (second revision) (withdrawn)		
(6)	IS 4289 (Part 1): 1984/ IEC 60245-5	Flexible cables for lifts and other flexible connections: Part 1 Elastomer insulated cables (first revision)		
ELECTRIC WIRING ACCESSORIES				
(1)	IS 9537 (Part 1): 1980/ IEC 60614-1 (1978)	Conduits for electrical installations: Part 1 General Requirements	November 2010	(1)
(2)	IS 9537 (Part 2): 1981	Conduits for electrical installations: Part 2 Rigid steel conduits (superseding IS:1653)	May 2012	(2)
(3)	IS 3480:1966	Flexible steel conduits for electrical wiring	May 2012	(1)
(4)	IS 2667:1988	Fittings for rigid steel conduits for electrical wiring (first revision) [Superseded by IS 14768 (Part 2): 2003]	February 2008	
(5)	IS 3837:1976	Accessories for rigid steel conduits for electrical wiring (first revision)	May 2012	(1)
(6)	IS 9537 (Part 4):1983	Conduits for electrical installations: Part 4 Pliable self-recovering conduits of insulating materials	May 2012	
(7)	IS 9537 (Part 5): 2000/ IEC 60614-2-3 (1990)	Conduits for a electrical installations: Part 5 Pliable conduits of insulating material [Superseding IS 6946]	June 2010	
(8)	IS 3419:1989	Fittings for rigid non-metallic conduits (second revision)	May 2012	
(9)	IS 14772:2000/ IEC 60670-1 (1989)	Enclosures for accessories for household and similar fixed electrical installations [Superseding IS 5133 (Part 1 and 2)]	May 2010	
(10)	IS 2412:1975	Link clips for electrical wiring (first revision)	May 2012	(2)
(11)	IS 371:1999	Ceiling roses (third revision)	March 2010	(4)
(12)	IS 3854:1997/ IEC 60669-1 (1998)	Switches for domestic and similar purposes (second revision)	July 2012	(6)
(13)	IS 4615:1968	Switch-socket outlets (non-interlocking type) (Withdrawn)		
(14)	IS 4160:2005/ IEC 60884-2-6 (1997)	Interlocking switch socket outlets - Specification (first revision)	June 2010	
(15)	IS 1293:2005/ IEC 60884-1 (2002)	Plugs and socket outlets of rated voltage upto and including 250 volts and rated current upto and including 16 amperes - Specification (third revision)	June 2010	(5)
ELECTRICAL LAMPS AND THEIR AUXILIARIES				
(1)	IS 418:2004/	Tungsten filament lamps for domestic and similar	March 2009	(4)

	IEC 60064 (1993)	general lighting purposes (fourth revision)		
(2)	IS 2418 (Part 1): 1977/ IEC 81 (1974)	Tubular fluorescent lamps for general lighting service: Part 1 Requirements and tests (first revision)	December 2010	(8)
(3)	IS 9900 (Part 1):1981 / IEC 188 (1974)	High pressure mercury vapour lamps: Part 1 Requirements and test [Superseding IS 2183 and IS 7023]	October 2012	(4)
(4)	IS 9974 (Part 1): 1981/ IEC 662 (1980)	High pressure sodium vapour lamps : Part 1 General requirements and tests	October 2012	(4)
(5)	IS 1258:2005/ IEC 61184 (1997)	Bayonet lamp holders (fourth revision)	June 2010	(3)
(6)	IS 3323:1980/ IEC 60400 (1972)	Bi-pin lamp holders for tubular fluorescent lamps (first revision)	October 2012	(1)
(7)	IS 3324:1982/ IEC 400 (1972)	Holders for starters for tubular fluorescent lamps (first revision)	June 2008	
(8)	IS 2215:2006/ IEC 60155 (1993)	Starters for fluorescent lamps (third revision)	Jun 2010	
(9)	IS 1534 (Part 1):1977 / IEC 82 (1973)	Ballasts for fluorescent lamps: Part 1 For switch start circuits (second revision)	July 2011	(5)
(10)	IS 1569:1976/ IEC 566	Capacitors for use in tubular fluorescent	July 2011	(1)
(11)	IS 6616:1982/ IEC 262 (1969)	Ballasts for high pressure mercury vapour Lamps (first revision)	July 2011	(1)
LIGHT FITTINGS AND LUMINAIRES				
(1)	IS 1913 (Part 1):1978	General and safety requirements for luminaires: Part 1 Tubular fluorescent lamps (second revision)		
(2)	*IS 10322 (Part1) :1982 / IEC 598 - 1(1979)	Luminaires: Part 1 General requirements	May 2010	
(3)	IS 10322 (Part 2):1982 / IEC 598 - 1(1979)	Luminaires: Part 2 Constructional Requirements	May 2010	
(4)	IS 10322 (Part 5/ Sec. 2):2012	Luminaires: Part 5 Particular requirements, Sec 2 Recessed luminaires (First Revision)	March 2012	
(5)	IS 10322 (Part 5/ Sec. 3):2012/ IEC 60598-2-3 (1979)	Luminaires: Part 5 Particular requirements, Sec 3 Luminaires for road and street lighting (First revision)	March 2012	
(6)	IS 10322 (Part 5/ Sec 4):1987/ IEC 60598-2-4 (1979)	Luminaires: Part 5 Particular requirements, Section 4 Portable general purpose	May 2010	1
(7)	IS 10322 (Part 5/ Sec	Luminaires: Part 5 Particular requirements, Section 5 Flood lights [superseding IS 1947]	May 2010	(1)

	5):1987/ IEC 60598-2-5			
(8)	IS 3287:1965	Industrial lighting fittings with plastic reflectors		
(9)	IS 1777:1978	Industrial luminaires with metal reflectors (first revision)		
(10)	IS 2206 (Part 1):1984	Flameproof electric lighting fittings: Part 1 Well-glass and bulkhead types (first revision)		
(11)	IS 3528:1966	Waterproof electric lighting fittings	May 2010	
(12)	IS 3553:1966	Watertight electric lighting fittings	May 2010	
(13)	IS 8030:1976/ IEC 162 (1972)	Luminaires for hospitals	March 2008	
(14)	IS 7537:1974	Road traffic signals	March 2008	
(15)	IS 9583:1981/ IEC 598-2-22 (1980)	Emergency lighting units	March 2008	
ELECTRICAL APPLIANCES				
(1)	IS 302 (Part 1): 2008/ IEC 60335-1 (2006)	Safety of household and similar electrical appliances: Part 1 General requirements (sixth revision)		(1)
(2)	IS 2268:1994	Electric call bells and buzzers for indoor use (second revision)	March 2009	
(3)	IS 3412:1994	Electric water boilers (second revision)	March 2009	
ELECTRICAL INSTRUMENTS				
(1)	IS 6236:1971/ IEC 60258 (1968)	Direct recording electrical measuring Instruments	January 2010	
(2)	IS 1248 (Part 1): 2003/ IEC 600 51-1 (1997)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 1 General requirements (fourth revision)	Sep 2008	
(3)	IS 1248 (Part 2): 2003/ IEC 600 51-2 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 2 Ammeters and voltmeters (third revision)	Aug 2008	
(4)	IS 1248 (Part 3): 2003/ IEC 600 51-3 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 3 Wattmeters and varmeters (third revision)	Aug 2012	
(5)	IS 1248 (Part 4): 2003/ IEC 600 51-4 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 4 Frequency meters (third revision)	Aug 2008	
(6)	IS 1248 (Part 5): 2003/ IEC 600 51-5 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 5 Phase meters, power factor meters and synchroscope (third revision)	Aug 2008	
(7)	IS 722 (Part 1):1998	AC electricity meters : General requirement and tests		
(8)	IS 722 (Part 2):1977	AC electricity meters: Part 2 Single-phase whole-current watt-hour meters, Class 2 (first revision)		
(9)	IS 722 (Part 3):1988	AC electricity meters: Part 3 Three-phase whole current and transformer operated and single-phase transformer operated watt-hour meters, class 2 (second revision)		

(10)	IS 722 (Part 5):1980	AC electricity meters: Part 5 Volt-ampere hour meters for restricted power factor range, class 3.5 (first revision)		
(11)	IS 722 (Part 7/Sec 1): 1987	AC electricity meters: Part 7 Volt-ampere hour meters for full power factor range, Section 1 General requirements (first revision)		
(12)	IS 722 (Part 8):1972	AC electricity meters: Part 8 Single-phase 2-wire whole current watt-hour meter (class 1.0)		
(13)	IS 722 (Part 9):1972	AC electricity meters: Part 9 Three-phase whole current and transformer operated watt-hour meters and single- phase two-wire transformer operated watt-hour meters (class 1.0)		
(14)	IS 8530: 1977 IEC 60211:1966	Maximum demand indicators (class 1)		
(15)	*IS 2992:1987	Insulation resistance testers, hand operated (magneto generator type) (second revision)	Jan 2010	
INSTRUMENT TRANSFORMERS				
(1)	IS 2705 (Part 1): 1992/ IEC 60185 (1966)	Current transformers: Part 1 General requirements (second revision)	Aug 2012	(1)
(2)	IS 2705 (Part 2): 1992/ IEC 60185 (1966)	Current transformers: Part 2 Measuring current transformers (second revision)	Aug 2012	
(3)	IS 2705 (Part 3): 1992/ IEC 60185 (1966)	Current transformers: Part 3 Protective current transformers (second revision)	Aug 2012	
(4)	IS 2705 (Part 4): 1992/ IEC 60185 (1966)	Current transformers: Part 4 Protective current transformers for special purpose applications (second revision)	Aug 2012	
(5)	IS 6949:1973	Summation current transformers	Sep 2011	
FUSES				
(1)	IS 9224 (Part 1):1979	Low voltage fuses: Part 1 General requirements [superseded by IS 13703 (Part 1):1993]		
(2)	IS 9224 (Part 2):1979	Low voltage fuses: Part 2 Supplementary requirements for fuses for industrial applications (superseding IS 2208) [superseded by IS 13703 (part 2/Section 1):1993]		
(3)	IS 2086:1993	Carriers and bases used in rewirable type electric fuses for voltages upto 650 V (third revision) [Superseding IS 8724]	Mar 2009	(1)
(4)	IS 9926:1981	Fuse wires used in rewirable type electric fuses upto 650 volts	Mar 2011	
(5)	IS 8187:1976/ IEC 269-3 (1973)	D-type fuses		
MISCELLANEOUS				
(1)	IS 2551:1982	Danger notice plates (first revision)	Mar 2010	
(2)	IS 2448 (Part 1):1963	Adhesive insulating tapes for electrical purposes: Part 1 Tapes with cotton textile substrates	Oct 2010	(5)
ELECTROTECHNICAL VOCABULARY				
(1)	IS 1885	Electrotechnical vocabulary: Part 1	Jul 2012	(2)

	(Part 1):1961	Fundamental Definitions		
(2)	IS 1885 (Part 9):1992/ IEC 60050 (446):1983	Electrotechnical Vocabulary: Part 9 Electrical relays (second revision)	Jul 2012	
(3)	IS 1885 (Part 11):1966	Electrotechnical vocabulary: Part 11 Electrical Measurements	Jul 2012	
(4)	IS 1885 (Part 16/ Sec 1):1968	Electrotechnical vocabulary: Part 16 Lighting, Section 1 General aspects	Jul 2012	
(5)	IS 1885 (Part 16/ Sec. 2):1968	Electrotechnical vocabulary: Part 16 Lighting, Section 2 General illumination, lighting fittings and lighting for traffic and signaling	Jul 2012	
(6)	IS 1885 (Part 16/ Sec. 3):1967	Electrotechnical vocabulary: Part 16 Lighting, Section 3 Lamps and auxiliary apparatus	Jul 2012	
(7)	IS 1885 (Part 17):1979	Electrotechnical vocabulary: Part 17 Switchgear and control gear (first revision)	Jul 2012	
(8)	IS 1885 (Part 32):1993/ IEC 60050 (461):1984	Electrotechnical Vocabulary: Part 32 Electric cables (first revision)	Mar 2009	
SAFETY				
(1)	IS 4770:1991	Rubber Gloves for electrical purposes		
(2)	IS 5424:1969	Rubber mats for electrical purpose (Superseded by IS 15652:2006)	April 2011	(2)

CHAPTER- V

FORMS FOR TENDER ETC.

Proforma A

LIST OF WORKS COMPLETED IN LAST THREE FINANCIAL YEARS

SN	Description of work	Organization for whom executed	Approximate value of contract at the time of award.	Date of award	Date of scheduled completion of work	Actual completion	Final value of contract

Signature of the Contractor.

Proforma B

LIST OF WORKS ON HAND

SN	Description of work	Contract value	Approximate value of balanced work yet to be done	Date of award

Signature of the Contractor

FORM 14**उपबंद**

सविदा करार सं.....तारीख.....यह करार आनुचछेद एक पक्षकार के रूप में.....रेल प्रशासन के माध्यम से कार्यरत भारत के राष्ट्रपति, जिनहे ईस्मे आगे “रेल” कहा गया है, तथा दूसरे पक्षकार के रूप में मेसर्स..... जिनहे इसमें आगे ठेकेदार कहा गया है, के बीच आज तारीख.....को किया गया ।।

ठेकेदारो को इसमें ऊपापबद्ध आनुसूची में उपवर्णित.....कार्य के निष्पादन के लिए ता.....की मुद्रित/अग्रिम संशोधा पर्ची सं.....संशोधित कार्य पुस्तिका भाग III में और ता..... की मुद्रित/अग्रिम संशोधा पर्ची सं.....तक संशोधित सवाछता संबंधी कार्य पुस्तिका में अंतर्विष्ट मध्य रेल के विनिर्देशों तथा तारीख..... की मुद्रित/अग्रिम संशोधा पर्ची सं तक संशोधित मध्य रेल की दर आनुसूची, भाग I तथा विशेष विनिर्देशों, यदि कोई हो, पर और इससे उपाबद्ध रेखाचित्र के अनुरोध कार्य करो का करार किया है और उक्त का निष्पादन ऐसा कार्य है, जिससे जाता हितबद्ध है।

अब यह विलेख इस बात का साक्षी है की, रेलो द्वारा किए जो वाले संदायों के प्रतिफलस्वरूप, ठेकेदार उक्त आनुसूची में उपवर्णित उक्ता कार्य का सम्यक रूप से निष्पादन करेंगे और उक्ता कार्य मध्य रेल के समाधानप्रद रूप में बहुत तत्परता, सावधानी और सही ढंग से कुशलता से करेंगे तथा तारीख.....को या इससे पहले उक्ता विनिर्देशों और उक्ता रेखाचित्रों तथा सविन्दा की उक्ता शर्तों के अनुसार पूरा करेंगे और उक्ता कार्यों के पूरा होने की प्रामाणिक तारीख से.....कलेंडर मास अवधि के लिए उनका अनुरक्षण करेंगे तथा उसमें उल्लेखित सभी शर्त (जिनहे इस सविन्दा का भाग समझा और मान जाएगा मानें वे इसमें पूर्णहता उपवर्णित की गई है) को मानेंगे, पूरा करेंगे उनका निर्वाह करेंगे और रेल इसके दुवारा करार करती है की, यदि ठेकेदार उक्ता कार्य का पूर्वोक्त रीति से सम्यक रूप से निष्पादन करेंगा उक्ता निर्बंधनों और शर्तों का पाला और विवाह करेंगा तो रेल उक्ता कार्यों के अंतिम रूप से पूरा हो जाने पर ठेकेदार को उक्ता कार्यों के संबंध में इससे उपबद्ध आनुसूची में विनिर्दिष्ट दरो पर देय रक्कम का संदाय करेंगी या कराएंगी ।

ठेकेदार.....	पदनाम.....
पता.....	भारत के राष्ट्रपति के लिए
तारीख.....	
ठेकेदार के हस्ताक्षर, साक्षियों के हस्ताक्षर तथा पते	तारीख.....
1.....	साक्षी
	1.....
2.....	2.....

MANDATE FORM FOR EFT/NEFT

1. Particulars of the Party.

- i) **Name:-** _____
- ii) **Address:-** _____
- iii) **Phone No.:-** _____ **Mobile No.** _____
Fax No:- _____
- iv) **Income Tax PAN No.** _____
- v) **E Mail ID** _____

2. Particulars of Bank Account

- i) **City :-** _____
- ii) **Bank Name:** _____
- iii) **Branch:** _____
- iv) **Bank Address:-** _____
- v) **Bank Tel. No.** _____ **FAX no.** _____
- vi) **Bank MICR Code(9 Digit)** _____
- vii) **Bank IFS Code:** _____
- viii) **Bank Account No.** _____
(Please enclose a canceled blank cheque)
- ix) **Account type :- (Saving/Current/Cash Credit)** _____

- 3. Certified that the particulars furnished with reference to Bank Account are correct and the bank guarantees to honor all EFT/NEFT advices/reports as per RBI Regulations.**

 Bank Seal Signature of the authorized official of the bank

4. DECLARATION BY THE PARTY

- i. I hereby declare that the particulars given in this mandate form are correct and complete. If the transaction is delayed or not effected at all for reasons of incomplete or incorrect information, the User institution i.e. FA & CAO/Central Railway Mumbai will not be held responsible.

Date _____

Signature of the party with stamp

FORM-15
(On Stamp Paper of Requisite Value)
GUARANTEE BOND FOR SECURITY DEPOSIT

(TO BE USED BY APPROVED SCHEDULE BANKS/NATIONALISED BANKS)

1. In consideration of the President of India " hereinafter called "the Government" having agreed to exempt.....(hereinafter called "the said Contractor (s)" from the demand, under the terms and conditions of an Agreement dated.....made between.... and..... for (hereinafter called "the said Agreement") of security deposit for the due fulfillment by the said Contractor (s) of the terms and conditions contented in the said Agreement, on production of a Bank guarantee for Rs.....(Rupees.....only). We,..... (indicate the name of Bank) hereinafter referred to as "the Bank" at the request of..... (Contractor(s) do hereby undertake to pay to the Government an amount not exceeding Rs..... against any loss or damage caused to or suffered or would be caused to or suffered by the Government by reason of any breach by the said Contractor (s) of any of the terms or conditions contained in the said Agreement.
2. We..... (indicate the name of Bank) do hereby undertake to Pay the amount due and payable under this guarantee without any demur, merely on a demand from the Government stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Government by reason of breach by the said Contractor(s) of any of the terms or conditions contained in the said Agreement or by reason of the Contractor (s) failure to perform the said Agreement. 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.....
3. We undertake to pay to the Government any money so demanded notwithstanding any dispute or disputes raised by the Contractor (s)/ supplier (s) in any suit for proceeding pending before any court or Tribunal relating thereto our liability under this present contract being absolute and unequivocal.

The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the Contractor (s)/supplier (s) shall have no claim against us for making such payment.

4. We..... (indicate the name of 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 Agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till..... office / Department Ministry of.....certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said contractor (s) and accordingly discharges this guarantee. Unless a Demand or claim under this guarantee is made on us in writing on or before the..... (b) we shall be discharged from all liability under this guarantee thereafter.
5. We..... (indicate the name of Bank) further agree with the Government that the Government 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 Agreement or to extend time of performance by the said Contractor (s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said Contractor (s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor (s) or for any forbearance, act or omission on the part of the Government or any indulgence by the

Government to the said Contractor (s) 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.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor (s)/ Supplier (s).
7. We..... (indicate the name of Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Government in writing.
Dated : the..... day of.....20
for.....
(indicate the name of Bank)

-
- (a) The guarantee shall be valid for a period of two months after the expiry of the guarantee period of the equipment.



FORM-16**STANDING INDEMNITY BOND FOR 'ON ACCOUNT' PAYMENTS****(On paper of requisite stamp value)**

We, M/s..... hereby undertake that we hold at our stores Depot/s at..... for and on behalf of the President of India acting in the premises through the General Manager or his successor of Central Railway (hereinafter referred to as "The Purchaser") all materials for which 'On Account' payments have been made to us against the Contract for supply and erection of (Name of work) *.on the section/s of Central Railway also referred to as Group/s..... vide letter of Acceptance of Tender No..... dated..... and materials handed over to us by the purchaser for the purpose of execution of the said Contract, until such time the materials are duly erected or otherwise handed over to him.

We shall be entirely responsible for the safe custody and protection of the said materials against all risk till they are duly delivered as erected equipment to the purchaser or as he may direct otherwise and shall indemnify the purchaser against any loss damage or deterioration whatsoever in respect of the said materials while in our possession and against disposal of surplus materials. The said materials shall at all times be open to inspection by any officer authorized by the General Manager incharge of Railway Electrification (whose address will be intimated in due course).

Should any loss, damage or deterioration of materials occur or surplus materials disposed off and refund becomes due, the Purchaser shall be entitled to recover from us the full cost as per prices included in Schedule 3 to the Contract (as applicable) and in respect of other materials as indicated in part I, Chapter- IV, section 1 and also compensation for such loss or damage if any long with the amount to be refunded without prejudice to any other remedies available to him by deduction from any sum due or any sum which at any time hereafter becomes due to us under the said or any other Contract.

Dated this day..... day of..... 20

for and on behalf of

M/s.....(Contractor)

Signature of witness

Name of witness in Block Letters

Address.

* Strike out whichever is not applicable

FORM-19
(On Stamp Paper of Requisite Value)
GUARANTEE BOND AGAINST "ON ACCOUNT" PAYMENTS

(TO BE USED BY APPROVED SCHEDULE BANKS/NATIONALISED BANKS)

1. In consideration of the President of India " hereinafter called "the Government") having agreed to exempt.....(hereinafter called "the said Contractor (s)") from the demand, under the terms and conditions of an Agreement dated.....made between.... and..... for (hereinafter called "the said Agreement") of "On- Account" Payments for the due fulfillment by the said Contractor (s) of the terms and conditions contented in the said Agreement, on production of a Bank guarantee for Rs.....(Rupees.....only).

We,..... (indicate the name of Bank) hereinafter referred to as "the Bank" at the request of..... (Contractor(s) do hereby undertake to pay to the Government an amount not exceeding Rs..... against any loss or damage caused to or suffered or would be caused to or suffered by the Government by reason of any breach by the said Contractor (s) of any of the terms or conditions contained in the said Agreement.

2. We..... do hereby undertake to Pay (indicate the name of the Bank) the amount due and payable under this guarantee without any demur, merely on a demand from the Government stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Government by reason of breach by the said Contractor (s) of any of the terms or conditions contained in the said Agreement or by reason of the Contractor (s) failure to perform the said Agreement. 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.....
3. We undertake to pay to the Government any money so demanded notwithstanding any dispute or disputes raised by the Contractor (s)/ supplier (s) in any suit for proceeding pending before any court or Tribunal relating thereto our liability under this present contract being absolute and unequivocal.

The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the Contractor (s)/supplier(s) shall have no claim against us for making such payment.

4. We..... (indicate the name of 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 Agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till..... office/ Department Ministry of.....certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said contractor (s) and accordingly discharges this guarantee. Unless a Demand or claim under this guarantee is made on us in writing on or before the..... (b) we shall be discharged from all liability under this guarantee thereafter.
5. We..... (indicate the name of Bank) further agree with the Government that the Government 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 Agreement or to extend time of performance by the said Contractor (s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said Contractor (s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such

variation, or extension being granted to the said Contractor (s) or for any forbearance, act or omission on the part of the Government or any indulgence by the Government to the said Contractor (s) 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.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor (s)/ Supplier (s).
7. We..... (indicate the name of Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Government in writing.

Dated : the..... day of..... 20

for.....

(indicate the name of Bank)

1. The guarantee shall be valid for a period of two months after the completion of installation and testing to the satisfaction of Engineer-in-Charge.



FORM-21**(On Stamp Paper of Requisite Value)****GUARANTEE BOND AGAINST PROVISIONAL ACCEPTANCE PAYMENTS****(TO BE USED BY APPROVED SCHEDULE BANKS/NATIONALISED BANKS)**

1. In consideration of the President of India " hereinafter called "the Government" having agreed to exempt.....(hereinafter called "the said Contractor (s)" from the demand, under the terms and conditions of an Agreement dated.....made between.... and..... for (hereinafter called "the said Agreement") of Provisional Acceptance Payments for the due fulfillment by the said Contractor (s) of the terms and conditions contented in the said Agreement, on production of a Bank guarantee for Rs.....(Rupees.....only). We,..... hereinafter referred to as "the Bank" (indicate the name of Bank) at the request of..... (Contractor(s) do hereby undertake to pay to the Government an amount not exceeding Rs..... against any loss or damage caused to or suffered or would be caused to or suffered by the Government by reason of any breach by the said Contractor (s) of any of the terms or conditions contained in the said Agreement.
2. We..... (indicate the name of the Bank) do hereby undertake to Pay the amount due and payable under this guarantee without any demur, merely on a demand from the Government stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Government by reason of breach by the said Contractor (s) of any of the terms or conditions contained in the said Agreement or by reason of the Contractor (s) failure to perform the said Agreement. 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.....
3. We undertake to pay to the Government any money so demanded notwithstanding any dispute or disputes raised by the Contractor (s), supplier (s) in any suit for proceeding pending before any court or Tribunal relating thereto our liability under this present contract being absolute and unequivocal.
The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the Contractor (s)/supplier (s) shall have no claim against us for making such payment.
4. We..... (indicate the name of 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 Agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till..... office/Department Ministry of.....certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said contractor (s) and accordingly discharges this guarantee. Unless a Demand or claim under this guarantee is made on us in writing on or before the..... (b) we shall be discharged from all liability under this guarantee thereafter.
5. We..... (indicate the name of the Bank) further agree with the Government that the Government 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 Agreement or to extend time of performance by the said Contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said Contractor (s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Contractor (s) or for any forbearance, act or omission on the part of the Government or any indulgence by the Government to the said Contractor (s) 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.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor (s)/ Supplier (s).

7. We..... (indicate the name of the Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Government in writing.

Dated: the..... day of..... 20

for.....

(indicate the name of Bank)

(a) The guarantee shall be valid for a period of two months after the completion of work.

ANNEXURE 'A'

DECLARATION FORMAT

As per GCC April 2022, Clause No.16 Employment / Partnership etc. of Retired Railway Employees.

Clause	CONDITIONS	WRITE YES/NO WHICH IS APPLICABLE
16 (a)	(i) Should a tenderer be a retired Engineer of the gazetted rank or any other gazetted officer working before his retirement, whether in the executive or administrative capacity or whether holding a pensionable post or not, in the Engineering or any other department of any of the railways owned and administered by the President of India for the time being,	YES/NO In case where such Engineer or officer had not retired from government service at least 1 year prior to the date of submission of the Tender.
	OR (ii) Should a tenderer being partnership firm / joint venture (JV) / registered society / registered trust etc. have as one of its partners a retired Engineer of the gazetted rank or any other gazetted officer working before his retirement,	THEN The tenderer will give full information as to the date of retirement of such Engineer or gazetted officer from the said service and as to whether permission for taking such contract, or if the Contractor be a partnership firm or an incorporated company, to become a partner or director as the case may be, has been obtained by the tenderer or the Engineer or officer, as the case may be from the President of India or any officer, duly authorized by him in this behalf, shall be clearly stated in writing at the time of submitting the tender.
	OR (iii) Should a tenderer being an incorporated company have any such retired Engineer of the gazetted rank or any other gazetted officer working before his retirement as one of its directors	
16 (b)	In case, upon successful award of contract, should a tenderer depute for execution of the works under or to deal matters related with this contract, any retired Engineer of gazette rank or retired gazetted officer working before his retirement in the Engineering or any other department of any of the railways owned and administered by the President of India for the time being, and now in his employment.	YES/NO If yes then the tenderer will ensure that retired Engineer or retired gazetted officer had retired from government service at least 1 year prior to the date of his employment with tenderer and in case he had retired from service within a year then he possesses the requisite permission from the President of India or any officer, duly authorized by him in this behalf, to get associated with the tenderer.
16 (c)	Should a tenderer or Contractor being an individual, have member(s) of his family or in the case of partnership firm/ company / joint venture (JV) / registered society / registered trust etc. one or more of his partner(s) / shareholder(s) or member(s) of the family of partner(s)/shareholder(s)having share of more than 1% in the tendering entity employed in gazetted capacity in the Engineering or any other department of the railway	YES/NO If yes then the tenderer at the time of submission of tender, will inform the Authority inviting tenders the details of such persons.
Note: - If information as required as per 16. a), b), c) above has not been furnished; contract is liable to be dealt in accordance with provision of clause 62 of Standard General Condition of contract.		

Date:
Place:

Signature
(Name of contractor/firm)

Annexure-B**SAMPLE FORMAT OF COMPLETION CERTIFICATE**

SN	Name of Item	Description
1	LOA No. and date	
2	Name of the work	
3	Contract Agreement No. and date	
4	Name of the contractor	
5	Original Agreement Value	
6	Revised Agreement Value, if any	
7	Date of commencement of work	
8	Date of completion of work as per original / revised agreement	
9	Date of actual completion	
10	Cumulative payment made to the contractor up to the Last paid bill	
11	Total Penalty Imposed (If No penalty, please specified as NIL)	
12	Performance of the contractor	

This certificate submitted by the tenderer should be signed by competent authority of the concerned department.

Annexure –VIA

Para 5 of the Instructions to Tenderers

(Bid Security)

Bank Guarantee Bond from any scheduled commercial bank of India
(On non-judicial stamp paper, which should be in the name of the Executing Bank).

Name of the Bank: -----

President of India,

Acting through,

..... Railway,

Beneficiary: Railway

Date:.....

Bank Guarantee Bond No.:**Date:-----**

In consideration of the President of India acting through----- (***Designation & address of Contract Signing Authority***), Railway,, (hereinafter called "The Railway") having invited the bid for _____ through Notice inviting tender (NIT) No. _____, We have been informed that ***[Insert name of the Bidder]***..... (***hereinafter called "the Bidder"***) intends to submit its bid (hereinafter called "the Bid")

WHEREAS, the Bidder is required to furnish Bid Security for the sum of ***[Insert required Value of Bid Security]***, in the form of Bank Guarantee, according to conditions of Bid.

AND

WHEREAS,.....***[Insert Name of the Bank]***, with its Branch.....***[Insert Address]*** having its Headquarters office at..... ***[Insert Address]***, hereinafter called the **Bank**, acting through.....***[Insert Name and Designation of the authorised persons of the Bank]***, have, at the request of the Bidder, agreed to give guarantee for Bid Security as hereinafter contained, in favour of the Railway:

1. KNOW ALL MEN that by these present that I/We the undersigned ***[Insert name(s) of authorized representatives of the Bank]***, being fully authorized to sign and incur obligations for and on behalf of the Bank, confirm that the Bank, hereby, unconditionally and irrevocably guarantee to pay to the Railway full amount in the sum of ***[Insert required Value of Bid Security]*** as above stated.
2. The Bank undertakes to immediately pay on presentation of demand by the Railway any amount up to and including aforementioned full amount without any demur, reservation or recourse. Any such demand made by the Railway on the Bank shall be final, conclusive and binding, absolute and unequivocal on the Bank notwithstanding any disputes raised/ pending before any Court, Tribunal, Arbitration or any Authority or any threatened litigation by the Bidder or Bank.
3. The Bank shall pay the amount as demanded immediately on presentation of the demand by Railway without any reference to the Bidder and without the Railway being required to show grounds or give reasons for its demand of the amount so demanded.
4. The guarantee hereinbefore shall not be affected by any change in the constitution of the Bank or in the constitution of the Bidder.
5. The Bank agrees that no change, addition, modifications to the terms of the Bid document or to any documents, which have been or may be made between the Railway and the Bidder, will in any way absolve the Bank from the liability under this guarantee; and the Bank, hereby, waives any requirement for notice of any such change, addition or modification made by Railway at any time.
6. This guarantee will remain valid and effective from.....***[insert date of issue]***till***[insert date, which should be minimum 90 days beyond the expiry of validity of Bid]***. Any demand in respect of this Guarantee should reach the Bank within the validity period of Bid Security.

7. The Bank Guarantee is unconditional and irrevocable.
8. The expressions Bank and Railway herein before used shall include their respective successors and assigns.
9. The Bank hereby undertakes not to revoke the guarantee during its currency, except with the previous consent in writing of the Railway. This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No.758.
10. The Bank hereby confirms that it is on the SFMS (Structured Financial Messaging System) and shall invariably send the advice of this Bank Guarantee to the following bank details –

IFSC CODE	SBIN00RAIL
IFSC TYPE	BRANCH
BANK NAME	STATE BANK OF INDIA
BRANCH NAME	RAIL
CITY NAME	NAVI MUMBAI
ADDRESS	SECTOR-11, CBD BELAPUR, NAVI MUMBAI
DISTRICT	NAVI MUMBAI
STATE	MAHARASHTRA
BG ENABLED	YES

11. The Guarantee shall be valid in addition to and without prejudice to any other security Guarantee(s) of Bidder in favour of the Railway. The Bank, under this Guarantee, shall be deemed as Principal Debtor of the Railway.

Date

Place.....

.....

Bank's Seal and authorized signature(s)

[Name in Block letters]

[Designation with Code No.]

[P/Attorney] No.

Witness:

1 Signature, Name & Address & Seal

2 Signature, Name& address & Seal

Bank's Seal

*[P/Attorney]*No.

Note: All italicized text is for guidance on how to prepare this bank guarantee and shall be deleted from the final document.

Annexure –VIB

Reference -Para 10.2 & 17.15.2 of Tender Form (Second Sheet) of Annexure I of ITT

Each Bidder or each member of a JV must fill in this form separately:

NAME OF BIDDER/JV PARTNER:

Annual Contractual Turnover Data for the Previous 3/4 Years (Contractual Payment only)			
Year	Amount Currency	Exchange Rate	Indian National Rupees Equivalent
Average Annual Contractual Turnover for last 3 years			

1. The average annual contractual turnover shall be calculated as an average of “total contractual payments” in the previous three financial years. However, in case balance sheet of the previous year is yet to be prepared/ audited, the audited balance sheet of the fourth previous year shall be considered for calculating average annual contractual turnover.
2. The information supplied shall be substantiated by data in the audited balance sheets and profit and loss accounts for the relevant years in respect of the bidder or all members constituting the bidder.
3. Contents of this form should be certified by a Chartered Accountant duly supported by Audited Balance Sheet duly certified by the Chartered Accountant.

SEAL AND SIGNATURE OF THE BIDDER

Certified that all figures and facts submitted in this form have been furnished after full consideration of all observations/notes in Auditor’s reports. _____

(Signature of Chartered Accountant)

Name of CA: _____

Registration No: _____

(Seal)

ANNEXURE-V(A)

Reference -Para 6.1 of ITT

(This certificate is to be given by attorney/authorized signatory/each member of Partnership firm/Joint Venture (JV)/ Hindu Undivided Family (HUF)/ Limited Liability Partnership (LLP) etc.)

I/We.....(Name), attorney/authorized signatory of the
.....(constituent firm / constituent partner) and member/partner of the
.....(tendering firm) hereby solemnly affirm and state as under:

1. I/we certify that.....(Constituent firm/constituent partner) is/are not blacklisted or debarred by Railways or any other Ministry/ Department of Govt. of India from participation in tender on the date of submission of bids, either in individual capacity or as a HUF/ member of the partnership firm LLP/JV/Society/Trust.
2. I/We have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India and certify that I am/We are not from such a country or, if from such a country, have been registered with the competent Authority. I/We hereby certify that I/we fulfil all the requirements in this regard and am/are eligible to be considered (evidence of valid registration by the competent authority is enclosed),

SEAL AND SIGNATURE
OF THE CONSTITUENT FIRM/CONSTITUENT PARTNER

Place :
Dated :

-----End of the document---