



IRCON INTERNATIONAL LIMITED
NAVRATNA COMPANY
 (A Govt. of India Undertaking)

e-PROCUREMENT DOCUMENTS
(National Competitive bidding)

FOR

“Conversion of LT & HT (11 & 33 kV) overhead power line crossings into underground cable lines including replacement/relocation of associated lines & equipments to remove infringement of new diverted alignment of Beohari – Joba section in connection to Katni Singrauli Doubling Project of West Central Railway.”

July' 2026

Registered Office	Project Office
IRCON INTERNATIONAL LIMITED (A Govt. of India Undertaking) C-4, DISTRICT CENTRE, SAKET, NEW DELHI-110017 PHONE:+91-11-29565666; FAX:+91-11-26522000,26854000 Web:www.ircon.org CIN-L45203DL1976GOI008171	IRCON INTERNATIONAL LIMITED (A Govt. of India Undertaking) 1st Floor above Maruti Suzuki Show Room, Near Jhinhari Police station, NH-7, Jabalpur Road Katni-483501 e-mail: rekss.5031@ircon.org Web:www.ircon.org CIN-L45203DL1976GOI008171



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e-PROCUREMENT DOCUMENT

(National Competitive bidding)





SECTION - I
e-PROCUREMENT NOTICE
(National Competitive bidding)



IRCON INTERNATIONAL LIMITED
NAVRATNA COMPANY
(A Govt. of India Undertaking)

No.: IRCON/2065/KSDP/Elect/BEHR-JOBA/PLC/01

Date: 21.07.2026

e-PROCUREMENT NOTICE

i. Chief General Manager/ Electrical, IRCON International Ltd, 1st, Floor above Maruti Suzuki Show Room, Near Jhinhari Police station, NH-7, Jabalpur Road Katni-483501, email.id rekss.5031@ircon.org & raikumar.singh@ircon.org, Mob. No. **7024994563** (Alternate no. **7470793981**) for & on behalf of West Central Railway invites online bids on prescribed forms from bonafide firms/companies having requisite experience and financial capacity for execution of the work detailed in the table given below. The bidder is advised to examine carefully all instructions including addendum/ corrigendum(s), condition of contract data, forms, terms, technical specifications, bill of quantities in the bid document.

1.1 The brief particulars of the project and the tender are as follows in the Key Information Table (KIT):

S. No.	Particular	Details/ Reference of Clause
1	Name of Work	Conversion of LT & HT (11 & 33 kV) overhead power line crossings into underground cable lines including replacement/ relocation of associated lines & equipments to remove infringement of new diverted alignment of Beohari – Joba section in connection to Katni Singrauli Doubling Project of West Central Railway
2	Estimated Cost of Work	Rs. 19,54,36,923/-
3	Completion Period	12 Months (Refer SCC Cl. 30)
4	Publishing Date	21.07.2026 at 11.30 Hrs
5	Bid Document Download/ Start Date	21.07.2026 at 11.30 Hrs
6	Clarification Start Date & Time	21.07.2026 at 12.00 Hrs
7	Clarification End Date & Time	23.07.2026 at 12.00 Hrs
8	Pre-bid Meeting Date, Time & Venue (Optional)	N.A.
9	Email for receiving pre bid queries	N.A.
10	Last date for receiving pre bid queries	N.A.
11	Bid Submission Start Date & Time	24.07.2026 at 09.00 Hrs
12	Bid Submission End Date & Time	12.08.2026 at 15.00 Hrs

13	Bid Opening Date & Time	13.08.2026 at 16.00 Hrs
14	Type of Tender	Open Tender
15	No. of Packets	Two Packet
16	e-Procurement Portal	https://etenders.gov.in/eprocure/app
17	Fee for participating in the bidding (Non-refundable)	Rs. 30,000/- (Refer e-procurement Notice Cl. 4.5)
18	Earnest Money Deposit	Rs. 39,08,800/- Pay Order/ Demand Draft shall be in favour of "IRCON INTERNATIONAL LIMITED" payable at Katni (Refer ITT Cl. 9)
19	Tender Box location address to submit physical document, if any	IRCON International Limited, 1st Floor above Maruti Suzuki Show Room, Near Jhinhari Police station, NH-7, Jabalpur Road Katni-483501 (Refer ITT Cl. 9)
20	Validity of the Bid	90 Days after the date of opening of the tender
21	Place of Registration of firm/ Company	Anywhere in India (Refer ITT Cl. 1.2)
22	Whether Joint Venture (JV) is permitted or not	JV is not permitted
23	Maximum no. of JV members allowed.	N.A.
24	Client/ Owner Name	West Central Railway (Refer ITT Cl. 1.4 a)
25	Employer/ Executing Agency Name & address	IRCON INTERNATIONAL LIMITED, C-4, District Centre, Saket, New Delhi-110 017. (Refer ITT Cl. 1.4 b)
26	Scope of Work	Conversion of LT & HT (11 & 33 kV) overhead power line crossings into underground cable lines including replacement/ relocation of associated lines & equipments to remove infringement of new diverted alignment of Beohari – Joba section in connection to Katni Singrauli Doubling Project of West Central Railway (Refer SCC Cl. 4)
27	Purchase Preference to MSEs	Not Applicable
28	Proforma for Statement of Minor Deviations	Annexure-IV(A) of ITT (Refer ITT Cl. 6 & 7)
29	Statement of Minor Deviations with Price in the Financial Bid	Annexure-IV(AA) of Bill of Quantity (BOQ) (Refer ITT Cl. 6 & 7)
30	Performance Security	5% of Contract Value (Refer SCC Cl. 10.1)
31	Retention Money	Refer SCC Cl. 10.2
32	Insurance	Refer SCC Cl. 11
33	Price Variation	Refer SCC Cl. 58
34	Submission of Performance Security	Within 21 days from the date of issue of Letter of Acceptance (LOA)

		(Refer SCC Cl. 10.1)
35	Defect Liability Period	18 months (Refer SCC Cl. 55)
36	Signing of Agreement	Within 28 days from the date of issue of Letter of Acceptance (LOA) (Refer SCC Cl. 14)

- 2.0 Website <https://etenders.gov.in/eprocure/app> may be referred for detailed terms and conditions of the bidding documents, which is available online. Amendments/ Corrigendum / Addendum, if any would be hosted on the website only.

3.0 Eligibility Criteria

Eligibility of the applicants shall be assessed based on the “Essential Qualifying Criteria” as given in Annexure-V to “Instructions to Tenderers”.

4.0 Accessing of Bid Documents & Fee for participating in the bidding

- 4.1 The complete Bid Document can be viewed / downloaded from the eProcurement portal i.e. <https://etenders.gov.in/eprocure/app> free of cost.

- 4.2 Help for Contractors, FAQ, Information about DSC and Bidders Manual Kit containing the detailed guidelines for e-Procurement system are also available on Central Public Procurement Portal.

- 4.3 It is mandatory for all the bidders to have class-III Digital Signature Certificate (in the name of person having power of attorney to sign the Bid) from any of the licensed Certifying Agency (Bidders can see the list of licensed CA's from the link www.cca.gov.in) to participate in e-Procurement of IRCON.

- 4.4 It is mandatory for the bidders to get their firm /company registered with e-procurement portal <https://etenders.gov.in/eprocure/app> to have user ID & password. A firm/ company who has registered with the e-Procurement portal as a single entity in the individual capacity can submit the tender either as individual firm/ company or joint venture/ consortium, if JV/ consortium is permitted.

- 4.5 Tender documents will be available online on website <https://etenders.gov.in/eprocure/app> as per date mentioned in Key Information Table (KIT) which can be downloaded free of cost. However, to participate in the online bidding process, bidders are required to pay a non-refundable fee of **30,000/- (Rupees Thirty Thousand only) towards the cost of one set of tender document through NEFT or RTGS only in IRCON's Bank account No. 5750000084161, IFSC Code: HDFC0000732 at HDFC bank, Rahul Sadan, Heera Ganji bhagwati Chowk, Katni-483501.**

5.0 Instructions to Bidders for Online Bid Submission on the e-Procurement portal <https://etenders.gov.in/eprocure/app>.

Bidders may download and refer the “Instructions for Online Bid Submission” from (<https://etenders.gov.in/eprocure/app.jsessionid=F90A7689A0BF87EF35B88D2CA57C6FD4.cppsugep2?page=StandardBiddingDocuments&service=page>).

6.0 Pre-bid meeting

~~The bidder is requested to submit his queries in writing so as to reach this office not later than one week before the meeting.~~

- 6.1 ~~A pre-bid meeting of the interested prospective bidders shall be convened on the date as given in Date Sheet in the office of [(Tender Inviting Authority) & Address].~~

- ~~6.2 The purpose of the pre-bid meeting is to clarify issues and to answer questions on any matter that may be raised.~~
- ~~6.3 The bidder is requested to submit his queries in writing either by post/ by hand or by email @ email id mentioned in Key Information Table above so as to reach this office not later than two days before the meeting. The bidder is requested to submit his queries in writing so as to reach this office before clarification end date.~~
- ~~6.4 Any prospective bidders desirous of attending the pre bid meeting shall send a letter of authority on its letter head specifying the name and designation of the person who will be attending the pre bid meeting on its behalf to the Chief General Manager/Electrical, IRCON International Ltd, Katni Singrauli Project Katni, Any such letter of authority shall reach IRCON at least three days before the date of pre-bid meeting.~~
- 7.0 IRCON may issue addendum(s)/corrigendum(s) to the tender documents. In such case the addendum(s)/ corrigendum(s) shall be issued and placed on website **<https://etenders.gov.in/eprocure/app>** at any time before the closing time of tender. The tenderers who have downloaded the tender documents from website must visit the website and ensure that such addendum(s)/corrigendum(s) (if any) is also downloaded by them. This shall be the responsibility of the prospective registered bidders to check the web site for any such corrigendum/addendum at the time of closing time of tender and ensure that bid submitted by them are in accordance with all the corrigendum's/addendums. Suitable time extension (not less than 3 days beyond the date of last amendment) for submission of bids will be granted.
- 8.0 The tender documents shall be submitted online in the prescribed format given on the websites and technical bids received online shall be opened as per date mentioned in Key Information Table (KIT) or corrigendum thereof. No other mode of submission is acceptable. Detailed credentials as per the requirement of eligibility criteria and all tender papers except Bill of Quantities are to be submitted in "Technical Bid". Bill of Quantities with rates duly filled in along with proforma for statement of minor deviations (Annexure-IV AA) with price adjustment for each deviation(s) duly filled in are to be submitted in the format provided online in the name of "Financial Bid". Hence, physical submission of the documents is limited to submission of original Earnest Money Deposit in the form of Pay Order/ Demand Draft / Fixed Deposit Receipt / Bank Guarantee (Note: In case of e-BG physical submission of Bank Guarantee is not required) as per provision given in sub-clause 9.1 of Instructions to Tenderers. Representative of the bidder, who wish to attend in person, may attend the online opening of the bids on scheduled date & time of bid opening by IRCON officials. However, such representatives shall be allowed to attend the opening of the Bids, only, if such person presents the letter of authority issued in his name by the bidder on his letter head.
- 9.0 Bidders cannot submit the tender after the due date and time of e-bid submission. Time being displayed on Central Public Procurement Portal <https://etenders.gov.in/eprocure/app> ("Server System Clock Time") shall be final and binding on the bidder. e-Bids are required to be submitted by bidders, only as per the Indian Standard Time (IST) and not the time as per their location/ country.
- 10.0 The bidders are advised to submit their e-bids well before the e-bid due date. IRCON shall not be responsible for any delay in submission of e-bids for any reason including server and technical problems
- 11.0 The Technical and Financial Bid shall be digitally signed by the Authorized Signatory of the bidder & submitted "on-line" only. The authorized signatory of the bidder

must be in possession of Power of Attorney before submitting the digitally signed bid. Scanned copies of various documents can be prepared in different file format (PDF, JPEG).

12.0 Tender shall be submitted as per “Instructions to Tenderers” forming a part of the tender document.

13.0 **Any tender received without original Earnest Money in the form as specified in tender documents shall not be considered and shall be summarily rejected.**

14.0 IRCON reserves the right to cancel the tenders before submission/opening of tenders, postpone the tender submission/opening date and to accept/reject any or all tenders without assigning any reasons thereof. IRCON’s assessment of suitability as per eligibility criteria shall be final and binding.

15.0 Tenderers may note that they are liable to be disqualified at any time during tendering process in case any of the information furnished by them is not found to be true. EMD of such tenderer shall be forfeited. The decision of IRCON in this regard shall be final and binding.

16.0 IRCON reserves the right to pre-qualify the bidder(s) provisionally based on the documents submitted by them and open financial bid(s), subject to their final verification. In the event of any document being found false, the provisional qualification shall stand withdrawn, and the next lower bidder shall automatically come to the position of such disqualified bidder. Action against such disqualified tenderers shall be taken as per above clause no. 15.0 of Notice Inviting Tender.

16.1 The tenderers shall submit affidavit stating that all their statements/ documents submitted along with bid are true and correct. Standard format of affidavit to be submitted by the bidder is enclosed as Annexure-IV. Non submission of above affidavit by the bidder shall result in summarily rejection of his/ their bid.

17.0 **The validity of tender shall be for the period indicated in Key Information Table (KIT) in para 1.1 of e-Procurement Notice after the date of the opening of the tender.**

18.0 Public Procurement (Preference to Make in India), Order 2017

18.1.1 **Class-1 Local Vendor** - a supplier or service provider, whose goods, services or works offered for procurement, has minimum local content equal to or more than 50%.

18.1.2 **Class-II Local Vendor** - a supplier or service provider, whose goods, services or works offered for procurement, has minimum local content more than 20% but less than 50% (Clarification: Local vendor does not mean vendor from particular state/ area)

18.1.3 **Non-Local Vendor** - a supplier or service provider, whose goods, services or works offered for procurement, has minimum local content less than or equal to 20%.

18.2 In procurement of all goods, services or works in respect of which the Nodal Ministry/ Department has communicated that there is sufficient local capacity and local competition, only 'Class-I local vendor', as defined above, shall be eligible to bid irrespective of purchase value.

- 18.2.1 Only '**Class-I local vendor**' and '**Class-II local vendor**' shall be eligible to bid in procurement of all goods, services or works, and with estimated value of purchases less than ₹ 200 crore.
- 18.2.2 In all other domestic tenders, Class-I local vendors " and "Class-II local vendors can participate in the bidding process.
- 18.2.3 'Class-I local vendors' shall get purchase preference over 'Class-II local vendors'
- 18.2.4 'Class-II local vendors' will not get any purchase preference.
- 18.2.5 Non local vendors can participate only when global tender is invited. In global tender enquiry. 'Non-local vendors' shall also be eligible to bid along with 'Class-I local vendors' and 'Class-II local vendors'.
- 18.2.6 The bidder(s) offering imported products will fall under the category of Non-local vendors. They can't claim themselves as Class-I local vendors/ Class-II local vendors by claiming the services such as transportation, insurance, installation, commissioning, training and after sales service support like AMC/CMC etc. as local value addition
- 18.3 The margin of purchase preference shall be 20%.
- 18.3.1 'Margin of purchase preference means the maximum extent to which the price quoted by a "Class-I local Vendor may be above the L1 for the purpose of purchase preference.
- 18.4 Bidders (manufacturer or principal of authorised representative) who have a valid/ approved ongoing 'Make in India' agreement/ program and who while meeting "Essential Qualifying Criteria" **as given in Annexure-V to "Instructions to Tenderers"**, would also be considered to be qualified provided:
- i) their foreign 'Make-in-India' associates meets "Essential Qualifying Criteria" **as given in Annexure-V to "Instructions to Tenderers"** without exemption, and
 - ii) the Bidder submits appropriate documentary proof for a valid/ approved ongoing 'Make in India' agreement/ program.
 - iii) the bidder (manufacturer or principal of authorised representative) furnishes along with the bid a legally enforceable undertaking jointly executed by himself and such foreign Manufacturer for satisfactory manufacture, Supply (and erection, commissioning if applicable) and performance of 'The Product' offered including all warranty obligations as per the general and special conditions of contract.
- 18.5 In the procurements of goods or works, which are covered by sub-clause 18.2.1 and 18.2.5 above and which are divisible/ splittable in nature, the 'Class-I local vendor' shall get purchase preference over 'Class-II local vendor', as per the following procedure:
- 18.5 (i) Among all qualified bids, the lowest bid will be termed as L1. If L1 is 'Class-I local vendor', the contract for full quantity will be awarded to L1.
- 18.5 (ii) If L1 bid is not a 'Class-1 local vendor, 50% of the order quantity shall be awarded to L1. Thereafter, the lowest bidder among the 'Class-I local vendors', will be invited to

match the L1 price for the remaining 50% quantity subject to the 'Class-I local vendor's quoted price falling within the purchase preference margin of (L1+20%), and contract for that quantity shall be awarded to such 'Class-I local vendor' subject to matching the L1 price. In case such lowest eligible 'Class-I local vendor' fails to match the L1 price or accepts less than the offered quantity, the next higher Class-I local vendor' within the purchase preference margin of (L1+20%) shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In case some quantity is still left uncovered on 'Class-I local vendors, then such balance quantity may also be ordered on the L1 bidder.

- 18.6 In procurements of goods or works, which are covered by sub-clause 18.2.1 and 18.2.5 above and which are not divisible in nature, and in procurement of services where the bid is evaluated on price alone, the 'Class-I local vendor' shall get purchase preference over 'Class-II local vendor' as well as 'Non-local vendor' as per following procedure:
- 18.6 (i) Among all qualified bids, the lowest bid will be termed as L1. If L1 is "Class-I local vendor, the contract will be awarded to L1.
- 18.6 (ii) If L1 is not 'Class-I local vendor', the lowest bidder among the 'Class local vendors', will be invited to match the L1 price subject to Class-1 local vendor's quoted price falling within the purchase preference margin of (L1+ 20%), and the contract shall be awarded to such 'Class-I local vendor' subject to matching the L1 price.
- 18.6 (iii) In case such lowest eligible 'Class-I local vendor' fails to match the L1 price, the 'Class-I local vendor' with the next higher bid within the purchase preference margin of (L1+ 20%) shall be invited to match the L1 price and so on and contract shall be awarded accordingly. In case none of the 'Class-I local vendor' within the purchase preference margin of (L1+20%) matches the L1 price, then the contract may be awarded to the L1 bidder.
- 18.7 The 'Class-I local vendor' / 'Class-II local vendor' at the time of tender, bidding or solicitation shall be required to indicate percentage of local content and provide self-certification that the item offered meets the local content requirement for 'Class-I local vendor' / 'Class-II local vendor', as the case may be. They shall also give details of the location(s) at which the local value addition is made.
- 18.8 In cases of procurement for a value in excess of ₹10 Crores, the 'Class-1 local vendor' / 'Class-II local vendor' shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of supplies other than companies) giving the percentage of local content.
- 18.9 A vendor who has been debarred by any procuring entity for violation of this Order shall not be eligible for preference under this Order for procurement by any other procuring entity for the duration of the debarment.
- 18.10 Entities of countries which have been identified by the Nodal Ministry/Department as not allowing Indian companies to participate in their Government procurement for any item related to that Ministry/Department shall not be allowed to participate in procurement for all items related to the nodal Ministry/Department, except for the list of items published by

the Ministry/Department permitting their participation. The term entity of a country shall have the same meaning as in the FDI policy of DPIIT as amended from time to time.

For & on behalf of
West Central Railway

Chief General Manager (Elect)
IRCON INTERNATIONAL LIMITED
R. K. Singh
1st Floor, above Maruti Suzuki Shoowroom,
Near Jhinhari Police Station, NH-7,
Jabalpur Road, Katni-483501
e-mail id: rajkumar.singh@ircon.org, rekss.5031@ircon.org
Contact No.: 7024994563

SECTION - II
FORM OF BID

FORM OF BID

To

IRCON INTERNATIONAL LIMITED,
Acting Through
Chief General Manager/ Electrical,
1st Floor, Above Maruti Suzuki Show Room
Jhinjari, Katni-483501

Dear Sir,

I/We, _____ (*Name and address of the tenderer*) have read the various terms and conditions of the e-Procurement documents attached here with duly signed by me/us and agree to abide by the same. I/We also agree to keep this tender open for acceptance **within the period of the validity of bids** and on default thereof our Earnest Money is liable to be forfeited.

I/We hereby declare that we have visited the site of the work and have made ourselves fully conversant of the conditions therein and including the topography of area, soil strata at site of work, sources and availability of construction materials, rates of construction materials, water, electricity, all local taxes, royalties, octroi etc., availability of local labour (both skilled and unskilled), relevant labour rates and labour laws, the existing road and approaches to the site of work, requirements for further service roads / approaches to be constructed by me / us, the availability and rates of private land etc. that may be required by me / us for various purposes, climatic conditions, law and order situation and availability of working days.

I/We have quoted our rates for various items in the Bill of Quantities taking into account all the above factors and I/We offer to do the work "Design, Supply, Installation, Testing & Commissioning of External electrification of Residential quarters, platform lighting, Station buildings, HT/LT power supply arrangement, power line modification etc. for balance general electrical work in connection to Katni Singrauli Doubling Project of West Central Railway" at the rates quoted in the attached Bill of Quantities and hereby bind ourselves to complete the work in all respects within time schedule depicted in tender documents from the date of issue of letter of acceptance of tender.

I/We also understand that until a formal Contract Agreement is executed, Letter of Acceptance along with all tender documents shall constitute a binding contract between me/us and Ircon International Limited.

Our Bank Account No. for the purpose of refund of EMD is.....(*Account No., Name of A/C Holder, other details for NEFT/RTGS*).

Thanking you,
Yours Faithfully,

Signature_____ and name of signatory _____

in capacity of _____ duly authorized to sign bids for and on behalf of:

_____ (*In Block capital letters*)

Date this _____ day of _____ 20__.

SECTION - III
INSTRUCTION TO TENDERERS

SECTION III: Instructions To Tenderers

Table of Clauses

Clause No.	Description
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C.5	Language of Bid
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C.7	Deviations
C.8	Submission of tender documents
C.9	Earnest Money
C.10	Integrity Pact
C.11	Period of validity of the tender
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Annexure-B	Procedure for Suspension/Banning of Business Dealings with agencies in IRCON
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INSTRUCTIONS TO TENDERERS (ITT)

A.

1. General

1.1. Name of the Work: As indicated in 'Key Information Table (KIT) in Para 1.1 of e-Procurement Notice'.

1.2. "A bidder in the capacity of Individual or Sole Proprietor, Partnership Firm, or Company/~~Joint Venture (JV)~~ can participate in the tender and the bidder must upload copies of the constitution of its firm such as Partnership Deed, Registration Certificate, Memorandum & Articles of Association, etc., as applicable, ~~MOU/ Joint Venture agreement, if applicable,~~ duly attested by the authorized signatory along with Power of Attorney of authorized signatory, signing the e-bid documents digitally as well as manually, duly attested by Notary Public".

Note: Joint Venture Firms are not permitted.

1.2.1 Place of Registration of firm/ company as indicated in "Key Information Table (KIT) in Para 1.1 of e-Procurement Notice".

1.2.2 Please refer Key Information Table (KIT) in Para 1.1 of e-Procurement Notice to check whether Joint Venture (JV) is permitted or not permitted to participate in the tender.

1.2.3 Foreign bidder as a single entity is not permitted to participate in the national competitive bidding, if it is not legally valid firm/ company registered in India as per Indian laws. ~~However, if Joint Venture is permitted in this tender as per sub-clause no. 1.2.2 above, then foreign bidder can participate as a member of JV. Foreign bidder from a country which shares land border with India also has to satisfy the requirements mentioned in sub-clause 1.3 below.~~

1.2.5 Participation of Partnership Firms:

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

1.2.5.2 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.

1.2.5.3 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.

1.2.5.4 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 the Employer and in any case the minimum eligibility criteria should not get vitiated. The reconstitution 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 Employer 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 the Employer 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 50 of the Standard General Conditions of Contract.

- 1.2.5.5 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.
- 1.2.5.6 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.
- 1.2.5.7 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.
- 1.2.5.8 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.
- 1.2.5.9 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 Employer 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 Employer 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 the Employer, shall constitute a breach of the contract, liable for determination of the contract under Clause 50 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 Employer.

1.3 Any bidder from a country, which shares a land border with india, will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) or works (including turnkey projects) only if the bidder is registered with the Competent Authority which shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT). Further, any bidder (including an Indian Bidder) who has a specified Transfer of Technology (TOT) arrangement with an entity from a country which shares a land border with India, shall also be required to be registered with the same competent authority as above.

The above requirement of registration of bidders who have specified Transfer of Technology (ToT) arrangement with an entity from a country which shares a land border with India will be applicable for all Procurements where tenders are issued/ published after 01.04.2023.

- i) "Bidder (or entity) from a country which shares a land border with India" for the purpose of this Clause means: -

- a. An entity incorporated, established or registered in such a country; or
- b. A subsidiary of an entity incorporated, established or registered in such a country; or
- c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
- d. An entity whose beneficial owner is situated in such a country; or
- e. An Indian (or other) agent of such an entity; or
- f. A natural person who is a citizen of such a country; or
- ~~g. A consortium or joint venture (if joint venture is permitted in the tender in terms of sub-clause 1.2.2 above) where any member of the consortium or joint venture falls under any of the above.~~

- ii) The beneficial owner for the purpose of (i) above will be as under:

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

Explanation-

- a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five percent of shares or capital or profits of the company.
 - b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements.
- 2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more judicial person, has

ownership of entitlement to more than fifteen percent of capital or profits of the partnership:

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;
4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;
5. In case of a trust, the identification of beneficial owner (s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control of ownership.

iii) An agent is a person employed to do any act for another, or to represent another in dealings with third person.

(NOTE:

- a) A person who procures and supplies finished goods from an entity from a country which shares a land border with India will, regardless of the nature of his legal or commercial relationship with the producer of the goods, be deemed to be an Agent for the purpose of this Order.
 - b) However, a bidder who only procures raw material, components etc. from an entity from a country which shares a land border with India and then manufactures or converts them into other goods will not be treated as an Agent.]
- iv) The successful bidder shall not be allowed to sub-contract works to any contract from a country, which shares a land border with India unless such contractor is registered with the Competent Authority.
- v) The registration shall be valid at the time of submission of bid and at the time of acceptance of bid.
- vi) If the bidder was validly registered at the time of acceptance/ placement of order, registration shall not be a relevant consideration during contract execution.

1.3.1 “*Transfer of Technology*” means dissemination and transfer of all forms of commercially usable knowledge such as transfer of know-how, skills, technical expertise, designs, processes and procedures, trade secrets, which enables the acquirer of such technology to perform activities using the transferred technology independently. (Matters of interpretation of this term shall be referred to the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade, and the interpretation of the Committee shall be final.)

1.3.2 “Specified Transfer of Technology” means a transfer of technology in the in the sectors and/ or technologies, specified as under occurring on or after 23.07.2020:

- (a) Certain sectors and technologies have been identified as sensitive from the national security point of view. The sectors listed in Schedule I below are considered Category-I sensitive sectors. The sectors listed in Schedule II below are considered Category-II sensitive sectors. The technologies listed in Schedule III below are considered sensitive technologies.
- (b) For Category-I sensitive sectors, bidders with ToT arrangement in any technology with an entity from a country which shares a land border with India shall require registration.
- (c) For Category-II sensitive sectors, bidders with ToT arrangement in the sensitive technologies listed in Schedule III, with an entity from a country which shares a land border with India shall require registration.
- (d) In Category-II sensitive sectors, the Secretary (or an officer not below the rank of Joint Secretary to Government of India, so authorized by the Secretary) of the Ministry/ Department of the Government of India is empowered, after due consideration, to waive the requirement of registration for a particular item/ application or a class of items/ applications from the requirement of registration, even if included in Schedule III. The Ministry/ Department concerned shall intimate the Department for Promotion of Industry and Internal Trade (DPIIT) and National Security Council Secretariat (NSCS) of their decision to waive the requirement of registration. Ministries/ Departments of the Government of India are not required to consult the DPIIT/ NSCS before deciding and are only required to intimate the decision to DPIIT/ NSCS. If any point is raised by DPIIT/ NSCS, it should be considered in future procurements; ongoing procurement for which the waiver was granted need not be interrupted or altered.

Sr. No.	Schedule I	Schedule II	Schedule-III
	Category-I Sensitive sectors	Category-II Sensitive sectors	Sensitive Technologies
(i)	Atomic Energy	Power and Energy (including exploration/ generation/ transmission/ distribution/ pipeline)	Additive Manufacturing (e.g. 3D Printing)
(ii)	Broadcasting/ Print and Digital Media	Banking and Finance including Insurance	Any equipment having electronic programmable components or autonomous systems (e.g. SCADA systems)
(iii)	Defence	Civil Aviation	Any technology used for uploading and streaming of data including broadcasting, satellite communication etc.
(iv)	Space	Construction of ports and dams & river valley projects	Chemical Technologies
(v)	Telecommunications	Electronics and Microelectronics	Biotechnologies including Genetic Engineering and Biological Technologies
(vi)		Meteorology and Ocean Observation	Information and Communication Technologies

(vii)		Mining and extraction (including deep sea projects)	Software
(viii)		Railways	
(ix)		Pharmaceuticals & Medical Devices	
(x)		Agriculture	
(xi)		Health	
(xii)		Urban Transportation	

1.3.3 The above Clause 1.3 will not be applicable for cases following under Special Cases:

- A. In projects which receive international funding with the approval of the Department of Economic Affairs (DEA), Ministry of Finance, the procurement guidelines applicable to the project shall normally be followed, notwithstanding anything contained in this order and without reference to the Competent Authority. Exceptions to this shall be decided in consultation with DEA.
- B. This order shall not apply to procurement by Indian missions and by offices of government agencies/ undertakings located outside India.
- C. This order will not apply to bidders (or entities) from those countries (even if sharing a land border with India) to which the Government of India has extended lines of credit or in which the Government of India is engaged in development projects. Updated lists of countries to which lines of credit have been extended or in which development projects are undertaken are given on the website of the Ministry of External Affairs.
- D. Procurement of spare parts and other essential service support like Annual Maintenance Contract (AMC)/ Comprehensive Maintenance Contract (CMC), including consumables for closed systems, from Original Equipment Manufacturers (OEMs) or their authorized agents, shall be exempted from the requirement of registration.

1.4 The work is proposed to be executed under the following relationship.

- a) Client/ Owner: As indicated in 'Key Information Table (KIT) in para 1.1 of e-Procurement Notice'.
- b) Employer/ Executing Agency: IRCON INTERNATIONAL LIMITED
address as given in 'Key Information Table (KIT) in para 1.1 of e-Procurement Notice'.
- c) Contractor: The successful tenderer to whom the work is awarded shall become the contractor for the execution of this work.

1.5 Throughout these bidding documents, the terms "bid" and "tender" and their derivatives ("bidder"/ "tenderer"), "bid/tendered", "bidding"/ "tendering", etc.) are synonymous. Day means calendar day. Singular also means plural.

1.6 Scope of Work: As indicated in 'Key Information Table (KIT) in para 1.1 of e-Procurement Notice'.

The scope of work given in KIT is only indicative. The detailed scope has been described in the tender documents.

- 1.7 Approximate Estimated cost of the work is as indicated in the 'Key Information Table (KIT) in para 1.1 of e-Procurement Notice.'
- 1.8 A bidder shall submit only one bid in the capacity of an Individual or Sole Proprietor, Partnership firm, or Company. Violation of this condition is liable to disqualify the tenders in which such bidder has participated and EMD of all such tenderers shall stand forfeited.

2. Cost of Bidding

- 2.1. The bidder shall bear all costs associated with the preparation and submission of the bid and the Employer will in no case be responsible or liable for these costs regardless of the conduct or the outcome of the bidding process.

B. The Bidding Documents

The tenderers must use the online technical and financial sheets available in excel format in this Tender Document for submission of their Technical as well as Financial Bid. Any Bid not conforming to the prescribed format is liable to be declared non-responsive.

3. Content of bidding documents

- 3.1 The bidding documents include the following:

- e-Procurement Notice
- Form of Bid
- Instructions To Tenderers
- Appendix to Tender
- Special Conditions of Contract
- General Conditions of Contract
- Specifications and Standards
- Explanatory Notes
- Bill of Quantities

- 3.2 The bidder is expected to examine all instructions, terms, conditions, forms, specifications, corrigendum/addendums and other information in the bidding documents. Failure to furnish all information required by the bidding documents or submission of a bid not substantially responsive to the bidding documents in every respect will be at the bidders' risk and may result in rejection of his bid.

4. Understanding and Amendment of Tender Documents

- 4.1. The bidder must obtain for itself on its own responsibility and its own cost all the information including risks, contingencies & other circumstances in execution of the work. It shall also carefully read and understand all its obligations & liabilities given in tender documents.
- 4.2. The bidder is advised to visit and examine the site where the work is to be executed and its surroundings or other areas as deemed fit by the bidder and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and execution of the contract. The cost of visiting the site and collecting relevant data shall be at the bidder's own expenses. It is a condition of the tender that the tenderer is deemed to have visited the site and satisfied himself with all the conditions prevailing including any difficulties for executing the work.
- 4.3. Bidders 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 Service Tax Act (SGST) also, as notified by Central/State Government and as amended from time to time and applicable taxes before bidding. Bidders will ensure that full benefit of Input Tax Credit (ITC) likely to be availed by them is duly considered while quoting rates.

- 4.4. The successful bidder 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 IRCON immediately after the award of contract, without which no payments shall be released to the contractor. The contractor shall be responsible for deposition of applicable GST to the concerned authority.
- 4.5. In case the successful bidder is not liable to be registered under CGST/ IGST/ UTGST/ SGST Act, IRCON shall deduct the applicable GST from his/their bills under Reverse Charge Mechanism (RCM) and deposit the same to the concerned authority.
- 4.6. At any time prior to the deadline for submission of bids, Employer may for any reason whether at its own initiative or in response to any request by any prospective bidder, amend the bidding documents by issuing Corrigendum, which shall be part of the Tender documents. The amendment shall be advised to all the prospective bidders.
- 4.7. Employer may at its discretion extend the deadline for submission of the bids at any time before the time of submission of the bids.

C. Preparation of the Bids

5. Language of Bid

- 5.1. The bid prepared by the bidder and all documents related to the bid shall be written in English.

6. Signing of All Bid papers and Completing Bill of Quantities

- 6.1. It shall be deemed that e-bid uploaded by the tenderer is digitally signed by his authorized representative holding the Power of Attorney.
- 6.2. While filling up the rates/ percentage in the Bill of Quantities, tenderer shall ensure that the rates/ percentage, are filled up in figures only. System will automatically convert such filled up rates/ percentage into words. In case of item rate/ percentage tenders, the system will automatically calculate the total price by multiplying the unit rate with quantity/ quoted percentage with estimated cost put to tender.
- 6.3. The bid should be submitted online only in the prescribed format given in the e-procurement portal of IRCON. No other mode of submission is accepted. The Technical and Financial Bid shall be digitally signed by the authorized signatory of the bidder & submitted "online" only. **No hard copy of Technical and Financial bid is required to be submitted except the documents as specified in Annexure VII of ITT.**

The tenderer may download financial bid form & proforma for statement of minor deviations (Annexure 'IV(AA)' to financial bid) and upload the same duly filled through online e-Procurement process.

The tenderer must fill and submit the prices as per instructions given in Bill of Quantities and proforma for statement of minor deviations. The system does not

permit any addition or alteration in the tender documents. The requisite details should be filled in by the tenderer wherever required in the documents. Incomplete tender or tender not submitted as per instructions is liable to be rejected.

The price of each minor deviation mentioned in the Proforma for statement of minor deviations will be the price which the tenderer agrees to offer to the employer from his quoted offer in BOQ if deviation is agreed by the employer. Any such deviation without a price shall not be considered and will be treated as withdrawn by the tenderer. Any other deviation mentioned anywhere in the submission other than in Annexure-IV(A) of Instructions to Tenderer shall be considered as if mentioned inadvertently by the tenderer and shall be considered as withdrawn without any confirmation from the tenderer.

7. Deviations

- 7.1. The tenderer should clearly read and understand all the terms and conditions, specifications, drawings, etc. mentioned in the original tender documents.

The tenderer may submit minor deviations in Annexure IV(A) and a confirmation that price of every such minor deviation has been given in the financial bid/Bill of Quantity (BOQ). Minor deviation may be in the employer's requirements or in any other tender requirement which do not alter the basic functionality of the work or part thereof. If there is no such minor deviation, then the tenderer must write "NIL" in this Annexure. Tenderer to note that such minor deviations may or may not be accepted by the employer and the tenderer shall not have any right to any claim on this account. The offer in BOQ shall be given without considering any deviation in tender conditions. The lowest bidder will be decided without considering any deviation in the tender conditions. If the lowest bidder has given some minor deviations then the Employer has right to accept some or all such minor deviation and the offer of the lowest bidder will be reduced by the price of such accepted deviations (Tenderer to see note 1 of Annexure-IV(A) of ITT).

8. Submission of tender documents

Tender Documents will be received in electronic form only after payment of Tender document fee.

9. Earnest Money

- 9.1. The tenderer must furnish the Earnest Money as indicated in 'Key Information Table (KIT) in Para 1.1 of e-Procurement Notice' for the work as specified, failing which the tender shall be summarily rejected. The Earnest Money may be in any one of the following forms:

- a) Pay Order/ Demand Draft of any Scheduled Bank in India in favour of IRCON INTERNATIONAL LIMITED payable at a place as given in 'Key Information Table (KIT) in Para 1.1 of e-Procurement Notice'. It is mandatory for bidders to provide their Banker's details (Name of Bank & Branch) along with their own bank details (Account No., Name of Account Holder, NEFT/RTGS details).
- b) Fixed Deposit Receipt issued by any Scheduled Bank in India endorsed in favour of IRCON INTERNATIONAL LIMITED.
- c) EMD value up to ₹10.00 Lacs must be in the form of Pay Order/DD/FDR. In addition, EMD may also be paid through NEFT or RTGS in IRCON's bank account no.: **57500000084161, IFSC Code: HDFC0000732 at HDFC bank, Rahul Sadan, Heera Ganji bhagwati Chowk, Katni-483501** in favour of "IRCON

INTERNATIONAL LIMITED” payable at Katni and email Id- rekss.5031@ircon.org. In case of EMD amount being more than 10 Lacs it can also be deposited in the form of irrevocable bank guarantee (e-BF issued on NeSL platform is also acceptable) issued by a schedule bank as per the format enclosed at annexure-IX to SCC / insurance security bond in the format annexed as Annexure IX A by an insurance company authorized to do so by IRDAI, valid for minimum 180 days beyond the last date of submission of bid,. BG / insurance surety bond not valid for 180 days beyond the last date of submission of bid, will not be considered a valid EMD instrument.

- d) The schedule bank issuing the bank guarantee must be on the Structure Financial Messaging System (SFMS) platform. A separate advice of the BG shall invariably be sent by the issuing bank to the Employer's bank through SFMS and only after this, the BG shall become operative and acceptable to the employer.
- e) Earnest Money in the form of Pay Order/DD/FDR/BG/ Insurance Surety Bond shall be scanned & uploaded through online e-Procurement process. Further EMD in original form (For BG along with a copy of 'SFMS – Messaging Report' sent by the BG issuing Bank) sealed in an envelope must be submitted in the tender box at the address given in Key Information Table (KIT) in Para 1.1 of e-Procurement Notice **not later than the prescribed date and time for e-bid submission (In case of e-BG issued on NeSL Platform, the original BG is not required to be submitted in the tender box).**
- f) Proof of transaction towards payment of Earnest Money through NEFT or RTGS shall be scanned either in PDF or JPEG format such that file size is not more than 5 MB and uploaded during the online submission of the e-bid not later than the prescribed date and time for e-bid submission.
- g) No interest shall be allowed on Earnest Money Deposit.

9.2. Forfeiture of Earnest Money:

- 9.2.1 The Earnest Money of the tenderer shall be forfeited if he withdraws his tender after opening of the tender during the period of tender validity specified in the “Key Information Table (KIT) in Para 1.1 of e-Procurement Notice” or extended validity period as agreed to in writing by the tenderer.
- 9.2.2 The Earnest Money of the successful tenderer is liable to be forfeited if he fails to;
 - i) sign the Contract Agreement in accordance with the terms of the tender, or
 - ii) furnish Performance Guarantee in accordance with the terms of the tender, or
 - iii) Commence the work within the time period stipulated in the tender.
- 9.2.3 In case of forfeiture of EMD, the tenderer shall be debarred from bidding in case of re-invitation of the tenders.

9.3. Return of Earnest Money:

- 9.3.1. The Earnest Money of the unsuccessful tenderers in the form of FDR/BG/ Insurance Surety Bond shall be discharged and returned as promptly as possible and the Earnest Money in the form of DD/Pay Order/ NEFT or RTGS shall be directly credited to his bank account through Electronic Fund Transfer, under advice to the bidder.
- 9.3.2. The Earnest Money Deposit of the successful tenderer shall be dealt as under:

- i) The Earnest Money Deposit of the successful tenderer shall be returned after submission of the Performance Bank Guarantee in the acceptable form as per relevant contract conditions and verification of the same from the issuing bank/ Insurance company.
- ii) In case, there is no provision in the contract for submission of Performance Bank Guarantee:
 - a) If the Earnest Money Deposit (EMD) is in the form of Demand Draft/Pay Order/NEFT or RTGS, the same shall be retained towards retention money and further deduction of retention money from the bills shall commence after adjusting this EMD amount.
 - b) If the Earnest Money Deposit is in the form of Fixed Deposit Receipt (FDR)/ Bank Guarantee (BG)/ Insurance Surety Bond, the FDR/BG/ Insurance Surety Bond shall be returned after deduction of an equivalent amount from the on account bills towards retention money and further balance amount of retention money shall continue to be recovered from on account/ Final bills as per relevant contract conditions.

10. Integrity Pact (IP):

- 10.1 Integrity Pact will be applicable for all tenders/ contracts (for works & supply) of value Rs. 5 Crore & above at all Indian projects. Integrity Pact attached as Annexure-VI to 'Instructions to Tenderers' shall become a part of tender.
- 10.2 Integrity Pact shall be signed by the authorized signatory of the tenderer and witnessed in the format attached as Annexure-VI at the time of signing Contract Agreement. Bidders shall abide by the provisions of Integrity Pact by signing the Affidavit attached as Annexure – IV to Instructions to Tenderers.
- 10.3 This Pact shall be signed by all the partners of Partnership firm ~~and all the members of Joint Venture (JV)/ MOU (if participation of JV/ MOU is permitted in the tender)~~
- 10.4 Only those vendors/bidders who sign the Affidavit shall be qualified to participate in the bidding process.
- 10.5 The Integrity Pact will be signed by IRCON at the time of execution of Agreement with the successful tenderer.
- 10.6 Name, Designation & Address of Tender Inviting Authority of IRCON:

Name: Shri Raj Kumar Singh

Designation of The Tender Inviting Authority: Chief General Manager/ Electrical

Address: IRCON INTERNATIONAL LTD

1st Floor Above Maruti Suzuki Showroom,
Near Jhinhari Police Station, NH-7, Jabalpur Road
Katni-483501.
Mobile No- 7024994563
Email: rajkumar.singh@ircon.org

10.7 Name & Address of IEM:

- 1. Shri Virendra Kumar Saxena, IRS (Retd)
Flat no. C-175, Kendriya Vihar

Sector-51, Noida-201301,
Email: iem.reference@ircon.org

2. Shri Madhusudan Prasad, IAS (Retd)
M-11, Green Park Main,
New Delhi-110016
Email: iem.reference@ircon.org
3. Lt. Gen Harsha Gupta
PVSM, UYSM, AVSM, YSM, VSM (Retd)
Apartment No. A-113, India Bulls Engima,
Dwarka Expressway, Sector-110,
Gurugram (Haryana) – 122017
Email: iem.reference@ircon.org

10.8 IEM(s) shall not be made party to any dispute between the parties to the agreement for this work.

11. Period of validity of the tender

- 11.1 The tender shall remain valid for the period indicated in “Key Information Table (KIT) in Para 1.1 of e-Procurement Notice” after date of the opening of the tender. If the Tenderer gives validity period less than that fixed/ prescribed by Employer, the tender shall be liable to be rejected.
- 11.2. Notwithstanding the above clause, Employer may solicit the tenderer’s consent to extend the validity period of the tender. The request and the response shall be made in writing.

D. Submission of Bids

12. Deadline for submission of tender

- 12.1. Earnest Money Deposit required in physical form, as per sub-clause 9.1 of “Instructions to Tenderers” must be submitted in the tender box at the address specified in the “Key Information Table (KIT) in Para 1.1 of e-Procurement Notice” **not later than the prescribed date and time for e-bid submission.**
- 12.2. Any tender related documents received after opening of the tender shall be rejected.

Tenderers must upload the good, scanned copy of relevant documents required to be submitted on e-Procurement website as mentioned in the tender documents. The document which is not readable or legible will not be given cognizance. e-Bids which are not supported by relevant documents shall not be considered during evaluation of bid.

13. Modification / Substitution / Withdrawal of tender

- 13.1 The tenderer may modify, substitute or withdraw his e-bid after online submission prior to the date and time of e-bid opening.
- 13.2 For modification of e-bid, bidder has to upload / resubmit digitally signed modified e-bid in the CPP portal (<https://etenders.gov.in/eprocure/app>).
- 13.3 For withdrawal of e-bid, bidder can withdraw his e-bid by clicking on withdrawal icon at e- procurement portal.
- 13.4 Before withdrawal of an e-bid, it may specifically be noted that after withdrawal of an e-

bid for any reason, tender fee will not be refunded. The bidder trying to re-submit the e-bid will have to pay the cost of tender document again.

- 14 Submission of an e-bid by a tenderer implies that he had read all the tender documents including amendments if any, visited the site and has made himself aware of the scope and specifications of the work to be done, local conditions and other factors having any bearing on the execution of the work.

15 Part of tenders

- 15.1 All documents/ forms/ instructions/ specifications etc. listed in item 3.1 of this Instructions to Tenderers and those attached as per the Annexure VII are deemed to be a part of the bid/tender and accepted by the bidder.
- 15.2 In case of any ambiguity, IRCON will be free to seek confirmation of information from the issuer of the document.

E. e-Bid opening and Evaluation

16 Opening of the tender

- 16.1 Tenders will be opened at the address mentioned in “e-Procurement Notice” in of tenderers or authorized representatives of tenderers who wish to attend opening of tenders. Physical presence during e-bid opening is optional.
- 16.2 Tenderers or their authorized representatives who are present shall sign register in evidence of their attendance.
- 16.3 Tenderer's name, presence or absence of requisite Earnest Money, total cost of work quoted or any other details as Employer may consider appropriate will be displayed with list to all participating bidders online after bid opening.

17 Clarification of the tenders

- 17.1 To assist the examination, evaluation and comparison of the tenders, Employer may at his discretion ask the tenderers for any clarifications as considered essential. All such correspondence shall be in writing and no change in price or substance of the tender shall be sought or permitted. The above clarification for submission of the details shall form part of the tender and shall be binding on tenderer.

18 Preliminary examination of bids

- 18.1 The Employer shall examine the bids to determine whether they are complete, whether physical copy of all the relevant documents have been scanned, uploaded and Earnest Money Deposit in original form received **not later than the prescribed date and time for e-bid submission** and generally they are in order.
- 18.2 Prior to the detailed evaluation, Employer shall determine whether each bid is of acceptable quality, is generally complete and is substantially responsive to the bidding documents. For purposes of this determination, a substantially responsive bid is one that conforms to all the terms, conditions and specifications of the bidding documents without material deviations, objections, conditionality or reservation and for minor deviation details have been submitted in Annexure 'IV(A)' in terms of clause 7.1 above and cost of withdrawal of minor deviations (if any) has been quoted in the proforma for statement of minor deviation attached with the financial bid. A material deviation, objections, conditionality or reservation is one;

- i) That affects in any substantial way the scope, quality or performance of the contract.
- ii) That limits in any substantial way, inconsistent with the bidding documents, the Employers' rights or the successful Bidder's obligations under the contracts; or
- iii) Whose rectification would unfairly affect the competitive position of other Bidders who are presenting substantially responsive bids.

18.3 If an e-bid is not substantially responsive, it shall be rejected by the Employer.

18.4 In case of tenders containing any conditions or deviations or reservations about contents of tender document, Employer may ask for withdrawal of such conditions/ deviations/reservations. If the tenderer does not withdraw such conditions/deviations/ reservations, the tender shall be treated as non-responsive. Employer's decision regarding responsiveness or non-responsiveness of a tender shall be final and binding.

19 Evaluation and comparison of tenders

19.1 Bids, which are determined as substantially responsive, shall be evaluated based on Essential Qualifying Criteria as given in the tender document. The tenderer must scan and upload all necessary authentic data with necessary supporting certificates of the various items of evaluation criteria failing which his tender is liable to be rejected.

19.1.1 The lowest bidder will be decided without considering any deviation in the tender conditions. If the lowest bidder has given some minor deviations then the Employer has right to accept some or all such minor deviation and the offer of the lowest bidder will be reduced by the price of such accepted deviations (Tenderer to see note 1 of Annexure-IV(A) of ITT).

19.2 The Employer/ Engineer reserves the right to negotiate the offer submitted by the tenderer to withdraw certain conditions or to bring down the rates to a reasonable level. The tenderer must note that during negotiations of rates of items of BOQ can only be reduced and not increased by the tenderer. In case the tenderer introduces any new condition or increases rates of any item of BOQ, his negotiated offer is liable to be rejected and the original offer shall remain valid and binding on him.

20 Canvassing

No tenderer is permitted to canvass to Employer on any matter relating to this tender. Any tenderer found doing so may be disqualified and his bid may be rejected.

21 Right to accept any tender or reject all tenders

Employer/ Engineer reserves the right to accept, split, divide, negotiate, cancel or reject any tender or to annul and reject all tenders at any time prior to the award of the contract without incurring any liability to the affected tenderers or any obligation to inform affected tenderer, the grounds of such action.

22 If the tenderer, as individual or as a partner of partnership firm, expires after the submission of his tender but before award of work, the Employer/ Engineer shall deem such tender as invalid.

23 Award of Contract

23.1 Employer/ Engineer shall notify the successful tenderer in writing by Courier/ Speed Post or per bearer or delivering the same by e-mail.

- 23.2 Letter of Acceptance after it is signed by the Contractor in token of his acceptance shall constitute a legal and binding contract between Employer/ Engineer and the contractor till such time the contract agreement is signed.

24 Contractor Performance Feedback and Evaluation System

The employer will have a 'Contractor Performance Feedback and Evaluation System' for periodic evaluation of Contractors performance during execution of Contract. In case contractor's over-all performance is found unsatisfactory (<85% for Works Contracts and <75% for Consultancy Contracts) based on the parameters as listed in Annexure 'II' and 'III' respectively, the Contractor is liable to be declared a 'Non-Performer', and will become ineligible for participation in future tenders of this Organization for a period of 2 (two) years from the date of such decision. This decision is to be conveyed to the Contractor in writing. The non-performer status may be revoked during currency of the contract on improvement of performance parameters during the next annual review.

This is without prejudice to any other recourse available to the Employer under the Conditions of Contract.

25 Ineligibility to participate in re-tenders/ future cases

Notwithstanding anything contained in the Qualification Clauses of ITT, if a bidder withdraws from an offer after having been declared a preferred bidder or after Notification of Award or does not sign the Contract Agreement pursuant to the Letter of Acceptance or does not submit an acceptable Performance Security which results in tender being annulled then such bidder shall be treated as ineligible for participation in re-tendering of this particular work and also for any other work for a period of 6 months. A repeat incident of similar type within a period of 2 (two) years will render the bidder ineligible for participation in all future tenders for a further period of 2 (two) years.

26 Bidder non-eligibility for participation in tender & Declaration of non-performance or ban status or termination

- 26.1 Tenderers are not eligible to participate in the tender process under the following conditions:

- a. They have been declared a non-performer by Central/State Government Department in India including authority controlled by them during the last two years prior to the date of our bid submission.
- b. They are currently debarred for tendering, blacklisted, suspended in Central/ State Government Department in India including authority controlled by them.
- c. Any previous contract awarded to them has been terminated by IRCON on account of contractor's default during the last two years prior to the date of bid submission.
- d. The bidder (any partners of JV, in case JV is permitted in the tender) is in Corporate Insolvency Resolution Process (CIRP)/ liquidation/ Winding up/ CDR/SDR/S4A/Flexible Structuring or any other restructuring scheme due to financial stress and is in default on any debt obligations on the bid due date. An undertaking of bidder (All partners of JV in case JV is permitted in the tender) (duly certified by the statutory auditor of the bidder with UDIN where the accounts are audited. In other cases the same may be certified by Chartered Accountant with UDIN) must be submitted along with the bid.

26.2 Declaration of non-performance or ban status or termination

Accordingly, tenderers are required to sign an Affidavit as per the enclosed pro-forma in Annexure-'IV', declaring their status of non-performance or debarment/ termination or Corporation Resolution Process/ liquidation/ Winding up/ CDR/ SDR/ S4A/ Flexible Structuring or any other restructuring scheme due to financial stress or in default on any debt obligations.

27 Tenderer to be fully responsible for the consequences of misrepresentation

- a. Any suppression of information and misrepresentation will render the tenderer ineligible for the tender along with the forfeiture of Earnest Money. The tenderer will also be liable for disqualification for future tenders of IRCON and its subsidiaries for a period of 2 years.
- b. If any suppression of information and misrepresentation is found after the award of Contract, the Contract may be terminated with forfeiture of EMD, PG and SD (if any). The Contractor will also be disqualified for future tenders of IRCON and its subsidiaries for a period of 2 years.

For & on behalf of
West Central Railway

Chief General Manager (Elect)
1st Floor, above Maruti Suzuki Shoowroom,
Near Jhinhari Police Station, NH-7,
Jabalpur Road, Katni-483501
e-mail id: rekss.5031@ircon.org

Annexure -'I'

DETAILS OF THE BIDDER

1. Name of the Bidder & authorized signatory :

1.1 Registered Address of the bidder :

Land Line Telephone Number with STD Code :

FAX Number with STD Code :

Mobile Number :

Email address :

1.2 Address for communication :

Land Line Telephone Number with STD Code :

FAX Number with STD Code :

e-mail Address :

2. Banker's Details for Payment through Electronic Clearing System (ECS):

Name of bank :

Address of bank :

Account No. :

Name of Account Holder :

IFSC :

Telephone No. with STD Code :

e-mail Address :

(Ref. Clause 24 of 'Instructions to Tenderers')

ASSESSMENT OF PERFORMANCE OF WORKING SUBCONTRACTOR

S. No.	Description	Weightage		Remarks
		Assigned	Obtained	
1	Resource Management/ Financial Status			
1.1	Timely mobilization of manpower, as per the requirement of work and/or as suggested by Engineer in writing	5		
1.2	Timely mobilization of machinery, as per the requirement of work and/or as suggested by Engineer in writing	5		
2	Physical Progress /Project Execution Capability			
2.1	Target vs Achieved review of the progress and adherence to milestones of the work as per above submitted & approved programme (may be judged as below, to be modified depending on availability of front/ site or as indicated in Contract) A At 33% time: >20% B At 50% time: >40% C At 100% time: >98% D At 125% time: ≥100%	75		
3	Quality Assurance Capability			
3.1	Documentation of procedures, work instructions, check list and adherence to the requirements of ISO 9001:2008	2		
3.2	Rectification of defects/non-conformity to quality standards within 30 days: (Nos. mentioned in writing/Rectified within 30 days of writing)	4		
3.3	Implementation of corrective and preventive measures to control non-conformities/rejections	4		
4	Claims and Disputes			
4.1	Raising unnecessary claims and litigation	5		
	TOTAL:	100		

Annexure-'III'

(Ref. Clause 24 of 'Instructions to Tenderers')

ASSESSMENT OF PERFORMANCE OF WORKING CONSULTANT

S. No.	Description	Weightage		Remarks
		Assigned	Obtained	
1	Resource Management	15		
1.1	Mobilization time	5		Shall be immediate as per the submission
1.2	Deputation of qualified team leader-overall co-ordination	5		Person so nominated at the time of submission shall not be changed
1.3	Deputation of experienced staff for specific job/trade	5		Persons identified at the time of submission may not be changed
2	Quality Assurance	20		
2.1	Methodology of submission of drawing	5		There has to be a document stating the methodology of forwarding the drawing
2.2	Methodology to ensure that integrated drawings are issued and not in isolation	5		Working on the same platform and on the same corrected drawing
2.3	Formats for delivery stages of project	5		So as to segregate the drawings for info, tender and working drawings
2.4	Quality of submission – adequate detailing	5		Is there in house cross checking facility
3	Physical Progress	65		
3.1	Submission of detailed schedule of delivery with number of drawings to be submitted	5		This needs to be tweaked with construction programme
3.2	Adherence to Milestones for various submissions	10		Important to ensure smooth working
3.3	Capability of change management and incorporation of changes	10		
3.4	Timely response to the queries			Important for execution and is measure of seriousness about the project
a	During design stage	5		
b	During execution stage	5		
3.5	Quality and detailing of Report	20		Speaks about the effort and sincerity
3.6	Timely submission of the reports/details/ calculations etc.	10		Mandatory for timely execution of the project
	TOTAL:	100		

(Ref. Clause 1.3 Instruction to Tenderers)
(Ref. Sub-Clause 10.2, 10.4 and Clause 26 of ITT and Clause 6 Of essential qualifying criteria)

**FORMAT
AFFIDAVIT**

(On non-judicial stamp paper of ₹100/- duly notarized)

I/we, the undersigned, do hereby solemnly affirm and declare that-

1. Neither our firm nor any of the members/ partners in any form/ manner as an individual or the constituent partner in case of partnership firm have been declared non- performer by Central/State Government Department in India including authority controlled by them during the last two years prior to the date of bid submission.
2. As on date our bid submission, neither our firm nor any of the members/ partners in any manner as an individual or the constituent partner in case of partnership firm are debarred for tendering, blacklisted, suspended in Central/ State Government Department in India including authority controlled by them.
3. As on date our bid submission neither our firm nor any of the members/ partners in any manner as an individual on the constituent partner in case of partnership firm/JV are in corporate insolvency resolution process (CIRP)/ liquidation/ Winding up/ CDR/SDR /S4A / Flexible Structuring or any other restructuring scheme due to financial stress and have not be in default on any debt obligation on the bid due date.
4. No contract agreement between IRCON or its wholly owned subsidiaries and either our firm or any of the members/partners in any manner as an individual or the constituent partner in case of partnership firm have been terminated on account of our default during the last two years prior to date of our bid submission.
5. We have no objection to IRCON requesting to any bank, person, firm or body and any such agency furnishing pertinent information as deemed necessary or to verify this statement or regarding our competence and general reputation.
6. We understand that further qualifying information may be requested by IRCON and we agree to furnish any such information at the request of IRCON within the prescribed time.
7. We bind ourselves with all the stipulations of the Bidding Document including period of completion, provision of adequate equipment, personnel and other resources required for completion within the stipulated completion period and agree to augment any resources, if found necessary for timely completion of the project, as desired by the IRCON.
8. **Certification on submitted/ Attached Documents/ Credentials:**
 - 8.1 That the facts stated and documents enclosed by us in the Bid are true and correct and we have not concealed/ suppressed any facts/ record/ documents and/ or misrepresented the facts/ record/ documents.
 - 8.2 I/ We further declare and certify that I/ We have not made any misleading or false representation in the forms, statements and attachments in proof of the qualification requirements.

- 8.3 I/ We also understand that my/ our offer will be evaluated based on the documents/ credentials submitted along with the offer and same shall be binding upon me/ us.
- 8.4 I/ We declare that the information and documents submitted along with the tender by me/us are correct and I/we are fully responsible for the correctness of the information and documents, submitted by us.
- 8.5 I/ We understand that if the certificates regarding eligibility criteria submitted by us are found to be forged/ false or incorrect or any suppression of information and misrepresentation is noticed at any time during process for evaluation of tenders, it shall lead to forfeiture of the tender EMD besides disqualification for future tenders of IRCON & its subsidiaries for a period of two years. Further, I/ We (insert name of the tenderer) ** and all my/ our constituents understand that my/ our offer shall be summarily rejected.
- 8.6 I/ We also understand that if the certificates submitted by us are found to be false/ forged or incorrect or any suppression of information and misrepresentation is noticed at any time after the award of the contract, it will lead to termination of the contract, along with forfeiture of EMD/ SD and Performance Guarantee besides any other action provided in the contract including disqualification for future tenders of IRCON & its subsidiaries for a period of two years.
9. We have read and understood all the provisions included in the Integrity Pact and undertake to abide by them, if applicable.
10. We have read and understood all the provisions included in the bid documents and undertake to abide by them.
- 11.1 Model certificate for Tenders:
- “I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India: I certify that this bidder is not from such a country or, if from such a country, has been registered with competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration with the Competent Authority nominated/ Registration committee constituted by the department for Promotion of Industry and Internal Trade (DPIIT) shall be attached.]”
- 11.2 Model certificate for Tenders for works involving possibility of sub-contracting
- “I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries: I certify that this bidder is not from such a country or, if from such a country, has been registered with competent Authority and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration with the Competent Authority shall be attached.]”
- 11.3 Model Certificate by Bidder in cases of specified Transfer of Technology (ToT)
- “I have read the clause regarding restrictions on procurement from a bidder having Transfer of Technology (ToT) arrangement. I certify that this bidder does not have any ToT arrangement requiring registration with competent authority”

OR

“I have read the clause regarding restrictions on procurement from a bidder having Transfer of Technology (ToT) arrangement. I certify that this bidder has valid registration to participate in this procurement.” [where applicable evidence of valid registration with the competent authority shall be attached.]

12. The information furnished by us is true and correct and we understand the consequences, in case, any of the information furnished is not found to be true/ correct and /or any suppression/ concealment of facts/ record or misrepresentation of facts/ record is noticed.

(Signed by the Authorized Representative of the Firm)

Name of the Authorized Representative.

Name of the Firm.

Dated:

This Affidavit shall be signed by all the partners of Partnership firm ~~and all the members of Joint Venture (JV)/ MOU (if participation of JV/ MOU is permitted in the tender).~~

PROFORMA FOR STATEMENT OF MINOR DEVIATIONS
(Refer Clause 6 & 7 of ITT)

The following are the particulars of minor deviations from the requirements of the Tender Document:

Sr. No.	Clause	Deviations	Remarks (Including Justification)	Confirming that price of adjustment of each deviation/s is given in Annexure-IV(AA) of financial package (Yes/No)

Note:

1. The Tenderer shall indicate price adjustment against each deviation in Annexure-IV(AA) of BOQ. This price is the price which the tenderer shall reduce from his tender price if deviation(s) is/are accepted by the Employer.
2. Where there is no deviation, the statement should be returned duly signed with an endorsement indicating 'No Deviations'. In case, Performa of deviations is not submitted or submitted as blank, it will be construed that the tenderer has not proposed any deviations from tender documents.
3. If the tenderer proposes deviations in tender documents and/or any other terms and conditions of the tender, other than in this Annexure, it will have no effect.

Signature of authorized signatory on behalf of Tenderer

Essential Qualifying Criteria:

4. The bidder should possess the experience of having successfully completed or substantially completed similar works during the last 7-years (ending last day of the month previous to the one in which tenders are invited) which should be anyone of the following:-
- i) Three similar works each costing not less than the amount equal to 30% of the estimated cost.
 - ii) Two similar works each costing not less than the amount equal to 40% of the estimated cost.
 - iii) One similar work costing not less than the amount equal to 60% of the estimated cost.

Notes:

Work shall be considered similar, if the executed works consists of the following:

“Supply, Installation, Testing & Commissioning of Power line crossing modification work/ Internal/ External electrification of Residential Building/ Office Complex/ Office Building/ Service Building, in Railway/ State/ Central Government Department/ Public Sector Undertaking.”

2. The average annual financial turnover during the last 3-years should be at least 30% of the estimated cost.

Notes:

- a) The financial turnover shall mean Revenue from Operations of standalone Financial Statements of the Bidder.
 - b) Revenue from Operations shall be judged from Audited Balance Sheet, Profit & Loss A/c, relevant Notes to A/cs and Statutory Auditor Report/ relevant abstracts of Annual Reports covering above documents and the same shall be certified by statutory auditor with UDIN where the accounts are audited. In other cases, the same may be certified by Chartered Accountant with UDIN.
 - c) In case the financials of immediate prior Financial Year have not yet been audited till the time of submission of the tender, the bidder can submit an Affidavit to this effect stating that "the financial results of the immediate prior Financial Year has actually not been audited so far". In such cases, the financials of preceding three audited financial years will be taken into consideration for evaluating the Annual Financial Turnover of the bidder. In the absence of such an Affidavit, the benefit of considering three preceding years would not be given and the bid would be evaluated considering turnover for two preceding years only.
3. Net worth of the bidder should be at least 10% of the estimated cost of the work. This will be judged from the audited Balance Sheet of the last financial year ending on a date not prior to 18 months from the date of invitation of the tender, but not earlier than a year immediate financial year.

- 3.1 The bidder whose annual financial turnover do not exceed Rs. 50 Lakhs should submit copy of applicable ITR under Income tax rules which is generated from Income tax portal and duly self- attested to judge their net worth and turnover.
- 3.2 In case of Companies “Net Worth” means the aggregate value of the paid up share capital and all reserves created out of the profits, securities premium account and debit or credit balance of profit and loss account, after deducting the aggregate value of the accumulated losses, deferred expenditure and miscellaneous expenditure not written off, as per the audited balance sheet, but does not include reserves created out of revaluation of assets, write-back of depreciation and amalgamation.
- 3.3 In other cases, the “Net Worth” means the aggregate value of the capital accounts, owners’ current account and all reserves (including credit balance of profit and loss account) created out of the profits, after deducting the aggregate value of the accumulated losses, drawing accounts, loan / advances to Sole Proprietor / Partners / Owners, deferred expenditure and miscellaneous expenditure not written off, as per the audited balance sheet, but does not include reserves created out of revaluation of assets, writeback of depreciation and amalgamation.
4. The bidder should submit completion certificates in reference to S.No.1 (minimum 3 nos., 2 nos. or 1 no. as the case may be) above issued by Government Organizations/ Semi Government Organizations/ Public Sector Undertakings/ Autonomous bodies/ Municipal bodies/ Public Limited Company / Concessionaire Company/ Private Company/ JV Company for having successfully completed similar works in the last 7 years. Certificates issued by such Public Limited Company / Concessionaire Company /Private Company/ JV Company must be supported by Tax Deducted at Source (TDS) Certificates (Form 16A/ 26AS) in evidence of the value of work executed. In case of supply contracts, Copies of GSTR-1/GSTR 3B to be submitted by the bidder as a proof of payment received for supply. Before implementation of GST where no TDS is deducted, relevant copies of purchase order and invoices along with bill wise details of payment received duly certified by Chartered Accountant should be submitted by the bidder in support of value of work executed.
- 4.1 It shall be mandatorily incumbent upon the tenderer to identify, state and submit the supporting documents duly self-attested by which they/he is qualifying the Qualifying Criteria mentioned in the Tender Document.

NOTE:-

- i) Value/ Quantity of Key Construction activities of a successfully completed work done by a member in an earlier JV shall be reckoned only to the extent of the concerned member’s share in that JV for the purpose of satisfying his/ her compliance to the above-mentioned technical eligibility criteria in the tender. A copy of the JV agreement submitted to client at the time of award of work or any subsequent change in the provision of original JV agreement as agreed by the client shall be submitted along with tender document, while claiming share of the experience in the previous JV.
- ii) 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/ Financial Benchmarks India Pvt. Ltd. for the relevant date. Where, relevant date shall be 1st day (i.e. 1st April) of the relevant year (financial year) in which work was completed. In case of any other currency, the same shall first be converted to US Dollars as on 1st day (i.e. 1st April) of the relevant year

(financial year) in which work was completed 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.

5. Bid Capacity: Not Applicable

- 6.** The bidder shall sign the Affidavit as enclosed in Annexure-‘IV’ of “Instructions to Tenderers”.

This Affidavit shall be signed by all the partners of Partnership firm and all the members of Joint Venture (JV)/ MOU (if participation of JV/ MOU is permitted in the tender).

- 7.** If the bidder (~~any partners of JV, in case JV is permitted in the tender~~) is in Corporate Insolvency Resolution Process (CIRP)/ liquidation/ Winding up/ CDR/SDR/S4A/Flexible Structuring or any other restructuring scheme due to financial stress and is in default on any debt obligations on the bid due date. An undertaking of bidder (~~All partners of JV in case JV is permitted in the tender~~) (duly certified by the statutory auditor of the bidder with UDIN where the accounts are audited. In other cases the same may be certified by Chartered Accountant with UDIN) must be submitted along with the bid.

8. Not Applicable

• *[Explanation for above Essential Qualifying Criteria No. 1 to 8:*

1. Substantially Completed Work means an ongoing work in which payment equal to or more than 90% of the present contract value (excluding the payment made for adjustment of Price variation (PVC), if any) has been made to the contractor in that ongoing contract and no proceedings of termination of contract on Contractor's default has been initiated. The credential certificate in this regard should have been issued not prior to 60 days of date of invitation of present tender.
2. In case of substantially completed work, the total gross amount already paid including the PVC amount (if paid), as mentioned in the certificate, shall be considered as the cost of substantially completed work.
3. If a provisional completion certificate is issued by the concerned organization, such work shall be considered for fulfillment of credentials. However, the value of work done shall be considered to the extent of actual amount paid by the client.
4. Deleted
5. In case a work is considered similar in nature for fulfillment of technical credentials, the overall cost of that work including Price Variation amount if any shall be considered and no separate evaluation for each component of that work shall be made to decide eligibility.
6. In case of newly formed partnership firm, the credentials of individual partners from previous propriety firm(s) or dissolved previous partnership firm(s) or split previous partnership firm(s), shall be considered only to the extent of their share in previous entity on the date of dissolution / split and their share in newly formed partnership firm. For example, a partner A had 30% share in previous entity and his share in present partnership firm is 20%. In the present tender under consideration, the credentials of partner A will be considered to the extent of 0.3×0.2 * value of the work done in the previous entity. For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of

previous partnership deed(s), dissolution deed(s) and proof of surrender of PAN No.(s) in case of dissolution of partnership firm(s) etc.

7. In case of existing partnership firm, if any one or more partners quit the partnership firm, the credentials of remaining partnership firm shall be re-worked out i.e., the quitting partner(s) shall take away his credentials to the extent of his share on the date of quitting the partnership firm(e.g. in a partnership firm of partners A, B & C having share 30%, 30% & 40% respectively and credentials of Rs 10 crore; in case partner C quits the firm, the credentials of this partnership firm shall remain as Rs.6crore). For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deed(s), dissolution deed(s) and proof of surrender of PAN No.(s) in case of dissolution of partnership firm(s) etc.
8. In case of existing partnership firm if any new partner(s) joins the firm without any modification in the name and PAN/TAN no. of the firm, the credentials of partnership firm shall get enhanced to the extent of credentials of newly added partner(s) on the same principles as mentioned in item 6 above. For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deeds, dissolution/splitting deeds and proof of surrender of PAN No.(s) in case of dissolution of partnership firm etc.
9. Any partner in a partnership firm cannot use or claim his credentials in any other firm without leaving the partnership firm i.e., In a partnership firm of A&B partners, A or B partner cannot use credentials of partnership firm of A&B partners in any other partnership firm or propriety firm without leaving partnership firm of A&B partners.
10. In case a partner in a partnership firm is replaced due to succession as per succession law, the proportion of credentials of the previous partner will be passed on to the successor.
11. If the percentage share among partners of a partnership firm is changed, but the partners remain the same, the credentials of the firm before such modification in the share will continue to be considered for the firm as it is without any change in their value. Further, in case a partner of partnership firm retires without taking away any credentials from the firm, the credentials of partnership firm shall remain the same as it is without any change in their value.
12. In a partnership firm "AB" of A&B partners, in case A also works as propriety firm "P" or partner in some other partnership firm "AX", credentials of A in propriety firm "P" or in other partnership firm "AX" earned after the date of becoming a partner of the firm AB shall not be added in partnership firm AB.
13. In case a tenderer is LLP, the credentials of tenderer shall be worked out on above lines similar to a partnership firm.
14. In case company A is merged with company B, then company B would get the credentials of company A also.]

INTEGRITY PACT

General

This Agreement (hereinafter called the Integrity Pact) is made on -----day of the month of---
----- 2020..., between Ircon International Limited (hereinafter called "IRCON"), a government
company under the Ministry of Railways, and M/s -----
(hereinafter called the "BIDDER") Description of Bidder.

The expressions "IRCON" and "BIDDER" shall mean and include their respective legal
representatives, successors in interest, and assigns and shall collectively be referred to as "the
Parties" and individually as "the Party".

WHEREAS IRCON intends to award, under laid down organizational procedures, contract(s) for
..... (Name of the Tender/Work) (hereinafter
referred to as the 'Contract').

WHEREAS IRCON necessarily requires full compliance with all relevant laws of the land, rules,
and regulations, economic use of resources, and fairness/transparency in relations with its
Bidder(s) and/or Contractor(s).

WHEREAS In order to achieve these goals, IRCON has appointed Independent External
Monitors (IEMs), as detailed in Para 6 of this Pact to monitor the entire tender process till the
final completion of the contract for compliance with the Integrity Pact by all the parties concerned
for all works covered in the Contract.

NOW, THEREFORE,

To Avoid all forms of corruption by following a system that is fair, transparent, and free from any
influence/prejudiced dealings prior to, during, and subsequent to the currency of the contract to
be entered into,;

To Enable IRCON to obtain the desired works/stores/equipment at a competitive price in
conformity with defined specifications by avoiding high cost and distortionary impact of corruption
on public procurement, and

To Enable BIDDERS to abstain from bribing or indulging in any corrupt practice in order to secure
the contract by providing assurance to them that IRCON will commit to prevent corruption, in any
form, by its officials by following transparent procedures.

**THE PARTIES HERETO HEREBY AGREE TO ENTER INTO THIS INTEGRITY PACT AND
AGREE AS FOLLOWS:**

1. Scope

The Integrity Pact, in respect of the said contract, would be operative from the stage of
invitation of bids till the final completion of the contract. Any violation of the same would
entail disqualification of the BIDDERS and exclusion from future business dealings as
specified in this Integrity Pact.

2. Commitments of IRCON

- 2.1 No official of IRCON, connected directly or indirectly with the contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, any benefit, or any other advantage from the BIDDER, either for themselves or for any person, organization, or third party related to the contract in exchange for an advantage in the bidding process, bid evaluation, contracting, or implementation process related to the contract.
- 2.2 IRCON will, during the entire tender process stage, treat all BIDDERS with equity and reason. It will provide to all BIDDERS the same information and will not provide any such information to any particular BIDDER which could afford an advantage to that particular BIDDER in comparison to other BIDDERS.
- 2.3 IRCON shall obtain bids from only those party/parties who have been short-listed or pre-qualified or through a process of open advertisement/web publishing or any combination thereof.
- 2.4 In case any misconduct on the part of any official(s) of IRCON is reported by the BIDDER to the Chairman & Managing Director of IRCON with full and verifiable facts and the same is prima facie found to be correct by the Chairman & Managing Director of IRCON, necessary disciplinary proceedings, or any other action as deemed fit, may be initiated by IRCON and such a person shall be removed from further dealings related to the subject contract process. In such situations of misconduct, while an enquiry may stand initiated or may be going on, the progress of bidding, execution, etc. under the contract shall not be stalled.

3. Commitments of BIDDERS

- 3.1 The BIDDER commits itself to take all measures necessary to prevent corrupt practices, unfair means, and illegal activities during any stage of bid including pre-contract, contract, or post-contract stage. In particular the BIDDER undertakes to abide by the measures given in the following paragraphs.
- 3.2 The BIDDER will not offer, directly or through intermediaries, any bribe, benefit, or any other advantage like commission, fees, brokerage or inducement to any official of IRCON, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding, evaluation, contracting, and implementation of the contract.
- 3.3 The BIDDER has not given, offered, or promised to give, directly or indirectly, any bribe or any benefit or other advantage like commission, fees, brokerage, or inducement to any official of IRCON or their family members or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the contract.
- 3.4 The BIDDER will disclose the name and address of its agents and representatives, if any, in India and/or abroad.
- 3.5 The BIDDER will disclose the payments to be made by them to agents/brokers or any other intermediary, in connection with this bid/contract.
- 3.6 The BIDDER further confirms and declares to IRCON that the BIDDER has not engaged any individual or firm or company, whether Indian or foreign, to intercede, facilitate, or in any way to recommend to IRCON or any of its functionaries, whether officially or unofficially, award of the contract to the BIDDER, nor has any amount been paid, promised, or intended to be paid to any such individual, firm or company in respect of any such intercession, facilitation, or recommendation.

- 3.7 The BIDDER will not collude with other parties interested in the contract to impair the competition, transparency, fairness, and progress of the bidding process, bid evaluation, contracting, and implementation of the contract.
- 3.8 The BIDDER will not accept any advantage in exchange for any corrupt practice, unfair means, and illegal activities.
- 3.9 The BIDDER will not use for purposes of competition or personal gain, or pass on to others, any information provided by IRCON as part of the business relationship, regarding plans, technical proposals, and business details, including information contained in any electronic data carrier. The BIDDER also undertakes to exercise due and adequate lest any such information is divulged.
- 3.10 The BIDDER commits to refrain from making any complaint, directly or through any other manner, without supporting it with full and verifiable facts. If the BIDDER submits frivolous or false complaint(s), it will be liable to attract sanctions as mentioned in Para 5 of this Pact.
- 3.11 The BIDDER will not instigate or cause to instigate any third person to commit any of the actions mentioned above.
- 3.12 If the BIDDER or any employee of the BIDDER or any person acting on behalf of the BIDDER, either directly or indirectly, is a relative of any of the officers of IRCON, or alternatively, if any relative of an officer of IRCON has financial interest/stake in the BIDDER's firm, the same will be disclosed by the BIDDER at the time of filing of tender.

The term 'relative' for this purpose would be as defined in Section 6 of the Companies Act 1956 or any amendment thereto ([Annexure-A](#)).

- 3.13 The BIDDER will not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of IRCON.
- 3.14 **All disclosures required under this Pact shall be included as Annexures/Appendices thereto as an integral part of this Pact.**
- 3.15 If the BIDDER/Contractor is a partnership or a consortium, this Pact will be signed by all partners or consortium members.

4. Previous Transgression

- 4.1 The BIDDER declares that no previous transgression has occurred in the last three years immediately before signing of this Integrity Pact, with any other company in any country in respect of any corrupt practices envisaged hereunder or with any Public Sector Enterprise in India or any Government Department in India that could justify BIDDER's exclusion from the tender process.
- 4.2 The BIDDER agrees that if it makes incorrect statement on this subject, BIDDER can be disqualified from the tender process or the contract and, if already awarded, can be liable to attract sanctions under this Pact.

5. Sanctions for Violations

- 5.1 Any breach of the provisions of this Pact by the BIDDER or anyone employed by it or acting on its behalf (whether with or without the knowledge of the BIDDER) shall entitle IRCON to take all or any one of the following actions, wherever required: -

- 5.1.1 To disqualify the BIDDER in pre-award stage without assigning any reason and without any compensation to the BIDDER. However, the proceedings with other BIDDER(s) would continue.
 - 5.1.2 To take such actions/steps as per provisions made in the tender documents/contract, if contract already signed, without giving any compensation to the BIDDER.
 - 5.1.3 To debar the BIDDER from participating in future bidding processes as per IRCON's policy on "Suspension/Banning of Business Dealings" with Agencies" ([Annexure-B](#)).
 - 5.1.4 To forfeit, either fully or partially, the Earnest Money Deposit (in pre-contract stage) and/or Security Deposit/Performance Bond (after the contract is signed), without assigning any reason thereof.
- 5.2 IRCON will also be entitled to take all or any of the actions mentioned under this Para 5 in the event of commission by the BIDDER, or anyone employed by it or acting on its behalf (whether with or without the knowledge of the BIDDER), of an offence as defined in Chapter IX of the Indian Penal code, 1860, or Prevention of Corruption Act, 1988, or any other statute enacted for prevention of corruption.
 - 5.3 The decision of IRCON to the effect that a breach of any provision of this Pact has been committed by the BIDDER shall be final and conclusive on the BIDDER.
 - 5.4 The BIDDER shall be liable to pay compensation for any loss or damage to IRCON in the event of any action under this Para 5 and IRCON shall be entitled to deduct the amount so payable from the money(s) due to the BIDDER.
6. **Independent External Monitors (IEMs)**
 - 6.1 IRCON has appointed Independent External Monitors (hereinafter referred to as IEMs) for this Pact in consultation with the Central Vigilance Commission Names and Addresses of the IEMs are given below:
 - 6.1.1 Shri Virendra Kumar Saxena, IRS (Retd),
Flat no. C-175, Kendriya Vihar
Sector-51, Noida-201301,
Email: iem.reference@ircon.org
 - 6.1.2 Shri Madhusudan Prasad, IAS (Retd),
M-11, Green Park Main,
New Delhi-110016
Email: iem.reference@ircon.org
 - 6.1.3 Lt. Gen Harsha Gupta,
PVSM, UYSM, AVSM, YSM, VSM (Retd)
Apartment No. A-113, India Bulls Engima,
Dwarka Expressway, Sector-110,
Gurugram (Haryana) – 122017
Email: iem.reference@ircon.org
 - 6.2 The task of IEMs shall be to review independently and objectively whether, and to what extent, the Parties comply with the obligations under this Pact.
 - 6.3 The IEMs shall not be subject to instructions by the representatives of the Parties and perform their functions neutrally and independently.
 - 6.4 Both the Parties accept that the IEMs would have a right to access, without restriction to

all Project documentation of IRCON and the BIDDER upon request and demonstration of a valid interest by the IEMs. The same is also applicable to sub-contractors of the BIDDER. The IEMs shall be under contractual obligation to treat the information and documents of all the parties with confidentiality.

- 6.5 In case of non-compliance of the provisions of the Integrity Pact, any complaint/non-compliance can be sent by an aggrieved party, giving specific details of non-compliance with supporting documents, to the designated Nodal Officer of IRCON appointed by the CMD. The Nodal Officer, after verification of the complaint, shall refer the complaint/non-compliance so received by him to the aforesaid IEM(s). Alternatively, as soon as the IEM notices a violation of this Pact, or has reason to believe that a violation has occurred, or had received a complaint, he will so inform the CMD of IRCON in the first instance.
- 6.6 The IEMs would then examine all complaints, other than anonymous/pseudonymous complaints, received by them and give their written report to the CMD of IRCON within 6 weeks from the date of reference or intimation to him by IRCON/BIDDER and, should the occasion arise, submit proposals for correcting problematic situations.

7. **Law and Place of Jurisdiction**

This Pact shall be applicable to all tenders invited and finalized in India. This Agreement is subject to Indian Law and the place and jurisdiction for resolving any issue shall be New Delhi.

8. **Other Legal Actions**

The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

9. **Validity**

- 9.1 The validity of this Integrity Pact shall be from the date of its signing and extend up to 5 years or the complete execution of the contract to the satisfaction of both IRCON and the BIDDER including Defect Liability/Warranty period, whichever is later. In case BIDDER(s) is (are) unsuccessful, this Integrity Pact shall cease to be valid on the expiry of two months from the date of award of the contract.
- 9.2 Should any provision of this Pact turn out to be invalid, the remaining parts of this Pact shall remain unaffected which shall be honoured and implemented by the Parties in its intent and spirit.
10. The Parties hereby sign this Integrity Pact at -----on-----

(Full name & Registered Office address)

For and on Behalf of
Ircon International Limited

For and on Behalf of
BIDDER (Full name of Bidder & address)

Name of the Authorized Officer.
Designation

Name of the Authorized Officer
Designation

(SEAL)

(SEAL)

Witness

Witness

1. _____

1. _____

2. _____

2. _____

LIST OF RELATIVES

Section 2(77) of the Companies Act, 2013

[Effective from 1st April, 2014]

“Relative”, with reference to any person, means anyone who is related to another, if –

- (i) they are members of a Hindu Undivided Family;
- (ii) they are husband and wife; or
- (iii) one person is related to the other in such manner as may be prescribed;

List of Relatives in terms of Section 2 (77) [as prescribed under Rule 4 of Companies (Specification of Definitions Details) Rules, 2014]

A person shall be deemed to be the relative of another, if he or she is related to another in the following manner, namely:-

1. Father:

Provided that the term “Father” includes step-father.

2. Mother:

Provided that the term “Mother” includes the step-mother.

3. Son:

Provided that the term “Son” includes the step-son.

4. Son's wife.

5. Daughter.

6. Daughter's husband.

7. Brother:

Provided that the term “Brother” includes the step-brother;

8. Sister:

Provided that the term “Sister” includes the step-sister.

Annexure-B

Procedure for Suspension/Banning of Business Dealings with agencies in IRCON

**(Issue No.:01 Date: 10.06.2013)
(Revision:01 Date: 19.10.2022)**

IRCON INTERNATIONAL LIMITED
(A Govt. of India Undertaking)
C-4, DISTRICT CENTRE, SAKET,
NEW DELHI-110017

PHONE: +91-11-29565666; FAX: +91-11-26522000, 26854000

Web: www.ircon.org

CIN: L45203DL1976G01008171

PROCEDURE FOR SUSPENSION/BANNING OF BUSINESS DEALINGS**CONTENTS**

S. No.	Description	Page
1.	Introduction	
2.	Scope	
3.	Definitions	
4.	Grounds on which Suspension/Banning of Business Dealings can be initiated	
5.	Initiation of Suspension/Banning	
6.	Appeal against the Decision of the Competent Authority	

1 Introduction

- 1.1 IRCON is a specialized construction organization covering the entire spectrum of construction activities and service in the infrastructure sector, especially Railways. The primary objective of IRCON is timely and efficient execution of projects assigned to it and at the same time ensuring the quality thereof. As a commercial organization IRCON is expected to adopt ethics of highest standards and a very high degree of integrity, commitment and sincerity towards the work undertaken. Accordingly, it is not in the interest of IRCON to deal with such Agencies who commit deception, fraud or other misconduct in the execution of contracts awarded/orders issued to them. Appropriate action needs to be taken against them in accordance with the procedure prescribed herein.
- 1.2 This procedure shall be applicable for effecting suspension/banning of business dealings with Agencies working for IRCON. It is incumbent upon IRCON to ensure compliance with the laws and principles of natural justice for banning the business dealings with any Agency. After issue of the Ban order for dealings in IRCON the Management may consider whether or not to refer the matter to the Indian Railways to consider imposition of similar ban by Indian Railways.
- 1.3 Since banning of business dealings involves severe consequences for the Agency concerned, it is essential that an adequate opportunity is provided to the Agency to present its case and any explanation, if tendered, is properly considered. If necessary, a personal hearing may be given to the Agency, before passing an order of banning based on the facts and circumstances of the case on record.

2 Scope

- 2.1 The procedure for (i) Suspension and (ii) Banning of Business Dealings with Agencies, is laid down in these guidelines.
- 2.2 It is clarified that these guidelines do not cover the process for declaring an Agency as "Non Performer" for which instructions have been issued separately.
- 2.3 The suspension / banning shall be with prospective effect, i.e., it will affect future business dealings only.
- 2.4 These guidelines shall apply to all the Projects/Regional Offices of IRCON.

3 Definitions

- 3.1 In these Guidelines, unless the context otherwise requires:
 - i) 'Agency' means a 'Bidder/Contractor/Supplier/Consultant'
 - ii) 'Competent Authority' and 'Appellate Authority' shall mean the following:
 - a) 'Competent Authority' shall be the concerned Director of IRCON and
 - b) 'Appellate Authority' shall be CMD, IRCON

Note: 'Competent Authority' and 'Appellate Authority' shall not be the same person.

- iii) 'Investigating Agency' shall include Central Vigilance Commission (CVC), the Vigilance Departments of IRCON/Ministry of Railways, Central Bureau of Investigation, or any Central/State Government Department having powers to investigate into the propriety of working of the Agency for IRCON.
- iv) Other Terms used in this Circular shall have the same meaning as assigned to them in Clause 1102 of Chapter-XI of Vigilance Manual of Indian Railways.

4 Grounds on which Suspension/ Banning of Business Dealings can be initiated:

- 4.1 For security considerations, including suspected disloyalty of the Agency to the State or IRCON, as the case warrants;
- 4.2 If any Director/ Owner/ Proprietor or partner of the Agency, is convicted by a Court of Law for an offence involving moral turpitude in relation to its business dealings with IRCON, any Government Department/Ministry or any other Public Sector Enterprise.
- 4.3 If there is strong justification for believing that any Director, Proprietor, Partner, owner of the Agency has been guilty of malpractices, such as bribery, corruption, fraud, substitution of tenders, interpolations, etc.
- 4.4 If the Agency engages a public servant dismissed/removed from service on account of corruption or employs a person convicted for an offence involving corruption, moral turpitude or abetment of such offence; in a position where he could corrupt government servants.
- 4.5 If the Agency has resorted to corrupt, fraudulent malpractices including misrepresentation of facts;
- 4.6 If the Agency uses intimidation/threats or brings outside pressure on the Company (IRCON) or/on its officials in acceptance of Tender or performance of the job under the contract;
- 4.7 Based on the findings of the investigation report of the Investigating Department against the Agency that it has resorted to mala-fide/unlawful acts or improper conduct on its part in matters relating to IRCON, any Government Ministry/Department or any other PSU;
- 4.8 If the Agency has submitted a false or wrong Affidavit along with its bid with regard to the credentials of the firm or misrepresented/manipulated the facts in regard to or in connection with any bid submitted to IRCON.
- 4.9 Established litigant nature of the Agency to derive undue or benefit.
- 4.10 If the Agency misuses the premises or facilities of the IRCON, forcefully occupies or damages the IRCON's properties including land, water, resources, forests / trees or tampers with documents / records etc.
- 4.11 If the business dealings with the agency have been banned by the Ministry of Railways.

(Note: The above grounds are illustrative only and not exhaustive. The Competent Authority may decide to suspend/ban business dealings for any other reasonable cause and sufficient reason)

5 Initiation of Suspension/Banning:

5.1 Suspension of Business dealing

- 5.1.1 Action for suspension may be initiated by the concerned ED/IRCON on receipt of a report from the Project head/Functional head/ Investigating Department and if it is considered that allegations are of a serious nature, which may warrant banning of business dealings with the Agency. The report should also bring out whether pending banning of business proceedings it would be in the interest of IRCON to enter into fresh business dealings with the Agency or order immediate suspension of further business dealings with the Agency. The ED shall submit his report to the Competent Authority.
- 5.1.2 As far as possible, the existing contract(s) with the Agency may be continued unless the Competent Authority, having regard to the circumstances of the case decides otherwise in the interest of IRCON.
- 5.1.3 If the Competent Authority, after consideration of the matter, including the recommendations of the Investigating Department/report of the ED, decides that it would not be in the interest of IRCON to enter into business dealings with the Agency pending investigations, he may order suspension of business dealings with the Agency.
- 5.1.4 The Investigating Department may be advised to complete their investigations and submit a final report within a period of three months.
- 5.1.5 The order of suspension of business dealings would not remain effective for a period beyond three months from the date of the issue of the suspension order unless show cause notice for banning of business is issued to the Agency within this period. However, if the final investigation report is not received within this period, the Competent Authority may extend the period of suspension by another three months, during which period the show cause notice must be issued. Once the show cause notice is issued the suspension order will continue till decision by Competent Authority.
- 5.1.6 In case of suspension the Agency must be informed immediately of the suspension order with brief charges under investigation. It is not necessary to enter into correspondence with or offer explanations to the Agency at this stage.
- 5.1.7 The order of suspension can be issued without giving any show cause notice or personal hearing to the Agency. However, the suspension cannot be continued for an indefinite period, unless a show-cause notice for banning of business is issued within 6 (six) months, the period of suspension will either be extended or the suspension shall be revoked.

5.2 Banning of Business Dealings

- 5.2.1 A decision to ban business dealings with any Agency shall normally apply throughout IRCON. However, the Competent Authority can impose such a ban project/region wise only if in the particular case banning of business dealings in respective project/region will serve the purpose and achieve

its objective and banning throughout the Company is not required in view of the local conditions and impact of the misconduct / default. Any ban imposed by Corporate Office shall be applicable across all Units of IRCON.

5.2.2 An Investigating committee not below the CGM level nominated by Competent Authority shall look into the charge(s) against the agency. The functions of the committee shall, inter-alia include:

- i. To study the report of the project head/Functional head /Investigation agency and decide if a prima-facie case for banning exists, if not, send back the case to the Competent Authority.
- ii. To recommend for issue of show-cause notice to the Agency by the competent authority as per clause 5.2.3.
- iii. To examine the reply to show-cause notice and call the Agency for personal hearing, if required.
- iv. To submit final recommendations to the Competent Authority for banning or otherwise.

5.2.3 On receipt of the report of the Investigating Committee if the Competent Authority is prima-facie of the view that action for banning of business dealings with the Agency is called for, a show-cause notice may be issued to the Agency after approval by the Competent Authority.

5.2.4 The show cause notice, duly approved by the Competent Authority, may be issued by Regd. A.D./Speed Post by concerned ED in charge of the project along with a statement containing the imputation of misconduct or malpractice and the Agency should be asked to submit its written explanation or statement in defence within 30 days of the date of notice. If no reply is received, a decision may be taken ex-parte by the Investigating Committee based on facts and evidence on record.

5.2.5 If the Agency requests for inspection of any relevant document mentioned in the show cause notice in possession of IRCON, the facility for inspection of such documents may be provided.

5.2.6 After considering the reply of the Agency and other circumstances and the recommendation of the investigating committee, a final decision shall be taken by the Competent Authority, if considered necessary after giving an opportunity for personal hearing to the Agency. The Competent Authority may then consider and pass an appropriate speaking order:

- a) exonerating the Agency, if the charges are not established;
- b) banning the business dealings with the Agency along with the period for which the ban would be operative, if the charges are proved.
- c) whether or not to refer the matter to the Indian Railways to consider imposition of similar ban by Indian Railways.

- 5.2.7 The order for banning of business dealings by all units of IRCON shall be applicable to the Agency including its allied firms as defined in Para 1102 of IR Vigilance Manual.
- 5.2.8 Decision of Competent Authority will be intimated to the concerned ED, who will convey the same to the delinquent Agency and its allied firms and circulate it to the corporate office and all Project head /Functional head for applying these orders uniformly in IRCON. The reasons may not be disclosed in such communications. However, the fact that the representation has been considered should invariably be mentioned in the communication.
- 5.2.9 The validity of the banning order shall be for a specified time period, on expiry of which, the banning order shall cease to operate, unless extended further by competent authority.

6 Appeal against the Decision of the Competent Authority:

- 6.1 The Agency may file an appeal against the order of the Competent Authority for suspension continuing beyond six months or order of banning business dealings with the Agency. The appeal shall lie with the Appellate Authority. Such an appeal shall be preferred within one month from the date of receipt of the order banning of business dealings or order of continuance of suspension order beyond six months.
- 6.2 Appellate Authority shall consider the appeal and pass an appropriate order which shall be communicated to the Agency as well as the Competent Authority.

If the decision of the Competent Authority is modified by the Appellate Authority the same will be intimated by concerned ED to the delinquent agency and its allied firm and circulate it with advice to all Project Heads and Corporate Office of IRCON.

ANNEXURE – VII

CHECK LIST for list of documents duly page numbered, signed, stamped by authorized signatory of the Bidder to be scanned, uploaded (in PDF/ JPG format such that file size is not more than 5 MB) with the e-tender and submitted online not later than the prescribed date and time for e-bid submission:

(A) Documents in Original to be submitted in tender box at the address mentioned in the Key Information Table (KIT) Para 1.1 of eProcurement Notice.

- (i) Earnest Money Deposit in the form of Pay Order/DD/FDR/BG/ Insurance Surety Bond as referred in clause no. 9.0 of 'Instructions to Tenderers'. However, in case of e-BG issued on NeSL platform, the original BG is not required to be submitted in the tender box.

(B) Documents to be uploaded:

1. Forwarding Letter of the bidder
2. Form of Bid duly filled signed and stamped
3. Details of similar works completed/ substantially completed in last seven years (Format - 1) along with their completion certificate.
4. Revenue from operations for the last three years with supporting documents (Format - 2).
5. Program for deployment of manpower (Format - 3).
6. Program for deployment of Plant and Machinery on the project (Format - 4).
7. Maximum Value of construction works executed and payment received in any of the three financial years (Format - 5)
8. Existing Commitment and ongoing construction works (Format - 6)
9. Attested copies of the constitution of its firm such as Partnership Deed, Registration Certificate, ~~MOU/ Joint Venture Agreement~~, Memorandum and Articles of Association, etc.
10. GSTIN
11. ISO certificates (if any).
12. Schedule of start and completion of work in the form of Bar Chart.
13. Methodology for execution of works.
14. Proof of transaction towards payment of Cost of Tender Document/ Earnest Money through NEFT or RTGS and copy of Earnest Money Deposit of requisite amount in the prescribed form.
15. **Power of Attorney** duly attested by Notary Public in favour of the person signing the e-bidding documents digitally as well as manually.
16. Bankers details (name of bank and branch) along with bidders own bank details (Account No., Name of Account Holder, NEFT/RTGS details) as per Format given in Annexure-I).
17. Affidavit (as per Format given in Annexure-IV)
18. Scanned copy of EMD in prescribed form.
19. Valid class-A electrical contractor's license issued by any state govt./ Central Govt. of India
20. Any other details sought through ITT, NIT and tender conditions.

Note:

- i) **Hard copy of above documents listed at (B) in original must be presented to IRCON, if requested so, either during the process of finalization or after finalization of the tender.**
- ii) **Financial bid submitted by any bidder in physical form shall not be considered and the same will be left un-opened.**

FORMAT-1 <i>(Ref. Sr. No. 3. of Annexure-VII to Instructions to Tenderers)</i> DETAILS OF SIMILAR WORKS COMPLETED/SUBSTANTIALLY COMPLETED IN LAST SEVEN YEARS											
S. No.	Description of the Work	Name and address of the Employer	Contract No. and date	Date of award of work	Stipulated date of completion	Date of actual completion	Value of completed work (In Lacs of ₹)	Reasons for delays, if any	Penalty, if any, imposed for delay	Any other relevant information	Remarks
1											
2											
3											
4											
5											
6											

Note:-

- ~~1. In case of Joint Venture (if Joint Venture is permitted in the tender), the information is to be furnished by all the members.~~

FORMAT-2 (Ref. Sr. No. 4. of Annexure-VII to Instructions to Tenderers) REVENUE FROM OPERATIONS FOR THE LAST THREE YEARS			
S. No.	YEAR	Revenue from Operations (In lacs of ₹)	Remarks
1			
2			
3			

Note:

- ~~1. In case of Joint Venture (if Joint Venture is permitted in the tender), the information is to be furnished by all the members.~~
1. The above statement shall be certified by statutory auditor with UDIN where the accounts are audited. In other cases, the same may be certified by Chartered Accountant with UDIN.
2. The financial turnover shall mean Revenue from Operations of standalone Financial Statements of the Bidder.
3. Revenue from Operations shall be judged from Audited Balance Sheet, Profit & Loss A/c, relevant Notes to A/cs and Statutory Auditor Report/ relevant abstracts of Annual Reports covering above documents and the same shall be certified by statutory auditor with UDIN where the accounts are audited. In other cases, the same may be certified by Chartered Accountant with UDIN.
4. In case the financials of immediate prior Financial Year have not yet been audited till the time of submission of the tender, the bidder can submit an Affidavit to this effect stating that "the financial results of the immediate prior Financial Year has actually not been audited so far". In such cases, the financials of preceding three audited financial years will be taken into consideration for evaluating the Annual Financial Turnover of the bidder. In the absence of such an Affidavit, the benefit of considering three preceding years would not be given and the bid would be evaluated considering turnover for two preceding years only.

FORMAT-3 (Ref. Sr. No. 5. of Annexure-VII to Instruction to Tenderers) PROGRAMME FOR DEPLOYMENT OF MAN POWER					
S. No.	Name	Qualification	Designation	Total Experience (In years)	Programme for Deployment
1					
2					
3					
4					

FORMAT-4*(Ref. Sr. No. 6. of Annexure-VII to ITT)***PROGRAMME FOR DEPLOYMENT OF PLANT AND MACHINERY PROPOSED TO BE ENGAGED ON THE PROJECT**

S. No.	Description	Make	Model & Year of manufacture	Capacity	Condition	Nos. proposed to be deployed	Programme of Deployment	Remarks
1								
2								
3								
4								

FORMAT-5 (Ref. Sr. No. 7 of Annexure-VII to Instruction to Tenderers)		
MAXIMUM VALUE OF CONSTRUCTION WORKS EXECUTED AND PAYMENT RECEIVED IN ANY OF THE PREVIOUS THREE FINANCIAL YEARS OR CURRENT FINANCIAL YEAR (UP TO DATE OF INVITING TENDER)		
S. No.	MAXIMUM VALUE OF CONSTRUCTION WORKS EXECUTED AND PAYMENT RECEIVED IN ANY OF THE PREVIOUS THREE FINANCIAL YEARS OR CURRENT FINANCIAL YEAR (UP TO DATE OF INVITING TENDER) (In lacs of ₹)	Remarks
1		

Note:

- ~~1. In case of Joint Venture (if Joint Venture is permitted in the tender), the information is to be furnished by all the members.~~
2. The above statement should be duly verified by statutory auditor with UDIN where the accounts are audited. In other cases by Chartered accountant with UDIN.

Existing commitments and on-going construction works:**FORMAT-6**
(Ref. Sr. No.8. of Annexure-VII to ITT)

Description of Work	Place & State	Contract No & Date	Name & Address of Employer	Value of Contract (₹ in Lakhs)	Stipulated period of completion	Value of works remaining to be completed (₹ in Lakhs) *	Anticipated Date of completion
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Note:

- ~~1. In case of Joint Venture (if Joint Venture is permitted in the tender), the information is to be furnished by all the members.~~
2. The above statement should be duly verified by statutory auditor with UDIN where the accounts are audited. In other cases by Chartered accountant with UDIN.

SECTION - IV APPENDIX TO TENDER

APPENDIX TO TENDER

<u>DESCRIPTION</u>	Reference Clause
<u>Following materials shall be supplied by the Engineer to the Contractor free of cost:-</u> Nil	N.A.
<u>Following plants & machinery shall be issued by the engineer to the Contractor on hire basis:-</u> Nil	N.A.
<u>The operators for running/ operating following plant & machinery shall be provided by the Engineer:-</u> Nil	N.A.
<u>For Price Variation Clause:</u> 1) For Power Cables: As per IEEMA(PVC)/CABLE(R-1)/2017, dated 01.11.2017 2) Other than power cables: As per IRGCC April 2022 Clause no. 46A	SCC Cl. No. 58

SECTION - V
SPECIAL CONDITION OF CONTRACT



SPECIAL CONDITIONS OF CONTRACT



1.0 ORDER OF PRIORITY OF CONTRACT DOCUMENTS:

Where there is any conflict between the various documents in the contract, the following order of priority shall be followed i.e. a document appearing earlier shall override the document appearing subsequently:

- 1) The Contract Agreement
- 2) Letter of Acceptance of Tender
- 3) Addendum(s)/Corrigendum(s), if any
- 4) e-Procurement Notice
- 5) Instructions to the Tenderers
- 6) Appendix to Tender
- 7) Form of Bid
- 8) Special Conditions of the Contract
- 9) General Conditions of Contract
- 10) Specifications and Standards
- 11) Explanatory Notes
- 12) Bill of Quantities

2.0 DEFINITION:

All the terms referred as contract in Railway GCC, April-2022 would be applicable to contractor for the subject work. The conditions of the Contract shall be General Conditions of Contract (hereinafter called the General Conditions) as modified and added to by the following Special Conditions of Contract which shall be read and construed with the General Conditions as if they were incorporated therewith. In so far as any of the conditions of the Special Conditions of Contract conflict or be inconsistent with any of the General Conditions, the special condition of contract shall prevail.

In the Contract, as herein after defined, the following word expressions shall have the meanings hereby assigned to them, except where the context requires otherwise.

- i). "Railway shall mean Railway or IRCON interchangeably.
- ii) "President" shall mean Employer
- iii) "Chief General Manager/ Chief Engineer/ Div. Railway Manager/ Engineer/ any other Railway designation mentioned in GCC" shall mean Project Head of IRCON INTERNATIONAL LTD. (Employer) or any other officer authorized by the Employer to act on his behalf and for the purpose of operating the contract
- iv) "Client or Principal Employer or Owner" means the Department, Organization, individual, firm, company, who awarded the work to IRCON INTERNATIONAL LIMITED for execution of the project of which the works is a part, and shall include its heirs, executors, legal representatives etc.
- v) "Employer" means the IRCON INTERNATIONAL LIMITED, A Govt. of India



Undertaking (IRCON in abbreviation) acting through its Chairman & Managing Director or any other authorized officer and shall include their legal successors in title and permitted assignees.

- vi) "Engineer or Engineer in Charge" means the Project Head of IRCON INTERNATIONAL LTD. (Employer) or any other officer authorized by the Employer to act on his behalf and for the purpose of operating the contract.
- vii) "Engineer's Representative" means any official nominated from time to time by the Engineer to act on his behalf.
- viii) "Contractor" means the individual, firm, Company or Corporation whether incorporated or not, who enters into the Contract with the Employer/ Engineer, and shall include its heirs, executors, administrators, successors, legal representatives, as the case may be.
- ix) "Contractor's Representative" shall mean the person responsible for execution of the contract who shall be so declared by the Contractor and who shall be authorized under a duly executed power of attorney to comply the instructions and to use, receive materials issued by the Engineer to the Contractor for works. He shall be capable of taking responsibility for proper execution of works.
- x) "Sub-Contractor" means the individual, firm, Company or Corporation having direct Contract with the Contractor and to whom any part of the work has been sublet by the contractor and shall include his heirs, his executors, administrators, successors, legal representatives, as the case may be.
- xi) "Tenderer or Bidder" means the individual, firm, Company, Corporation submitting a bid/tender.
- xii) "Scheduled Bank" means a bank included in the second schedule to the Reserve Bank of India Act, 1934, or modification thereto.
- xiii) "Contract" shall mean and include the Agreement or Letter of Acceptance, the accepted Bill of Quantities and Rates, the General Conditions of Contract Special Conditions of Contract, Appendix to Tender, Form of Bid, Instructions to the Tenderers, Drawings, Specifications and other Tender Documents.
- xiv) "Tender or Bid" means the offer (Technical and/or Financial) made by individual, firm, Company, corporation, Joint Venture or Consortium for the execution of the works.
- xv) "Specifications" means the specifications referred to in the Contract and any modification thereof or addition thereto, or as may from time to time be furnished or approved in writing by the Engineer.
- xvi) "Bill of Quantities (BOQ)" means list of items of work, their quantities and rates.
- xvii) "Original Contract Value" means the sum stated in the letter of Acceptance/ Contract Agreement.



- xviii) "Site" means the land and/or other places on, under, in or through which the works are to be carried out, and any other lands or places provided by the Client/Employer/Engineer for the purpose of the Contract.
- xix) "Defect Liability Period" means the specified period of defects liability from the date of completion of the work or as certified by the Engineer.
- xx) "Letter of Acceptance" means the letter from the Employer or the Engineer to the Contractor, conveying acceptance of the Tender.

3.0 INTRODUCTION OF WORK:

Conversion of LT & HT (11 & 33 kV) overhead power line crossings into underground cable lines including replacement/ relocation of associated lines & equipments to remove infringement of new diverted alignment of Beohari – Joba section in connection to Katni Singrauli Doubling Project of West Central Railway.

4.0 SCOPE OF WORK

- 4.1 The scope of work is given for reference purpose only. However, the contractor is fully responsible for working out quantities required for completion of the works and carrying out all required activities for successful completion of the contract. All works shall be carried out as per RDSO/CORE/Railway/State-DISCOM/As per Given specifications and standards.
- 4.2 The major work involves Conversion of LT & HT (11 & 33 kV) overhead power line crossings into underground cable lines including replacement/ relocation of associated lines & equipments to remove infringement of new diverted alignment of Beohari – Joba section in connection to Katni Singrauli Doubling Project of West Central Railway.
- 4.3 The scope of work also includes preparation, submission & approval of Design and Drawing for power line crossing works, line shifting, DP/pole erection etc. showing location, structure, equipments showing location, General arrangement, power supply arrangement etc., Augmentation of existing power supply, general arrangement for laying of HDPE/GI/PVC pipe, laying of cable, cable trench, earthing arrangement etc, "As build drawing" etc. The design & drawing cost of the work is included in contract price, no any extra cost paid against design & drawing. Submission of all drawings including completion drawings shall be as under.
 - i) Initial submission for comments – 2 copies each
 - ii) Resubmission after correction – 2 copies of each
 - iii) Distribution copies after approval – Location Plan + General Arrangement Drawing - 5 copies and Foundation+ Structure Erection+ Cable Laying, Cable Trench+ Earthing arrangement drawing - 5 Copies.
 - iv) Soft copies of full approved drawings – 1 set.

As built/As erected drawings:

- i) Initial submission – 2 copies each
- ii) Resubmission after correction – 2 copies each
- iii) Distribution copies after approval – 5 copies.
- iv) Soft copies (Auto CAD form in duplicate CD) of full approved drawings including RTF drawings – 1 set.



4.4 The scope of work shall also include any and all work towards supplies and services for completion of all works as described in Bill of Quantities.

4.5 The Contractor shall also execute all such works which, in the opinion of the Employer, are required to be executed for the successful completion of the work. All such works shall be deemed to have been included in the original scope of the tender.

4.6 The contractor shall obtain necessary clearance for his staff/agents from Engineer-in-charge of Railway/IRCON.

4.7 The contractor shall hand over all released/waste/scrap materials obtained during the execution of the work with proper handing over note to the concerned Railway store/ DISCOM store.

5. MOBILIZATION ADVANCE: Not Applicable

6. SUPPLY OF MATERIALS BY EMPLOYER/ ENGINEER

Contractor shall make his own arrangements at his cost for all materials required for execution, completion, and maintenance of all items of work included in his scope of work to the complete satisfaction of the Engineer.

Contractor is solely responsible for procurement and availability of any materials required for execution, completion and maintenance of works, however employer/engineer may provide required assistance on case to case basis.

7. PROCUREMENT & SUPPLY OF MATERIALS BY THE CONTRACTOR

Procurement and supply of materials for execution of entire work shall be in the scope of contractor. Procurement of materials has to be planned by the contractor in consultation with the Engineer-In-Charge and shall get approved from the employer before placing any orders for such materials. Procurement plan should be prepared in such a manner so that the materials are used before its properties get modified with age. The procurement of materials shall be planned as per the milestone/key activities. If the material does not remain of required specification at the time of actual use, the same will be replaced by the contractor with materials conforming to specifications against this item at his own cost.

Materials/Equipment to be supplied by the contractor should confirm to the latest RDSO/CORE/Railway/State-DISCOM/ As per given specifications, drawings & as per national/international specification wherever RDSO/CORE/Railway specifications are not available with prior approval from Employer. It will be the responsibility of contractor to obtain necessary specifications from relevant departments.

Materials/Equipment to be supplied by the contractor shall be procured from RDSO/CORE/Railway/State-DISCOM approved vendors, barring those cases where RDSO/CORE/Railway approved vendors are not available in such cases material should be ISI marked conforming to latest IS and approval shall be obtained from employer/engineer prior to procurement.

All materials used in the work shall be of the best quality and of the class most suited for the purpose specified and procured from the sources approved by RDSO/ CORE/ Railway/State-DISCOM as per the extant directives from Railway/IRCON.



The contractor shall procure required materials for execution of works against this contract with prior approval from employer, however employer/engineer may provide required assistance on case to case basis.

In case during the currency of the contract, any material/ Equipment is supplied by the employer, the same shall be accounted for and reconciled by the contractor. The procedure for this reconciliation/ accountability shall be decided mutually between the contractor and the Engineer and contractor shall abide by this procedure till completion of the contract.

The contractor shall make his own arrangement for storage and protection of materials at his store as well as at work sites, however in the vicinity of work site if Railway land/ space is available, same shall be provided as per terms and condition of IRCON/ Railway as applicable.

8. SUPPLY OF PLANT AND MACHINERY

- a. The Contractor shall make his own arrangements at his cost for all Tools, Plants and Machinery required for execution, completion, and maintenance of all items of work included in his scope of work to the complete satisfaction of the Engineer.
- b. The contractor shall arrange for deployment of machineries and plant required for casting of foundations, erection/dismantling of steel structures, cube testing, earthing arrangements, cabling/trenching/drilling/boring, installation, testing works etc.

9. FUEL & LUBRICANT:

All fuel & lubricant (POL) required for operation of all plant and machinery shall be arranged by the contractor at his own cost.

10. PERFORMANCE SECURITY & RETENTION MONEY

10.1 Performance Security-

- (i) The successful bidder shall submit a Performance Security (PS) in the form of a Performance Guarantee (PG)
- (ii) The Performance Guarantee (PG) shall be in the form of irrevocable Bank Guarantee (BG) (e-BG issued on NeSL Platform is also acceptable) in the format annexed as Annexure-XI from any Scheduled Bank or in the form of Insurance Surety bond in the format annexed as Annexure XI A issued by an Insurance Company authorized to do so by Insurance Regulatory & Development Authority of India (IRDAI) for an amount of 5% (Five percent) of the contract value (including GST and all other duties & taxes). (Note: The Insurance Surety Bond is allowed only if the completion period prescribed in the contract is upto 36 months only). The scheduled bank issuing the Bank Guarantee must be on the Structured Financial Messaging System (SFMS) platform. A separate advice of the B.G. shall invariably be sent by the issuing bank to the Employer's Bank through SFMS and only after this, the B.G. shall become operative & acceptable to the employer. However, in case of e-BG, the separate advice is not required. In case of foreign bidder or in case of Global Tender, if Bank Guarantee is from a foreign bank branch situated outside India, the Bank Guarantee shall be issued through any of the Scheduled



Commercial Bank in India. In case BG is issued directly by a bank outside India, it should be in the same currency as the contract, executed on Letter Head of the Bank and should be advised and payable through their Indian Branch/ Corresponding Bank in India. The issuing Bank shall also state the name and designation of the next Higher Authority of the Officials who have issued the BG. The PG shall be initially valid upto 60 days beyond the stipulated date of completion. In case, the time for completion of work get extended, the Contractor shall get the validity of PG extended to cover such extended time for completion of work plus 60 days.

Note: In case of extension of Date of Completion, Contractor needs to submit extended Insurance Surety Bond / Fresh Insurance Surety bond / fresh Performance Security, in any form as given above, before expiry of existing Insurance Surety Bond.

- (iii) The value of PG to be submitted by the Contractor will not change for variation in contract value (excluding Price Variation) upto 25% of the original contract value (either increase or decrease). In case during the course of execution, value of the contract (excluding Price Variation) increases by more than 25% of the original contract value, an additional Performance Guarantee amounting to 5% (5 percent) of the excess value over the original contract value shall be deposited by the Contractor. If the value of contract (excluding Price Variation) decreases by more than 25% of the original contract value, Performance Guarantee amounting to 5% (5 percent) of the decrease in the contract value shall be returned to the Contractor. The PG amount in excess of required PG for decreased contract value, available with the Employer, shall be returned to Contractor as per his request duly safeguarding the interest of the Employer.
- (iv) With respect to para (iii) above, the date on which the Revised Contract Value is approved by Competent Authority will be the effective date from which the Performance Guarantee amount will have to be increased or decreased.
- (v) The successful bidder shall have to submit a Performance Security (PS) Within 21 (Twenty-One) days from the date of issue of Letter Of Acceptance (LOA), but before signing of the contract agreement. Extension of time for submission of PS beyond 21 (Twenty-One) days and up to 60 days from the date of issue of LOA may be given by the Authority who is competent to sign the contract agreement. However, a penal interest of 12% per annum shall be charged for the delay beyond 21 (twenty) days, i.e. from 22nd day after the date of issue of LOA. Further, if the 60th day happens to be declared holiday in the concerned office, submission of PBG can be accepted on the next working day.
- (vi) In case the contractor fails to submit the requisite PS even after 60 days from the date of issue of LOA, award of contract shall be deemed to be terminated, unless otherwise permitted by the "Employer", and the Earnest Money Deposit and other dues payable against that contract shall be forfeited. In case a tenderer has not submitted Earnest Money Deposit on the strength of their registration as a startup recognized by Department of Industrial Policy and Promotion (DIPP) under Ministry of commerce and Industry, DIPP shall be informed to this effect.
- (vii) Additional Performance Security: If a tender is accepted on the quoted rates of bidder which is below the advertised tender value, an additional performance security shall be submitted by the bidder as below:



Bid quoted in % of advertised cost	Additional Performance Guarantee (%)
Below 0 – 5% (inclusive)	Nil
Below 5%	5% of the contract value (including GST and all other duties & taxes)

(viii) No payment under the contract shall be made to the Contractor before receipt of performance security.

(ix) In event Contractor commits default/breach in fulfilling contractual obligations i.e. achieving milestones, default(s) in commencing the work, fails to maintain the required progress, fail to mobilized at site as required, execute bad work or work not done as per specifications, abandons the work, persistently disregard to instruction of the Engineer or contravenes any provisions of the contract etc., Employer will be entitled to forfeit the performance security and/or may reserve the right to forfeit the performance security.

If the Contractor commits any default/breach as aforesaid and the same has been brought in notice of the Contractor in writing, the Employer shall, without prejudice to any other right or remedy available in law or contract, shall be at liberty to forfeit the performance security absolutely, notwithstanding and/or without prejudice to any other provisions in the contract, in addition to action taken under other provisions contained in this contract or otherwise.

(x) The bidder shall submit PBG confirmation by using Structured Financing Messaging System (SFMS) platform already available with the Banks. The process involves issuing an advice of PBG by the issuing Bank to the Beneficiary's Bank through Electronic channel. For this, the bidder is required to inform to his Bank, the following information of Ircon International Limited.

a) Name of the Bank & Branch Address: HDFC bank, Rahul Sadan, Heera Ganji bhagwati Chowk, Katni-483501.

b) Bank Account No: **57500000084161**

c) IFSC Code of the above Branch: HDFC0000732

d) Email Id: rekss.5031@ircon.org

(xi) "The scheduled foreign bank or scheduled commercial bank in india as defined above must be on the Structured Financing Messaging System (SFMS) platform. A separate advice of the PBG will invariably be sent by the issuing bank to the Employer's Bank through SFMS and only after this. the PBG will become operative and acceptable to the Employer/Purchaser."

(xii) The PBG confirmation through SFMS only will be accepted. A copy of the 'SFMS — Message Report' sent by the PBG issuing Bank should be attached with the PBG. However, PBG will continue to be issued on prescribed format by the issuing Bank on appropriate value of Stamp Paper as before.



10.2 Retention Money:

- i) Retention money for all contracts shall be recovered from on account/ final bills of the Contractor @ 10% of gross value of each bill after adjusting Earnest Money Deposit (EMD) amount till the amount so recovered including EMD amount adds up to 5% of the contract value (including GST and all other duties & taxes & all variations but excluding price variation) of the work.
- ii) No interest shall be payable to the Contractor on the amount retained in cash towards retention money.
- iii) The retention money is also referred to as the Security Deposit in some parts of the Contract.

10.3 Release of Performance Security:

- i) Performance Security shall be returned to the Contractor, subject to the issue of Completion Certificate by the Engineer. This shall not relieve the Contractor from his obligations and liabilities, to make good any failures, defects, imperfections, shrinkages, or faults that may be detected during the defect liability period specified in the Contract.
- ii) Wherever the contract is rescinded, the performance security, if no action has been taken as provided in clause 10.1 (ix), shall be encashed in full and also be forfeited in whole or part and the balance work shall be got done independently without risk and cost of the failed contractor. The failed contractor shall be debarred from participating in the tender for executing the balance work.

~~If the failed contractor is a JV or a partnership firm, then every member/partner of such a firm shall be debarred from participating in the tender for the balance work either in his/her individual capacity or as a partner of any other J.V./Partnership firm.~~

- iii) The Engineer shall not make a claim under the Performance Security (PS) except for amounts to which employer is entitled under the contract (not withstanding and/or without prejudice to any other provisions in the contract agreement) in the event of:
 - 1) Failure by the contractor to extend the validity of the PS as described herein above, in which event the Engineer may claim the full amount of the PS.
 - 2) Failure by the contractor to pay employer any amount due, either as agreed by the contractor or determined under any of the Clauses/Conditions of the agreement, within 30 days of the service of notice to this effect by Engineer
 - 3) The contract being determined or rescinded under provision of the General Conditions of Contract (GCC) the PS shall be forfeited in full and shall be absolutely at the disposal of the Engineer.
 - 4) Action has been taken as provided in clause 10.1 (ix)



10.4 Release of Retention Money:

- i) The Retention Money shall be released to the Contractor after preparation of final bill and acceptance of the same by the Contractor and after the expiry of the defect liability period specified in the Contract, reckoned from the date on which the Engineer shall have issued the Provisional Acceptance Certificate comprising the whole of works. The retention money shall be released after all failures, defects, imperfections, shrinkages and faults have been rectified by the Contractor to the satisfaction of the Engineer and Defect Liability certificate is issued by the Engineer

ii) Release of 50% Retention Money Against Bank Guarantee/FDR:

a) For contracts valuing less than Rs. 30 Crores:

If requested by the contractor, 50% of the Retention Money may be released on satisfactory completion of works against submission of Bank Guarantee (e-BG issued on NeSL platform is also acceptable) for an equivalent amount by the Contractor in the performa annexed as Annexure-XII from any Scheduled Bank in India. This Bank Guarantee shall be kept valid till the period of 90 days beyond the expiry of Defect Liability Period. The contractor shall get the validity of Bank Guarantee extended till the Defect Liability Certificate is mentioned above in clause 10.4 (i) is issued by the Engineer. Fixed Deposit Receipt (FDR) from a scheduled bank endorsed in favour of the employer can be submitted by the contractor in lieu of the bank guarantee for the release of 50% retention money.

b) For contracts valuing Rs. 30 Crores or more:

If requested by the contractor, 50% of the Retention Money may be released at a stage when full amount of retention money (i.e. 5% of the contract value) has been recovered at a stage when not less than 50% financial progress has been achieved against submission of Bank Guarantee (e-BG issued on NeSL platform is also acceptable) for an equivalent amount by the Contractor in the performa annexed as Annexure- XII from any Scheduled Bank in India. This Bank Guarantee shall be kept valid till the period of 90 days beyond the expiry of Defect Liability Period. The contractor shall get the validity of Bank Guarantee extended till the Defect Liability Certificate is mentioned above in clause 10.4 (i) is issued by the Engineer.

- i) Where different defect liability periods are applicable to different parts of the works, the expression “expiration of the defect liability period” shall for the purpose of this clause be deemed to mean the expiry of last of such periods.
- ii) Wherever the contract is rescinded, the retention money shall be forfeited in full.

11. INSURANCE

- 11.1 Depending on the nature of work, contractor's all risk (CAR) shall be Obtained by the contractor at his own cost as per the requirement. The contractor may take necessary add on covers and voluntary excess specified elsewhere in the contract which shall be binding on the contractor. At the time of taking policy, possible time over run, if any, may be taken into account in deciding



the period/ validity of the policy. The above insurance shall cover the risks normally covered under the CAR policy. Any item not covered under the above policy shall be the responsibility of the contractor.

11.2 Contractor's claims, if any, shall be entertained within the scope of insurance policy taken by the contractor. This will be subject to:

(i) Risk covered and voluntary excess selected by the contractor.

(ii) Claims on realization shall be passed to the contractor according to value of the claims accepted by the insurance company for his damaged portion of work after deducting 15% towards services rendered by Employer/ Engineer for processing the claims(s). The amount so disbursed to the contractor (s) shall be limited to the amount calculated on the basis of his accepted rates in the contract with, the Employer/Engineer.

11.3 Before commencing of works, it shall be obligatory for the Contractor to obtain at his own cost, insurance cover in the joint name of the Contractor and Employer from reputed companies for the following requirements:

i) Liability for death or injury to any person or loss or damage to any property (Other than the work) arising out the performance of the contract.

ii) Construction Plant, Machinery and Equipment brought to site by the Contractor.

iii) Any other Insurance cover as may be required by the law of the land.

The Contractor shall provide evidence to the IRCON/Engineer before commencement of work at site that the insurance covers required under the contract have been affected and shall within 60 days of the commencement date, provide the insurance policies to the IRCON/ Engineer. The Contractor shall, whenever, called upon, produce to the Engineer or his representative the evidence of payment of premiums paid by him to ensure that the policies indeed continue to be in force.

The Contractor at his own cost shall also obtain any additional insurance cover like theft etc. as per the requirements of the Contract.

The Employer/ Engineer shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor or his sub-contractor or petty contractor. The contractor shall indemnify and keep indemnified the Employer/ Engineer against all such damages and compensation for which the Contractor is liable.

The Insurance Policies of the Contractor shall remain in force throughout the period of execution of the works and till the expiry of the defect liability period except for any specific insurance covers necessary for shorter period.

If the Contractor fails to effect or keep in force or provide adequate cover as acceptable to the Engineer in the insurance policies mentioned above, then in such cases, the Engineer may effect and keep in force any such insurance or further insurance on behalf of the Contractor. The recovery shall be made at the rate of 1.5 times the premium/ premiums paid by the Engineer in this regard from the payment due to the Contractor or from the



Contractor's Performance Security. However, the Contractor shall not be absolved from his responsibility and/or liability in this regard.

12. DUTIES OF ENGINEER AND ENGINEER'S REPRESENTATIVE

12.1 Duties and Authority of Engineer:

The Engineer shall carryout the duties specified or implied in the Contract including issue of instructions, decisions, certificates and orders, as are specified in the contract, or necessary for the observance/ administration of the Contract and expeditious and timely completion of the work.

12.2 Duties and authority of Engineer's Representative:

The Engineer's Representative shall be responsible to the Engineer. His duties are to supervise the work and to test and examine any materials to be used or workmanship employed in connection with the works. He can issue day to day instructions to the Contractor in Site Order Book, which should be noted and complied by the Contractor. He shall have no authority to relieve the Contractor of any of his duties or obligations under the Contract, or except as expressly provided hereunder or elsewhere in the Contract, to order any work involving delay or any extra payment by the Employer, or to make any variation of or in the works. He is authorized to measure the works for the purpose of payment.

13 GENERAL OBLIGATIONS OF THE CONTRACTOR

13.1 General Responsibility of the Contractor:

The Contractor shall comply with the provisions of the Contract with due care and diligence design (to the extent provided for in the Contract), execute, complete and maintain the works and remedy the defects in accordance with the provisions of the Contract. The Contractor shall provide all superintendence, labour, materials, plant& Equipment and all other things, whether of a temporary or permanent nature, required in and for such design, execution, completion and maintenance of works and rectification of any defects, as directed by the Engineer or his Representative.

13.2 Site Operations and Methods of Construction:

The Contractor shall take full responsibility for the adequacy, stability and safety of all site operations and method of construction, provided that the Contractor shall not be responsible for the design and specifications of Permanent works or for the design or specifications of any temporary works provided by the Engineer. Where the Contract expressly provides that part of the Permanent Works shall be designed by the Contractor, he shall be fully responsible for that part of such works, notwithstanding any approval by the Engineer.

13.3 Appraisal of Errors / Omissions in the Drawings:

The Contractor shall promptly inform in writing to the Engineer of any error, omission, fault and other defects, in the design, drawings or specifications for the works which are noticed while reviewing the Contract documents or in the process of execution of the works.

13.4 Compliance with Regulations and Bye-laws:

The Contractor shall comply with the statutory provisions relating to the works, regulations and by-laws of any local authority and undertaking, including those



controlling the utilities such as water supply, sewerage, telephones, power supply, etc., in whose jurisdiction the work is to be executed. The Contractor shall be bound to give all notices required by statute, regulations or bye-laws, as aforesaid. It shall be the responsibility of the Contractor to arrange all necessary clearances and approvals from the concerned authorities or undertakings before the work is taken up. However, assistance, if any, may be provided by Engineer/Employer/Client.

14 Contract Agreement:

The Contractor shall enter into and execute the Contract Agreement in the form of agreement (Annexure-X) within 28 days from the date of issue of Letter of Acceptance. The stamp papers of the requisite value as per the prevailing laws shall be provided by the Contractor at his own cost. Original agreement shall be retained by the Employer/Engineer and a certified copy shall be made available to the Contractor.

15 Contractor's Representative:

When the Contractor is not in a position to be present, he shall keep responsible representative at site or work place during all working hours, who shall, on receiving a reasonable notice, present himself to the Engineer, Engineer's Representative or their Assistants. The instructions and orders given to the Contractor's representative shall be deemed to have the same force as if they have been given to the Contractor. The Contractor should furnish the necessary Power of Attorney in favour of his representative for the purpose of this clause. Failure on part of the Contractor to comply with this provision shall constitute a breach of Contract and may lead to action under clause 61.0 of GCC.

16 SUBCONTRACTING

16.1 Sub-contracting

- i) The Contractor shall not subcontract the whole of the works. Except where otherwise provided in the Contract, the Contractor shall not subcontract any part of the works without the prior consent of the Engineer in writing and in any case not beyond 30% of the contract value. Any such consent shall not relieve the Contractor from any of his liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of any subcontractor, his representative, servants or workmen as fully as if they were the acts, defaults or neglects of the Contractor.
- ii) Provided that the Contractor shall not be required to obtain such consent for
 - a) The provision of labour, or
 - b) The purchase of materials which are in accordance with the specifications/ standards specified in the Contract, or
 - c) The subcontracting of any part of the works for which the subcontractor is named in the contract.
 - d) The purchase of Plants and Equipment for execution of the works.
 - e) The hiring of Plants and Equipment for execution of the works.

Any breach of the above conditions shall entitle the Employer/Engineer to rescind the contract.

- 16.2 Provided always that execution of specific works by petty contractors, or on piecework basis, under the personal supervision of the Contractor, shall not be deemed to be subcontracting under this clause.



17 PROVISION OF EFFICIENT AND COMPETENT STAFF

The Contractor shall employ and keep on the works at all times efficient and competent staff to give necessary directives to his workers to see that they execute works in a safe and proper manner. The Contractor shall employ only such supervisors and workmen as are capable, careful, and skilled. The Engineer shall be at liberty to object to and order the Contractor to remove forthwith from the works, any person employed by the Contractor in or about the execution of works or maintenance of works, who, in the opinion of the Engineer, misconducts himself or is incompetent or negligent in the proper performance of his duties or whose employment is otherwise considered by the Engineer to be undesirable and such person shall not be employed again in the works without the written permission of the Engineer. Any person so removed from the works shall be replaced as soon as possible by a competent substitute.

18 ACCESS TO SITE OF WORK

18.1 Access to Engineer:

The Engineer or the Engineer's Representative, shall at all times have access to the works and to all workshops and places, where work is being performed and from where materials, manufactured articles or machinery are being obtained for the works, and the Contractor shall afford every facility and every assistance in obtaining the right to such access.

18.2 Access Road:

The Contractor shall provide necessary access roads to the site of work, from the nearest Public Thoroughfare/ right of way, at his own cost, unless otherwise provided for in the contract.

19 INDEMNITY BY THE CONTRACTOR

19.1 Indemnity against all actions of Contractor

The Contractor shall hold and save harmless and indemnify the Client/ Employer/ Engineer and their employees, from all actions, suits, proceedings, loss, costs, damages, charges, claims and demands of every nature and description brought against or recovered from the Client/ Employer/ Engineer and their employees by reason of any act or omission of the Contractor and/or his representative and/or his Employees and/or his sub-contractors in the execution of the works or in the guarding of the same. All the sums payable by Client/ Employer/ Engineer by way of compensation under any of these conditions, shall be recovered from the dues of the Contractor, without reference to the actual loss or damage sustained, and whether or not any damage shall have been sustained.

19.2 Indemnity against all Claims of Patent rights and Royalties

The Contractor shall hold and save harmless and indemnify the Client/ Employer/ Engineer, his officers and Employees from and against all claims and proceedings for or on account of infringement by the Contractor of copyright, any patent rights, design, trademark or name, secret process, patented or unpatented invention, articles or appliances manufactured or used for or in connection with



the works and from and against all claims, proceedings, costs, damages, charges, and expenses whatsoever in respect thereof or in relation thereto. The Contractor shall pay all royalties, taxes, rent and other payments or compensation, if any, for getting the materials required for the works and due fulfillment of the contract and indemnify Client/ Employer/ Engineer against any claims in this regard.

20.0 POWER & TRAFFIC BLOCK:

Any traffic/Power blocks, shut-downs, temporary restrictions and caution order required in connection with execution of works by the contractor, shall be got sanctioned from the MP-DISCOM/ Railway authorities well in advance, through the Engineer. Where power blocks are involved, the contractor shall ensure that interruption of power supply, if any, is kept to bare minimum level.

The protection required for working in Traffic/Power blocks i.e. flagman, flags, discharge rod, whistle etc. shall be provided by the contractor free of cost. Competency for the above shall however be given by the Railway/MP-DISCOM authority. Protection of Road/ Railway Track by Banner flags shall be done in accordance with General rules of Indian Railways and subsidiary rules of the concerned Zonal Railway where work is being carried out. The contractor shall provide safety helmet, safety belt, Safety shoes to his staff while working at site.

21. Provision of Road Crane for Structure erection:

The contractor shall arrange road crane (Hydra) with long jip along with fuel and operator for erection and dismantling of structures/ equipments etc. at site

22. Clearing of Work site:

Clearing of released/ dismantled materials/ equipment from the site immediately after completion of work and handing over of the same to the authorized Railway Representative through the employer's Engineer at the nearest store of the concerned authority by obtaining proper handing over certificate from concerned department shall be done by Contractor.

The Contractor shall arrange clearing of site, required Dismantling, shifting of left over utility etc. of their own. Safety bands, Ribbons and other gadgets for Construction site & workmen shall be maintained as per scheme approved.

Photography and videography before and after execution of work shall be done, if necessary for record.

23. Maintaining rules regulations and standards & Quality control:

The contractor shall carry out installation of components based upon the rules, Regulations and various applicable Indian standards, approved drawings, design & approved methodology, following codal provisions and requirement etc. for all safe & sound completion of the Work by providing his own Manpower, Machineries and Materials etc.

To organize, conduct & maintain quality control test and records for day to day work on regular basis, the contractor shall ensure that the work is executed conforming to the approved design, drawings and specifications. For execution of the Work, the contractor has to follow the quality Assurance, Safety, Health &



Environment guidelines as provided with this tender. The Engineers to be deployed by the Contractor shall work under the direction of the Engineer-in-charge. All facilities & equipment required for construction & quality control during execution of entire work, have to be provided by the contractor.

24. Security of Installations:

The contractor shall be held responsible for security of installations from theft/damage till handing over of the installations to the Railway Authority.

25. Handling of Materials for works:

Loading/unloading & transportation of materials from the store to the work site and head loading of materials at site, fabrication of new cantilevers, jumpers etc. and arranging of Tools & Tackles whichever is required shall be in the scope of the contractor.

26. Deployment of Manpower for work:

The Contractor shall deploy experienced engineers, supervisors, fitters and other skilled technicians/ staff for execution of the contract. The list of staff to be submitted before execution of the work. Contractors shall ensure timely completion of the contract.

27. Handing over of completed works:

The successfully completed works shall be handed over to the concerned Railway authority.

28. INTERFACING & INTEGRATION OF WORK

Various activities shall be executed by more than one agency in the section. The interfacing for the purpose of integration of works between the Contractors will arise. Moreover, during the currency of this contract, other agencies will be deployed for execution of earthwork, track works, signaling and electrification works. The contractor may be required to plan and phase his activities as per the directions of the Engineer for accommodating simultaneous execution of other works also. This has to be kept in view.

29. COMMENCEMENT OF CONTRACT

Date of issue of Letter of Acceptance (LOA) shall be considered as the commencement date of Contract.

30. COMPLETION PERIOD

The work is required to be completed within a period as specified in the Key Information table in Para 1.1 of e-Procurement Notice (12 months) from the date of issue of letter of acceptance.

The work has to be executed in co-ordination with other agencies working on or near the project.

In case of any delay in the completion period, the extension of the same shall be dealt as per clause 17 of General Conditions of the Contract.



31. FREIGHT AND INSURANCE CHARGES

The rate shall be inclusive of freight & Insurance charges.

32. TAXES AND DUTIES & LEVIES (Ref.: Sub-clause no. 4.3, 4.4 and 4.5 of 'Instruction To Tenderers')

32.1 The Contractor shall get registered with the concerned Goods and Services Tax Department of the relevant state(s) of the project and submit a copy of the same to the Employer/ Engineer. He shall be responsible for filing Goods and Services tax returns and assessments, as necessary as per prevalent Laws, Rules and Regulations and shall also furnish necessary certificates to Employer/ Engineer from time to time.

32.2 All rates quoted in the Bill of Quantities shall be deemed to be inclusive of all types of taxes, duties and levies imposed by Central/State Govt. and local bodies such as IGST/CGST/SGST/UTGST, Compensation Cess, Labour Cess, Custom duty, royalties and other levies. No additional amount shall be paid or claim be entertained on these account by Employer/Engineer.

32.3 If there is any change to the existing rates of statutory taxes/ duties of the state/ Central Governments or Levy of any new type of statutory taxes/ duties of substitution of existing taxes/duties after the last date of submission of tender shall be borne by Employer/Engineer. The increase or decrease in liability on this account will be dealt with accordingly. Increase in liability shall be reimbursed as per actual on submission of computation of increased liability statement with documentary evidences in the form of challans/ returns of the Contractors/ suppliers to the satisfaction of Employer /Engineer. Similarly, in case of reduction of taxes/duties by either the Central/ State Governments/ local bodies due to change in the rate of taxes/ duties or due to introduction of new tax or substitution of existing tax the benefits of reduction in liability shall be passed on to Employer/ Engineer immediately commencing from the first periodical return falls due. Computation of decrease in liability shall be submitted by the contractors/ suppliers/ service providers, examined and agreed by Employer/ Engineer. All the changes in rules and consequent payment should be supported by documentary evidences.

In case the contractor fails to intimate and does not pass on the benefit to employer, he may be liable to a penal interest for the period for which benefit has not been passed on at the rate of SBICLR+3%. In addition to this penalty equal to 10% of amount of benefit shall be levied in case benefit fallen due has not been intimated to Employer.

32.4 The Contractors/Suppliers/Service providers who is liable to get registered under the GST act shall submit a copy of the registration certificate with GST no. and such other details as desired by Employer/Engineer for compliance under the CGST/IGST/SGST/UTGST and Compensation Cess Act. The Contractor/ Suppliers/ Service provider shall be responsible for issuing of Tax Invoices, filling of statutory monthly return and deposit of statutory taxes within the time limit as prescribed in law. Any Interest/ Penalty/ Taxes (non-availment of Input Tax Credit due to mismatch in GSTR2) which is required to be paid by Employer/ Engineer due to the default by the Contractor/ Supplier/ Service provider to comply with the above mentioned activity/ provisions as prescribed in laws, rules and regulations shall be recovered from the Contractor/ Supplier/ Service provider and adjustment shall be made when mismatch is attended and solved and credit is extended to



Employer/Engineer.



- 32.5 While passing the bills of the Contractor/Supplier/service provider, the GST component will be kept in withheld account by the Employer/Engineer and the GST component shall be released only after the credit thereof is received by the Employer/Engineer in the electronic credit ledger on GSTN.
- 32.6 The contractor/Supplier/Service provider who is not liable to get registered under the GST Act or who has opted for composition scheme under the GST Act shall submit documentary evidence in support of the above.
- 32.7 In the case of unregistered Contractor/Supplier/Service provider Employer/Engineer shall deduct applicable GST under reverse charge from the payment released by back calculation method. GST deducted shall be deposited to the concerned authority.
- 32.8 Employer/ Engineer shall deduct Cess as the prescribed rate as per provision of the Building and Other Construction Work Welfare Cess Act 1996.
- 32.9 The Contractor shall bear the cost of all royalties, fees and other payments in respect of patents, patents right and license(s) or which may be payable to patentee, licensee, or other person or corporation and shall obtain all necessary license/permissions. In case of any breach (whether wilfully or inadvertently) by the Contractor of this provision, the contractor shall indemnify Employer, Engineer and their employees against all claims, proceedings, damages, costs, charges, loss and liability which they or any of them may sustain, incur or be put to by reason or in consequence directly or indirectly of such breach and against payments of any royalties, damage or other money which the Employer/Engineer may have to make to any person or pay in total to the patent rights in respect of the users of any machine, instruments, process, articles matter or thing constructed, manufactured, supplied or delivered by the Contractor under this contract.
- 32.10 The contractor shall be liable to submit the royalty payment receipt as per the applicable norms and the prevailing rate to the extent materials are used on the project. IRCON shall be free to deduct suitable amount from RA bill of the contractor if the royalty payment receipt is not submitted by the contractor before releasing payment. Amount deducted by the engineer on account of Royalty shall only be released on submission of royalty payment receipt/Royalty clearance certificate by the contractor. However, Contractor shall be liable to submit royalty clearance certificate from the concerned authority before releasing the final bill. The minerals being used by the contractor should be purchased from valid authorized lease/permit holders/authorized dealers.
- 32.11 Upon implementation of GST any reduction in tax on supply of goods or services or the benefit of input tax credit shall be passed on to Employer/ Engineer by way of commensurate reduction in prices.

33. CODES AND STANDARDS

List of Standard Drawings and specifications is listed separately.

Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be furnished and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and



codes in effect shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national or relate to a particular country or region, other authoritative standards which ensure an equal or higher quality than the standards and codes specified will be accepted subject to the Engineer-in-charge's prior review and written approval. All goods and materials to be incorporated be new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials unless provided for otherwise in the contract.

The specifications mentioned shall be prime governing. Unless specifically mentioned otherwise, all applicable codes and standards published by Bureau of Indian Standards and all other such documents (as may be published by BIS from time to time and existing) shall govern the design, the workmanship, the quality/ properties of the materials, the method of field and laboratory testing, the method of measurement for different items of work.

The decision of Engineer-in-charge shall be final and binding in the interpretation of the clause of the codes of practice, specifications and preferred makes of this tender and no claim whatsoever shall be entertained on this account from the Contractor.

34. OTHER SAFETY PROVISIONS

34.1 Safety of Labour and others

The Contractor shall, at his own expense, arrange for the safety provisions as required by any law in force, in respect of the labour employed directly or indirectly for performance of the works, and shall provide all facilities in connection therewith.

34.2 SAFETY OF WORKS

The Contractor shall provide and maintain at his own cost, all lights, guards, signage, signalmen, fencing and safety arrangements when and where necessary, or as required by the Engineer for the protection of the works or for safety and convenience of those employed on works or of the public.

34.3 Mere observance of these precautions shall not absolve the Contractor of his liability in case of loss or damage to property, or injury to or death of any employee/labour of Contractor, Client or Employer/Engineer or any member of the public.

34.4 Recovery of the cost from the Contractor

Should the Contractor fails to implement the provisions as required in the preceding sub-clauses 35.1 & 35.2, the Engineer may provide necessary arrangements and the cost of the same shall be recovered from the Contractor's payments/dues.

35. PROTECTION OF ENVIRONMENT

During execution of works, the Contractor and his sub-contractors, petty contractors shall abide at all times by all existing enactments on environmental protections and rules made there under, regulations, notifications and bye-laws of the State or Central Government or local authorities and any other law, bye-law, regulation that may be issued in this respect in future by the State or Central Government or local authority. Salient features of some of the laws that are



applicable are given below: -

a) The Water (Prevention and Control of Pollution) Act, 1974:

This provides for the prevention and control of water pollution and maintaining and restoring of wholesomeness of water. "Pollution" means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.

b) The Air (Prevention and Control of Pollution) Act, 1981:

This provides for prevention, control and abatement of air pollution. "Air Pollution" means the presence in the atmosphere of any "air pollutant", which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.

c) The Environment (Protection) Act, 1986:

This provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures, plants and property. Environment includes water, air and land and the inter-relationship which exists among and between water, air and land, other living creatures, plants, micro-organism and property.

d) The Public Liability Insurance Act, 1991:

This provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act, 1986, and exceeding such quantity as may be specified by notification by the Central Government.

36. APPROVAL/ REVIEW

Without prejudice to Employer's other rights and remedies stipulated under the Contract, the Contractor's following works shall be subject to approval by the Employer/ Consultant.

- i) The men, material and machinery proposed to be mobilized by the Contractor.
- ii) All changes from the agreed specifications/ drawings.
- iii) Design, type, quality, quantity, materials and workmanship of any or all items of supplies, work and services under Contractor's scope to ensure that supplies, work and services executed/performed by the Contractor are in accordance with the provisions of this Contract.
- iv) Where approval of the Employer is necessary or implied but is not specifically



provided for elsewhere in this Contract.



- v) Notwithstanding with any approval or acceptance which the Employer may grant to the Contractor under the Contract, the Contractor shall be solely and wholly responsible and liable for the execution and performance in terms of the Contract and the Employer reserves the right to reject, any of works/material performed and/or supplied by the Contractor under the Contract.

37 INSPECTION AT MANUFACTURER'S PREMISES

Material shall be inspected by RITES/IRCON/Railway/State-DISCOM representative as per the extant directives of Railway/IRCON. The RITES inspection charges shall be reimbursed to the contractor on submission of documentary proof.

No material shall be dispatched without inspection as per approved quality assurance plan (QAP) and dispatch instructions (DI) issued by Employer unless waived by the Employer. Inspection may be carried out by Employer's authorized representative/third party agency (to be appointed by Employer). At least fifteen (15) days prior notice shall be given by the Contractor for carrying out inspection at manufacturer's/ supplier's premises. All inspection facilities, gadgets, instruments, testing equipment, utilities and man-power, etc. for carrying out inspection at manufacturer's/supplier's premises shall be provided by the Contractor at no extra cost to the Employer. Employer shall bear only the cost of his personnel/representative towards travelling, lodging & boarding.

The Contractor shall give reasonable notice in writing together with his own inspection report as may be acceptable to the Engineer but not less than fifteen (15) days in advance of any material being ready for Testing or inspection specifying the period likely to be required for such Testing and the Engineer or his authorized representative shall (unless dispatch clearance is given), on giving 24 hours previous notice in writing to the Contractor to attend at the Contractor's or sub-Contractor's works as the case may be and witness the Testing as soon as possible from the date on which the materials are notified as being ready for Testing or inspection, failing which visit the Contractor shall proceed with the Tests and shall forthwith forward to the Engineer duly certified copies of the reports.

At any time during the execution of the contract, Employer reserves the right to test and inspect any material for quantity and quality.

In all cases, where examination, inspection and Testing are to be carried out whether at the premises of Contractor or sub-Contractor or at site, the Contractor except where otherwise specified shall provide, free of charges to the Engineer, such Labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably required to carry out efficiently such Tests of the plant, in accordance with the Contract and shall give facilities to the Engineer or his authorized representative to accomplish witness such Testing.

When the Tests have been satisfactorily completed at the Contractor's or sub-Contractor's works, the Engineer shall forth with issue a Certificate to that



effect. If a final Certificate cannot be issued, a preliminary or Provisional Certificate shall be issued. If the Tests were not witnessed by the Engineer or his representative, the Certificate shall be issued on receipt and scrutiny of the Test report from the Contractor but not later than fifteen (15) days after the receipt of the Test report by the Engineer. No structure/ plant/ facility shall be assembled or painted with prime coat or dispatched before such Certificates have been issued. The satisfactory completion of these Tests or the issue of the Certificates shall not bind the Engineer to accept the plant should it on further Tests, after erection be found not to comply with the Contract.

38 Co-ordination/ Liaoning with State Electricity Board

Co-ordination/ liaisoning and chasing with State Utility Company for availing new electrical connection/ augmentation of sanctioned load at stations, level crossings etc. including applying for load, collection of estimates for loads, modification of power line crossings, arranging payment from IRCON & depositing payment to State Utility Company, arranging release of load & other related works are in the scope of contractor.

However, payment to be made to SEB for new connection, load augmentation, supervision charges, deposits, modification of power line crossings etc. will be made by IRCON. Wherever it is required, contractor may also have to process these payments directly to SEB as advised by IRCON, on showing of documentary evidence/ payment receipts, the same amount will be reimbursed by IRCON.

39 PAYMENT TERMS:

BOQ:

SN	Description	Payment in Percentage
Sch. 1, 2, 3 & 4:		
1	Payment for supply of materials as per BOQ Schedules shall be as under:	
a)	Supply of materials at site/ Store	70%
b)	Erection of above materials	20%
c)	Testing & Commissioning of installation	5%
d)	Handing over of executed work	5%
Total		100%
2	Payment for Erection of materials as per BOQ Schedules shall be as under	
a)	Erection of Materials	90%
b)	Testing & commissioning of Executed Works	5%
c)	Handing over of executed work	5%
Total		100%
Sch. 5: Technical Consultants & Site Facilities		
1	Against providing services	100%

Note: 100% payment against supply may be released for handed over materials, on submission of relevant documents, after approval from engineer in charge.



Documents required for release of Schedule- payment

S. No.	Description	Documents to be submitted for release of payment
1.	Supply of Material	Against receipt of materials at site and on submission of documents as mentioned below: • Contractor's signed Invoice showing LOA reference, goods description, quantity dispatched, unit price, total amount - Original plus three (3) copies • Challan and Packing List –original +three (3) copies • Rail Receipt (RR)/Lorry Receipt (LR)/ Bill of Lading/ Airway Bill, as applicable –Original +three (3) copies • Inspection Certificate/ Dispatch Clearance, if any issued by the Railway/IRCON–original + three (3) copies • Manufacturer's Test Certificate –original + three (3) copies • Manufacturer's Guarantee Certificates – Original+ three (3) copies • Certificate from IRCON's representative clearly stating receipt of materials in good condition- Original plus Three (3) copies
2.	Installation of material & equipment	After successful erection of materials& equipment at site and certification of the same by IRCON's engineer along with Daily Progress Report
3.	Testing & Commissioning of Installation	After successful testing & commissioning of complete system and acceptance by the client on submission of documents as mentioned below: • Copy of the working drawings/as built drawings showing thereon additions or alterations (to be shown in RED) made during the execution of the work. • Operation & maintenance manual - Original plus Three (3) copies • Certificate from IRCON's representative clearly stating successful completion of testing & commissioning of equipment - Original plus Three (3) copies.
4.	Handing over of installations	Acceptance certificate from client, regarding acceptance of work

Only one bill shall be entertained per month.

Payment shall be made for actual work done and at the accepted rates only.

Payment shall be made only after submission of Performance Security and signing of contract agreement.

All payments shall be made after deduction of TDS, retention money or any other taxes /sums due from the contractor. Contractor is also required to give PAN/TIN number or GST Registration number etc. Payment will be made in Indian Rupee.

40 MODE OF PAYMENT AND TAX DEDUCTION AT SOURCE

40.1 Mode of Payment:

All payments to the Contractor shall be made through Electronic Clearing System (ECS) after submission of Tax Invoice and required documents. The contractor shall furnish his Banker's details in addition to his own bank account details. All amounts payable to the contractor shall be directly credited to his bank account.

In case, the contractor is having his account with a bank not having Electronic



Clearing System (ECS). The contractor may open a bank account with the bank having this facility.

All payments to the Contractor shall be made by above means only unless specifically otherwise agreed by the Engineer in special circumstances for petty payments.

40.2 Tax Deduction at Source

Income Tax and all statutory dues (if any applicable) shall be deducted from the payments credited/released by Employer/Engineer to the contractor/ Supplier/ service provider against execution of work as per as per the income tax Act, 1961. The deductions shall be made as per prescribed rates prevalent from time to time unless a tax exemption certificate is produced by the contractor. Amount of tax deduction shall be deposited with the concerned authorities and tax deduction certificate shall be issued by Employer/ Engineer. The Employer/Engineer shall deduct at source taxes/duties under any other law/statute as may be applicable at the time of making payments.

The contractor shall furnish to the Engineer required information (for TDS & GST TDS), as applicable.

The deduction towards income tax shall be made at source from the payments due to the non-resident contractor/supplier/service provider as per section 195 of the Income tax Act, 1961.

41 CONTRACTOR'S OBLIGATIONS

Unless expressly excluded and/or limited elsewhere in the Contract, the Contractor shall discharge the responsibilities as specified herein below at no extra cost to the Employer in addition to such other obligations and responsibilities as have been specified elsewhere in this contract;

The contractor shall be deemed to have obtained independently on his own all necessary information and shall be deemed to have carefully examined all details relating to works as given in the contract including its scope, nature and magnitude, requirements of associated materials and services and shall be deemed to have fully acquainted himself as to all conditions and matters which may in any way affect the execution of works in accordance with the Contract and/or the cost associated therewith.

The employer shall assume no responsibility and/or liability whatsoever as may arise due to lack of inadequacy of such information no matter whatever be the defects, omissions or errors that may be found in the information / documents furnished by the Employer.

The Contractor shall be deemed to have acquainted himself with the Indian Income Tax Act, 1961, Indian Companies Act, 1956, Indian Electricity Act, Electricity Rules, Factories Act, Labour laws, Pollution Control Regulation and other acts & laws, rules and regulations as applicable in execution of works and prevalent in India, respective state(s) and at Project site and as amended from time to time.



The Contractor shall further conform in all respects with the provisions of any such Statute, Ordinance or Law as aforesaid and the rules, regulations or by-law of any local or other duly constituted authority which may be applicable to the works or to any Temporary Works and with such rules and regulations of public bodies as aforesaid.

The Contractor shall carryout the testing at Employer/ Govt. approved lab without any extra cost, if so desired by the Employer/ Consultant in order to check & verify the quality of works or any part thereof, executed under the Contract.

The Contractor shall provide all temporary ladders, scaffolding materials, platforms, supports and other necessary facilities required for handling, installation/erection, testing and visual inspection of supplies at the point of installation. The Contractor shall provide sufficient strong and stable staging so as to ensure safety of the labour.

The Contractor shall provide sufficient fencing, notice boards and lights as may be considered necessary by the Employer to protect and warn others. All materials used for providing these facilities shall be properties of the Employer.

The Contractor shall take all precautions during execution, especially while excavation to avoid interference with or damage to underground works such as cables, drains, etc. whether shown in the drawing or not and provide all possible protection to these works and in case they are damaged, rebuild/divert them at his own cost.

Materials brought to the site shall not be removed from the site without the written consent of the Employer. Any material brought to site and rejected by the Employer shall be removed by the Contractor from the site of work immediately at Contractor's expense.

The contractor shall be deemed to have visited the site and surroundings of the proposed work at his own Cost and satisfied himself with all aspects, nature and extent of work and / or any other factor, (e.g. availability of Labour, water, power, ground and sub-soil conditions, uncertainties of weather, general and local conditions etc.) which might influence his tender and shall be deemed to have verified and / or checked the data furnished by the EMPLOYER, if any.

The contractor shall be deemed to have satisfied himself as to the accessibility to site by roads and feasibility of taking materials and Equipment to the site of work, erection of their Equipment and suitability of site for the proposed work.

All the services shall be in conformity with accepted norms and best available engineering standards including Indian Standards and IPSS.

Contractor's responsibility shall also include executing works as per latest RDSO/CORE drawings. The responsibility of obtaining necessary drawings from RDSO/CORE shall be of Contractor. Clearance / Approval, if any, required from the Statutory Authorities for execution of the work shall be obtained by the Contractor within the Quoted Price. However, formalities required to be fulfilled by EMPLOYER in this respect, if any, shall be met.



Testing jig for testing of Insulators shall be prepared by the contractor in OHE depot and cost of the same shall be borne by the contractor. No extra payment shall be made to the contractor in this regard.

Cube compaction testing machine shall be arranged by the contractor for testing of concrete cubes. No extra payment shall be made to the contractor in this regard. Only Steel Shuttering to be used.

RMC or nominal mix concrete is permitted. Hand-mixing is not allowed.

Minimum 02 nos. vibrators shall be available at each site during concreting. Foundation pits are required to be covered with FRP mesh for safety. Shuttering for foundation has to be of steel only with proper bolting arrangement, wooden shuttering would not be allowed. Safety barricading to be provided around foundation pits.

42 DELIVERABLES TO BE SUBMITTED WITH THE BID

42.1 Project Organizational Structure

The Bidder shall submit with its bid project organizational structure information containing the following minimum information:

Organizational structure depicting the on-site and off-site personnel supporting the successful completion of the project;

Location of site camps and their organizational structure should be presented as well including assigned equipment, facilities and communication channels; and

Narrative description of the organizational structure is required. The Bidder shall compile his own sheet in response to this section.

42.2 Method Statement

The Bidder shall submit with its bid a method statement containing the following minimum information:

Integrated method of executing the activities and interfacing between the various parts of this project, including but not limited to the following:

Demonstrate a good understanding of the activities associated with the various parts and their interfaces/integration of the scope; Interfacing and integration of the various parts during the construction and commissioning;

Demonstrate that the interfaces and overlaps between the scopes of the various parts are understood and provided for during the construction and commissioning;

Integrated construction methodology (e.g. working from two sides of the site, excavate, erect steel, wiring, on track vehicles, etc.); construction equipment and resources. The Bidder shall provide details of the proposed key equipment.



Management responsibilities;

Control of documents and records; materials management (e.g. on and off site, long lead items, acceptance procedures etc.);

The work method statement covered under this section shall be further developed and approved by the Employer after Contract award as may be required. Any work method statements for a specific activity that may arise during the construction phase shall be submitted to the Employer for approval before the activity commences.

The Bidder shall compile his own sheet in response to this section.

Construction and Commissioning Schedule

The Bidder shall submit with its bid a MS Project/ Equivalent, construction and Commissioning Schedule with milestones and critical path.

The submissions must show the different contract phases and how the project staff would be used and integrated to (i) manage each phase and (ii) provide internal controls in terms of quality and delivery. In addition to the above, the Bidder's submissions must contain the following minimum information:

Work Breakdown Structure (WBS) with Level III schedule containing milestones for each major discipline showing start and end dates for each phase of: Procurement; construction; testing; and Handover (Including all Factory Acceptance Tests and Site Acceptance Tests).

The Construction and Commissioning Schedule covered under this section shall be further developed and approved by the Employer after Contract award, as may be required. The Contractor will provide to the Employer, proposed Level III Baseline for execution of the Project within 20 working Days after the date of award of work using MS Project/Equivalent software. The Level III Schedule will be used to monitor the planned progress of the Project by comparing it with the actual progress of the Project. Fourteen (14) working days following Contractor's submission of the proposed Level III Schedule, the Employer and the Contractor will meet to discuss the Employer's findings. Seven (7) working days following the Employer's and Contractor's meeting, the Contractor shall incorporate all requested changes and resubmit the proposed Baseline Level III Schedule to the Employer for consideration. The above process of resubmission, review, meeting and incorporating corrections shall continue until the Employer approves the proposed Baseline Schedule at which time it will become the Project Baseline Schedule.

43 Implementation of Quality, safety, health and Environmental Management system

43.1 QUALITY MANAGEMENT SYSTEM: IRCON is an ISO Certified Company in Quality Management System and expects the Contractor to work as per the Standards.

43.1.1 The contractor shall follow various requirements of Quality Management System



of IS/ISO 9001:2015 and Quality Policy of IRCON. The contractor already holding QMS Certificate need to act swiftly to keep it updated and fulfill various requirements as sites.

43.1.2 The contractor shall develop the Quality Assurance Plan (QAP) and Inspection and Testing Plan (ITP) and get it approved from Project Head/ the Engineer. The records of tests to be conducted as per ITP and tests done actually shall also be kept by the Contractor.

43.1.3 The Contractor shall ensure the timely calibration of all measuring and testing equipment at his own cost from reputed laboratory and the hard copies of Documented Information are to be kept ready for any time inspection by the Engineer

43.1.4 The Contractor shall ensure maintenance and overhauling of all plants and machinery deployed for the works as per guidelines issued by Manufacturer/ Supplier/ Vendor/Legal Requirements/ Engineer

43.1.5 The Contractor shall keep the hard copies of the Documented Information of Manufacturer's Test Certificates (MTCs) and Third Party Test Certificates, from approved laboratory at his own cost, as required, for all the materials supplied by him. These records shall be checked any time by the Engineer.

43.2 Safety, Health and Environmental Management system (SHE)

IRCON is an ISO Certified Company in the areas of Occupational Health & safety, and Environment Standards and expects the Contractor to work as per these Standards.

The contractor shall execute the work as per Safety, Health, and environment Standards of IRCON (attached with the Tender Paper). Contractor shall provide and ensure the use of required Personal Protective Equipment's (PPEs) for all workers/staff and engineers. The contractor shall provide and erect safety barricades as required, display safety poster and instructions regarding safety.

The contractor shall prepare a Project Safety, Health and Environment Manual (SHE Manual) and get it approved by the Project Head. The contractor will own the ultimate responsibility of all aspects of Safety, Health and Environmental, upkeep of the work place and its surroundings.

The Contractor will facilitate Safety Checks, Health Checks and Environmental Checks and checks on compliance to all the norms as per the 'SHE Manual' and the same shall be checked by PH or the nominated Safety Officer at regular interval. IRCON has developed the Checklists on Safety, Health and Environmental issues and expects the Contractor to follow the same.

All Checklists and other Documents related to SHE should wear the logo of IRCON along with that of the contractor.

The Employer may at their discretion undertake such corrective measures as deemed fit for immediate restoration of safe conditions at the work place at the cost of the contractor and recover the cost from contractor running bills. The



contractor will keep the employer indemnified against any corrective action by the employer. In addition to such resource, the penalty for each violation will be enforced as under, without issuing any show cause notice for the same:

S. No.	Nature of Violation	Penalty
1.0	Non preparation of site safety plan before the first running bill.	₹ 10,000.00
2.0	Violation of safety norms pointed out by inspecting officials, such as deficient documentations or safety gadgets or lack of supervision/process control etc.	₹ 10,000.00 for each violation subject to maximum 1% of the contract value in all.
3.0	Injury to worker leading to stoppage of work.	₹ 25,000.00 for each case
4.0	Fatalities to workers at work related accidents.	₹ 5.00 Lakhs for each mortality
5.0	Repetition of Violation	May lead to termination of work

The Bidder shall submit with its bid Health, and Safety and Environment Policy signed by the CEO or MD, including description of the organization; The Bidder shall submit with its bid a SHE Plan of the Bidder and not of its subcontractor/s. The Bidder shall compile his own sheet in response to this section.

44 CONTRACTOR'S EQUIPMENT

The Contractor shall mobilize himself with adequate material handling equipment like cranes, trailers etc. in addition to other erection tools & consumables keeping in view the erection schedule. The Contractor shall provide within 30 days from the Effective Date of Contract his scheme for mobilization with Bar Chart indicating clearly the resources, manpower and machinery proposed to be deployed to ensure timely completion of work and quality of workmanship.

All necessary Tools, Tackles and Equipment required for execution of the Work including Welding Machines, Gas Cutting sets, Lifting Devices, Concrete Mixers, Concrete Vibrators, Transit Mixers etc. for executing the contractual work shall have to be arranged by the contractor at his Own Cost including the Cost of Fuel & consumables.

All Contractors' Equipment brought by the Contractor onto the Site shall be deemed to be intended to be used exclusively for the execution of the Contract. The Contractor shall not remove the same from the Site without the Engineer's consent that such Contractor's Equipment is no longer required for the execution of the Contract.

Contractor shall arrange for necessary Security and Safety of their materials, Plant & Equipment etc. till the project is taken over by EMPLOYER. No assistance shall be available from the EMPLOYER in this aspect.

45 PERMITS AND LICENCES:

The Contractor shall at his own expenses obtain all permits and licenses required for the performance of work under this Contract and the Contractor



shall bear any fee paid to the Government or local licensing authority for obtaining permits and licenses at their own cost. The Contractor shall perform the work in accordance with the conditions of all applicable permits and license. The Contractor shall provide evidence of license granted and any restriction contained therein.

This work needs to be executed in jurisdiction of MPPKVVCL, therefore contractor needs to get registered with MPPKVVCL as a registered contractor. Contractor registration certificate shall be obtained from MPPKVVCL and needs to be submitted before signing of the Contract Agreement/ submission of 1st Running Account Bill.

46 SITE REQUIREMENTS

Water Supply:

Water for drinking and for the works is scarce to get in the project area. The contractor shall be responsible for the arrangements to obtain water supply for drinking and necessary for the works. Rates quoted by contractor shall include the cost of arranging water supply at the site of works.

Power Supply:

Any electric supply required at the site of works for whatsoever purpose shall be arranged by the contractor. The contractor shall make his own arrangements for electric power supply/installation of Diesel generating sets etc. as required for the work at his own cost and the rates quoted shall include the cost of providing such electric supply arrangements required for the works and offices / accommodations etc.

If with the recommendation of Railway, the State Electricity Board provides electric connection, the contractor may be given the facility on chargeable basis however the contractor shall have no claim on this account.

Labour Camps:

The Contractor shall, at his own expense, make adequate arrangements for housing, electricity, road, supply of drinking water and provision of lavatories and urinals for his staff and labour.

47 Enabling Works:

The rates quoted shall be inclusive of all enabling works such as construction vats, stores, godown, workshop, maintenance places, offices, housing, labour camp, access roads, service roads, transport arrangements, drinking water facility, lighting etc. whether expressly specified or not. All temporary access facility created during execution of works including ramps in earthwork, concrete or masonry steps, ladders, etc. shall be treated as enabling works.

48 Updation of labour data on Indian Railways Shramik kalyan portal by Contractor:

- 48.1** Contractor shall abide by the provision of payment of wages act and minimum wages act in terms of clause no. 54 of Wages of Labour of Indian Railway 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 payments in this portals. These details shall be available in public domain. The registration / updation of portal shall be done as under:

- a) Contractor shall apply for one-time registration of his company/ firm etc in the shramik kalyan portal with requisite details subsequent to issue of letter of acceptance. Engineer shall approve the contractor's registration on the portal within seven days of receipt of such request.
 - b) Contractor once approved by the engineer, can create password with login ID (PAN no) for subsequent use of portal for all LOAs issued in his favor.
 - c) The contractor once register on the portal, shall provide details of his letter of acceptances (LOAs)/ contract agreements on sharmik kalyan portal within 15 days of issue of the LOA for approval of the concerned engineer. Engineer shall update (if required) and approve the details of LOA filled by contractor within seven days of receipt of such request.
 - d) After approval of LOA by the engineer contractor shall fill the salient details of contract labors engaged in the contract and ensure updating of each wage payment to them on shramik kalyan portal on monthly basis.
 - e) It shall be mandatory upon the contractor to ensure correct and prompt uploading of all salient details of engaged contractual labour and payments made thereof after each wage period.
- 48.2** While processing payment of any on account bill or final bill are 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 labors engaged in connection with this contract and payments made to them during the wage period in Railways shramik kalyan portal at www.shramikkalyan.indianrailways.gov.in till ____ month ____ Year.

49 WAGES OF LABOUR

49.1 WAGES UNDER RELVANT LAWS.

In dealing with labour and employees, the contractor and his subcontractors (Including piece rate and petty contractors) shall comply fully with all laws and statutory regulations such as:

- i) Workmen's compensation Act,1923
- ii) Payment of Gratuity Act,1972
- iii) Employees provident funds and miscellaneous provisions Actt,1952
- iv) Maternity Benefits Act,1951
- v) Contract labour (Regulations and Abolition) Act,1970
- vi) Minimum wages Act, 1948 _ 5 3 vii) Payment of wages Act, 1936
- vii) Equal Remuneration Act, 1979 ix) Payment of Bonus Act, 1965
- viii) Industrial Dispute Act, 1947
- ix) Industrial Employment (standing orders) Act, 1946 xii) Trade union Act, 1926
- x) Child Labour (Prohibition and regulation) Act, 1986
- xi) Inter-state mirant workmen (regulation of employment and conditions of V service) Act,1979



- xii) The buildings and other construction workers (regulation of employment and conditions of service) Act, 1996 and cess Act of 1996
- xiii) The factories Act, 1948

And other laws or regulations framed by competent legislative authorities from time to time as may be applicable. In accordance with the various Acts and Regulations with all up to date amendments, the contractor shall ensure that he and his sub-contractors (Including petty and piece rate contractors) observe strictly inter alia the following:

- a) Wages paid are not less than those prescribed.
- b) Wages and other dues are paid regularly and in time.
- c) Liens/ licenses are obtained as required under any of the acts or regulations.
- d) Maintain prescribed records, submit necessary statements to authorities concerned and display required notices.
- e) Take prompt action on any instructions/ directions from the authorities under various labour laws.

49.2 CLAIM ON ACCOUNT OF VARIATION OF LABOUR LAWS

If any moneys shall as a result of any instructions, directions or decisions from the authorities or claim or application made under any of the labour laws or regulations be directed to be paid by the Engineer because of any failure of the Contractor, such moneys shall be deemed to be moneys payable to the Engineer by the contractor and on failure of the contractor to repay the Engineer any money paid or to be paid as aforesaid within seven days after the same shall have been demanded, the engineer shall be entitled to recover the amount from any moneys due or becoming due to the contractor under this or any other contract with the employer. The Engineer shall not be bound to contest any such claim or demand unless the contractor makes a written request for it, and contractor's reasons for contesting are considered reasonable by the Engineer and the contractor deposits the full cost that the Engineer may have to incur in contesting the case.

50 CONTRACTOR'S SUPERVISION

The Contractor shall give or provide all necessary superintendence during the installation of the Facilities, and the Contractor's Representative or his deputy shall be constantly on the Site to provide full-time superintendence of the installation. The Contractor shall provide and employ only such technical personnel who are skilled and experienced in their respective discipline and supervisory staff who are competent to adequately supervise the work at hand.

51 SITE REGULATIONS AND SAFETY

The Contractor shall comply with the Site regulations, during the execution of the Contract at the Site. Contractor shall also maintain hindrance register which shall be periodically examined by Employer.

52 REPAIR TO DAMAGES

The Contractor shall be responsible for rebuilding/ repairs of any damage by any reasons not attributable to the design defect (where design is supplied by Engineer/ Client) during execution of works or Defect Liability Period. In case the Contractor is unable or unwilling to execute such repairing works promptly, the Engineer may get the same done by engaging another agency or using labour, materials and resources as may be considered necessary and the cost of such



remedial works shall be recovered from the Contractor's dues. The decision of the Engineer regarding reasons of the damage shall be final and binding.

53 MATERIALS AND WORKMANSHIP

- i) All materials and workmanship shall be as per the RDSO/ Railway standard specifications and contract condition. The materials are to be tested in accordance with the Engineer's instructions. The Contractor shall provide all such assistance, instruments, machines, labour and materials required to examine, measuring and testing any work and materials used. The Contractor shall supply samples of material before incorporating in the works for testing as may be selected and required by the Engineer.
- ii). The sources of materials to be used in the works shall be intimated to the Engineer and are subject to his approval.
- iii) All samples shall be supplied by the Contractor at his own cost.
- iv) The cost of carrying out any tests in a reputed laboratory as acceptable to the Engineer shall be borne by the Contractor except for the materials to be supplied by the Engineer.

54 QUANTITY VARIATION:

Quantity variation is applicable in line with Railway GCC.

55 DEFECT LIABILITY PERIOD

The Contractor shall maintain, rectify and make good at his own cost any defect/ deficiencies, which may develop in the work or as notified by the Engineer during Defect Liability Period as specified in the Key Information Table in Para 1.1 of e-Procurement Notice. However, maintenance during Defect Liability Period shall not include day to day upkeep, cleaning, custody and security of the work.

The Contractor shall guarantee the works (including bought-outs) for a defect liability period of Eighteen (18) months from the date of issue of Physical Completion Certificate or commercial use whichever is earlier against defective materials, and error in detailing work, faulty workmanship etc.

The Contractor shall be responsible for repair/ replacement of defective materials/ installations and workmanship to the entire satisfaction of the Employer at no extra Cost. The Material, workmanship and or any act or omission of the Contractor that may develop in the works executed/material supplied by the Contractor against the Contract at any point of time before the expiry of the Defect Liability Period, irrespective of whether the work/ material has been taken over by the Employer and regardless of whether the work/ material was earlier inspected/ accepted by the Employer.

The Defect Liability Period of 18 months shall stand extended by the period during which the material/work is not capable of being operated/ used as a result of such repair/ replacement. Further, the repaired/ new materials/ components shall also be guaranteed for 18 months from the date of final acceptance of the component.

56 FAILURE TO REMEDY OF DEFECTS

If the Contractor fails or refuses to carry out the repair/ replacement of defective work within a reasonable period of time, the concerned work/ portion, thereof, shall



be rejected by the Employer who shall place order elsewhere for such repair/ replacement at the sole risk and cost of the Contractor.

57 HANDING OVER OF SITE

On completion of the work, all rubbish, debris, temporary sheds, supports, enabling structures etc. shall be removed from the site and from the land/space provided to the contractor for temporary office/store shall be handed over to the Employer in a tidy manner. All scrap, slag rubbish & muck etc. shall be dumped suitably at a specified place by truck to a dumping yard as directed by the Employer. The successful Tenderer should cleanup the site within a reasonable period of completion of work.

58 Price Adjustment:

- 1) For Power Cables: As per IEEMA(PVC)/CABLE(R-1)/2017, dated 01.11.2017 (enclosed with Tender Documents)
- 2) Other than power cables: As per IRGCC April 2022 Clause no. 46A

59 PRICE BASIS:

59.1 The price shall be quoted on "Firm Price Basis" exactly in the .xls format of Price Bid/ BOQ hosted in e-Tendering Portal www.tenderwizard.com/IRCON. Any changes, modification shall not be accepted. Copy of the Price Bid/BOQ in .pdf format is also enclosed in Section-I of Financial bid for reference.

59.2 Prices shall cover Conversion of LT & HT (11 & 33 kV) overhead power line crossings into underground cable lines including replacement/ relocation of associated lines & equipments to remove infringement of new diverted alignment of Beohari – Joba section in connection to Katni Singrauli Doubling Project of West Central Railway, including all handling, loading & unloading, inland transportation, transit insurance, all temporary permits, freight, insurance etc. The price of clearance/ approval, if any required from the statutory authorities for execution of the work shall be obtained by the contractor within the quoted price.

60 COMPLETION CERTIFICATE

As soon as the work is completed, the Contractor shall give notice of such completion, whether of the whole of the works, or of any part of the work, for which a separate date of completion is stipulated in the contract, to the Engineer, and the Engineer, within 30 days of receipt of such notice, shall inspect the work and also arrange for carrying out of such tests as may be prescribed under the contract or ordered by the Engineer. If the Engineer notices any incomplete item of work or any defect, which is to be rectified by the Contractor, or if any part or whole of the work fails to pass the specified tests, the Engineer shall furnish to the Contractor, the list of all such incomplete items of work, deficiencies, defects, failure to pass tests, etc., and may refuse to issue a Certificate of Completion to the Contractor. If in the opinion of the Engineer the work has been satisfactorily completed and has satisfactorily passed final test or tests that may be prescribed, the Engineer shall issue a certificate of completion showing the date of completion in respect of the work. Provided that the Engineer may issue such a certificate with respect to any part of the works, before the completion of the whole of the works, which has been so completed and/or used by the Client/Employer/Engineer. When any such certificate is given in respect of a part of the work, such part shall be considered as completed.



60.1 Completion certificate not to absolve the Contractor from his Responsibilities:

The Certificate of Completion of Works referred to in sub-clause 60, shall not absolve the Contractor from his liability to make good defects, imperfections and shrinkages or faults, which may appear during the defect liability period specified in the contract, arising in the opinion of the Engineer from materials or workmanship being not in accordance with the Contract. These shall be rectified and made good by the Contractor at his own cost. In case of the default on the part of the Contractor, to so make good the defects or deficiencies, the Engineer may employ labour, plant and machinery and materials or appoint another agency or Contractor, to make good such defects, imperfections, shrinkages and faults, and all expenses consequent and incidental thereto, shall be recovered from any money due to the Contractor under the contract including the Performance Security amount or from any money payable to the Contractor by the Employer/ Engineer, under any other contract.

60.2 Completion Drawings:

Contractor shall be in his quoted rates prepare and submit detailed completion drawings of all the works executed by him, prepared in AutoCAD, in one copy of tracing sheet six copies on paper sheets and one copy pen drive/ hard disk. Drawings may be submitted in phased manner as the works get physically completed as directed by Engineer. However, all the drawings shall be submitted within 30 days of date of physical completion.

60.3 Contractor to study drawing and specification etc and his liability:

The contractor shall be responsible for close scrutiny of approved drawings supplied by the IRCON. For discrepancies, error or omissions in the drawings or in other particulars indicated therein, the contractor shall approach to IRCON immediately for rectification of such discrepancies, errors and omissions. If any dimensions/ figure/ features etc. on approved drawings or plans differ from those drawings or plans issued to the contractor at the time of calling of the tender, the dimension as figured upon the approved drawings or plans shall be taken as correct. No claim shall be entertained on this account and decision of IRCON shall be final, binding and conclusive on the contractor

61 Notice or Letter to Employer and Engineer:

All notices or letters to be given by the contractor to the employer or to the engineer, under the terms of the contract, shall be served by sending by speed post/ Registered post or by delivering the same to the respective nominated address and essentially delivering the same by e-Mail to the Engineer duly attached with scanned copy of such notice (s) or letters and proof of dispatch (POD) with copy to Employer on nominated e-mail address

62 LIQUIDATED DAMAGES: Ass per clause 17B of GCC.

63 LAWS GOVERNING THE CONTRACT & JURISDICTION OF COURTS;

The contract shall be governed by the laws in force in India and jurisdiction of courts shall be New Delhi only, in exclusion of other courts.

64 Clause of arbitration shall not be applicable and para 63 & 64 of Indian Railway Standard General Conditions of Contract, stands deleted



(Ref. Sub-clause 9.1 c of Instructions to Tenderers)

(To be executed on a non-judicial stamp paper of Rs.100/- only)

BANK GUARANTEE FOR EARNEST MONEY DEPOSIT

(Tender Notice No. and date)

Ref:(Bank Guarantee No. and Date)

To

IRCON INTERNATIONAL LIMITED,

[Acting through
Address]

(Tender Inviting Authority) Designation &

WHEREAS, _____ [name of Bidder]
(hereinafter called "the Bidder") intends to submit his bid dated _____ (date)
for _____ [name of work] (hereinafter called "the Bid").

AND WHEREAS it has been stipulated by you in the Bid Document that the Bidder shall furnish you a Bank Guarantee by a scheduled bank for the sum specified therein as Earnest Money Deposit as a precondition of submission of the Bid;

AND WHEREAS we have agreed to give the Bidder such a Bank Guarantee as required;

NOW THEREFORE we hereby affirm that;

1. KNOW ALL PEOPLE by these presents that We _____ [name of bank] of _____ (name of country) having our registered office at _____ (hereinafter called "the Bank") are bound unto IRCON INTERNATIONAL LIMITED (hereinafter called "the Employer") in the sum of Rs. _____ * [amount of Guarantee], _____ [amount in words] for which payment well and truly to be made to IRCON INTERNATIONAL LIMITED. The Bank binds itself, its successors and assigns by these presents with the Common Seal of the Bank this _____ day of _____ 20__ and undertakes and agree to pay unconditionally, without any demur or protest, at once to the Employer up to the above amount upon receipt of their first written demand, without IRCON INTERNATIONAL LIMITED having to substantiate their demand.



2. We, the _____ [name of bank], and our local branch at Katni, M.P. (Indicate detail address of local Katni, M.P. branch with Code No.), undertake to pay to IRCON INTERNATIONAL LIMITED up to the above amount upon receipt of their first written demand, without IRCON INTERNATIONAL LIMITED having to substantiate their demand, PROVIDED THAT in their demand IRCON INTERNATIONAL LIMITED will note that the amount claimed by them is due to them owing to the occurrence of one or any of the conditions, provided in the Bid documents as precondition for encashment of the Earnest Money Deposit , specifying the occurred condition or conditions.

3. This guarantee will remain valid and in full effect up to and including the date _____ **. Any demand in respect of this Guarantee should reach the Bank not later than the above date.

4. **This Bank Guarantee shall be operative only if it is accompanied by a separate advice sent by _____ (Name of issuing Bank, with address) on HDFC bank, Rahul Sadan, Heera Ganji bhagwati Chowk, Katni-483501, IFSC Code HDFC0000732 through Structured Financial Messaging system (SFMS) and authenticated by the Employer's Bank.**

DATE _____ SIGNATURE OF THE BANK _____

SEAL _____

WITNESS _____

[Signature, name and address]

*. The Bank should insert the amount of the guarantee in words and figures denominated in Indian Rupees. This figure should be the same as mentioned in the Tender Notice named on top.

**. Date to be filled in keeping a margin of minimum 180 days after the last date for submission of Bids as stated in the "Notice Inviting Tenders" or as executed by IRCON INTERNATIONAL LIMITED (through corrigenda).

**ANNEXURE-IX A**

(Ref. Sub-clause 9.1 c of Instructions to Tenderers)

Insurance Surety Bond for Earnest Money Deposit/ Bid Security

Name of the issuer of surety bond:

To

IRCON INTERNATIONAL LIMITED

Acting through.... . (Tender Inviting Authority, Designation and Address),

.....

Date:.....

Surety Bond No: Issue Date: . . .

Amount of Bond: Expiry Date:

WHEREAS, M/s XXXXXX (hereinafter called "The Bidder") intends to submit his bid for the work of "xxxxxxxx" under invitation of Bid notice No. XXXXXX Dated XXXXXX (hereinafter called "The Bid")

AND

WHEREAS, it has been stipulated by IRCON INTERNATIONAL LIMITED acting through _____ (Name, Designation and Address of the Tender Inviting Authority) (hereinafter called "The IRCON") in the Bid Document that the Bidder shall furnish to the IRCON surety bond for the sum of ₹XXXXXXX (Rupees XXXXXX Only) as Earnest Money Deposit/Bid Security as a precondition of submission of the bid

WHEREAS, we, _____, (Name of insurance company) hereinafter called "The Surety", acting through [Name, Designation and Address of the authorised person of the Surety], have, at the request of M/S.XXXX bidder, agreed to give Bond for Earnest Money Deposit/Bid Security as hereinafter contained:

1. KNOW ALL MEN by these present that I/We, the undersigned [Insert name(s) of authorized representative of the Surety], being fully authorized to sign and incur obligations for and on behalf of the Surety, confirm that the Surety, hereby, unconditionally and irrevocably bond to pay the IRCON the full amount in the sum of ₹XXXXXXX(Rupees XXXXXXXXXX Only) as above stated.
2. The Surety undertakes to immediately pay on presentation of demand by the IRCON any amount up to and including aforementioned full amount without any demur, reservation, recourse, contest or protest. Any such demand made by the IRCON on the Surety shall be final, conclusive and binding, absolute and unequivocal notwithstanding any disputes raised/pending before any Court, tribunal, arbitration or any authority or any threatened litigation by the Bidder or the Surety.



3. On payment of any amount less than aforementioned full amount, as per demand of the IRCON, the Bond shall remain valid for the balance amount i.e. the aforementioned full amount less the payment made to the IRCON.
4. The Surety shall pay the amount as demanded immediately on presentation of the demand by IRCON without any reference to the Bidder and without the IRCON being required to prove or to show grounds or give reasons for its demand or the amount demanded.
5. The Surety Bond shall be unconditional and irrevocable.
6. The Bond hereinbefore shall not be affected by any change in the constitution of the Surety or in the constitution of the Bidder/IRCON or winding up of the Bidder/IRCON or the Surety or any absorption, merger or amalgamation of the Bidder/IRCON or the Surety with any other party or entity.
7. The Surety agrees that no change, addition, modifications to the terms of the Bid Documents or to any documents, which have been or may be made between the IRCON and the Bidder, will in any way release the surety from the liability and obligation under this Bond; and the Surety, hereby, waives any requirement for notice of any such change, addition or modification to the Surety.
8. This Bond is valid and effective from the date of its issue, which is [insert date of issue]. The Bond and our obligations under it will expire on XXXX (Expiry Date, a date 180 days after the last date for submission of Bids as stated in the Notice Inviting Bids/Tenders or as extended by the IRCON through corrigendums /addendums to the bid documents). All demands for payment under the Bond must be received by us on or before that date.
9. The Surety agrees that the IRCON's right to demand payment of aforementioned full amount in one instance or demand payments in parts totalling up to the aforementioned full amount in several instances will be valid until either the aforementioned full amount is paid to the IRCON or the Bond is released by IRCON before the Expiry date.
10. The Surety agrees that its obligation to pay any amount demanded by the IRCON before the expiry of this Bond will continue until the amount demanded has been paid in full.
11. The expressions Surety, Bidder and IRCON hereinbefore used shall include their respective successors, administrators and assigns.
12. The Surety hereby undertakes not to revoke the Bond during its currency, except with the previous consent in writing of the IRCON. This Bond is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 758 except that the supporting statement under Article 15(a) is hereby excluded.
13. We, the Surety, further agree that the IRCON shall be the sole judge to decide as to whether the Bidder is in default of due and faithful fulfilment and compliance with the terms and conditions contained in the Bidding Documents including, inter alia, the failure of the Bidder to keep its Bid open during the Bid validity period set forth in the said Documents, and the decision of the IRCON that the Bidder is in default as aforesaid shall be final and binding on us, notwithstanding any differences between the IRCON and the Bidder or any dispute pending before any Court, tribunal, arbitrator or any other authority or by the discharge of the Bidder for any reason whatsoever.



14. The IRCON shall have the fullest liberty without affecting in any way the liability of the surety under this surety bond from time to time to vary any of the terms and conditions contained in the said bidding documents or to extend time for submission of the bids or the bid validity period or the period for conveying acceptance of Letter of Award by the Bidder or the period for fulfilment and compliance with all or any of the terms and conditions contained in the said bidding documents by the said bidder or to postpone for any time and from time to time any of the powers exercisable by it against the said bidder and either to enforce or forbear from enforcing any of the terms and conditions contained in the said bidding documents or the securities available to the IRCON, and the Surety shall not be released from its liability under these presents by any exercise by the IRCON of the liberty with reference to the matters aforesaid or by reason of time being given to the said Bidder or any other forbearance, act or omission on the part of the IRCON or any indulgence by the IRCON to the said Bidder.
15. The Bond shall be in addition to and without prejudice to any other security Bond (s) of the Bidder in favour of the IRCON available with the IRCON. The Surety, under this Bond, shall be deemed as Principal Debtor of the IRCON.
16. This Surety Bond shall also be operable at our , branch at New Delhi, from whom, confirmation regarding the issue of this Surety Bond or extension/renewal thereof shall be made available on demand. In the contingency of this Surety Bond being invoked and payment hereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.
17. Any notice by way of request, demand or otherwise hereunder may be sent by post (courier or registered post) or by authorized e-mail addressed to the Surety at its above referred branches, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the IRCON that the envelope was so posted shall be conclusive.

Dated the day of 20--

Place.....

Surety's Seal and authorized signature(s)

[Name in Block letters]

[Designation with Code No.]

.....

[P/Attorney] No.

Witness

1.

2.

[Note: All italicized texts are for guidance on how to prepare this Insurance Surety Bond and shall be deleted from the final document.]

**ANNEXURE-X****FORM OF AGREEMENT**

(To be executed on requisite value of stamp Papers)

AGREEMENT

THIS AGREEMENT made on _____ day of _____ (Month/year) between Ircon International Limited, acting through _____ (Project Head and name/address of the Project)(hereinafter called "the Employer/Engineer") of the one part and _____ (name and address of the Contractor) (hereinafter called "the Contractor") of the other part.

WHEREAS the Employer is desirous that work of " _____ " should be executed by the Contractor viz. Contract

No. _____ (hereinafter called "the Works"), and has accepted a Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expressions shall have the same meaning as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement:

- 1) The Contract Agreement
- 2) Letter of Acceptance of Tender
- 3) Addendum(s)/Corrigendum(s), if any
- 4) Notice Inviting Tender
- 5) Instructions to the Tenderers
- 6) Appendix to Tender
- 7) Form of Bid
- 8) Special Conditions of the Contract
- 9) General Conditions of Contract
- 10) Specifications and Standards
- 11) Explanatory Notes
- 12) Bill of Quantities

3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein the contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.



IN WITNESS where of the parties here to have caused this Agreement executed the day and year first before written.

(Name, Designation and address
of the authorized signatory)

(Name, Designation and address of the
authorized signatory)

Signed for and on behalf of the
Contractor in the presence of:

Signed for and on behalf of the Employer in the
presence of:

Witness:

Witness:

1.

1.

2.

2.



ANNEXURE-XI

(to be executed on a non-judicial stamp paper of Rs.100/- only)

PERFORMANCE BANK GUARANTEE (UNCONDITIONAL)

To

IRCON INTERNATIONAL LIMITED,

[Acting through _____ (Project In charge) & Address of the Project]

WHEREAS _____ [name and address of contractor] (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated _____ to execute the work of "_____ "[name of Contract and brief description of Works] (hereinafter called "the Contract.");

AND WHEREAS it has been stipulated by you in the said Contract that the contractor shall furnish you with a Bank Guarantee by any Scheduled Bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of _____ [amount of Guarantee], _____ [amount in words], such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [amount of Guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid up to _____ (a date 60 days from the date of completion of the work).

We, the _____ Bank further agree that, this guarantee shall be invokable at our place of business at New Delhi/NCR/Project HQ (Indicate detail address of branch with code No.)*. The branch at New Delhi/NCR/Project HQ is being advised accordingly.

This Bank Guarantee shall be operative only if it is accompanied by a separate advice sent by _____ (Name of issuing Bank, with address) on _____ (Name of Employer's Bank, with address) IFS Code _____ through Structured Financial Messaging system (SFMS) and authenticated by the Employer's Bank.

SIGNATURE AND SEAL OF THE GUARANTOR

Name of Bank:

Address:

Date:



ANNEXURE-XI A

Insurance Surety Bond for Performance Security

Name of the issuer of surety bond:

To

IRCON INTERNATIONAL LIMITED

Acting through.... (Project In-charge & Address of the Project),

.....

Date:.....

Surety Bond No: Issue Date: . . .

Amount of Bond: Expiry Date:

WHEREAS, In consideration of IRCON INTERNATIONAL LIMITED acting through(Name, Designation and Address of the Project In-charge), (hereinafter called "The IRCON") having accepted the bid of M/S XXXXX (hereinafter called "the Contractor"), for the work of "XXX" Vide Letter of Acceptance No. Dated.....

AND

WHEREAS, the Contractor is required to furnish Performance Security for the sum of ₹XXXXXXX(Rupees XXXXXX Only), in the form of Surety Bond, being a condition precedent to the signing of the Contract Agreement.

WHEREAS, we, _____, (Name of insurance company) (hereinafter called "The Surety"), acting through [Name, Designation and Address of the authorised person of the Surety], have, at the request of M/S.XXXX the Contractor, agreed to give Bond for Performance Security as hereinafter contained:

1. KNOW ALL MEN by these present that I/We, the undersigned [Insert name(s) of authorized representative of the Surety], being fully authorized to sign and incur obligations for and on behalf of the Surety, confirm that the Surety, hereby, unconditionally and irrevocably bond to pay the IRCON the full amount in the sum of ₹XXXXXXX(Rupees XXXXXXXXXX Only) as above stated.
2. The Surety undertakes to immediately pay on presentation of demand by the IRCON any amount up to and including aforementioned full amount without any demur, reservation, recourse, contest or protest. Any such demand made by the IRCON on the Surety shall be final, conclusive and binding, absolute and unequivocal notwithstanding any disputes raised/pending before any Court, tribunal, arbitration or any authority or any threatened litigation by the Contractor or the Surety.
3. On payment of any amount less than aforementioned full amount, as per demand of the IRCON, the Bond shall remain valid for the balance amount i.e. the aforementioned full amount less the payment made to the IRCON.



4. The Surety shall pay the amount as demanded immediately on presentation of the demand by IRCON without any reference to the Contractor and without the IRCON being required to prove or to show grounds or give reasons for its demand or the amount demanded.
5. The Surety Bond shall be unconditional and irrevocable.
6. The Bond hereinbefore shall not be affected by any change in the constitution of the Surety or in the constitution of the Contractor/IRCON or winding up of the Contractor/IRCON or the Surety or any absorption, merger or amalgamation of the Contractor/IRCON or the Surety with any other party or entity.
7. The Surety agrees that no change, addition, modifications to the terms of the Contract Agreement or to any documents, which have been or may be made between the IRCON and the Contractor, will in any way release the surety from the liability and obligation under this Bond; and the Surety, hereby, waives any requirement for notice of any such change, addition or modification to the Surety.
8. This Bond is valid and effective from the date of its issue, which is [insert date of issue]. The Bond and our obligations under it will expire on XXXX (Expiry Date, a date 60 days from the date of completion of the work). All demands for payment under the Bond must be received by us on or before that date.
9. The Surety agrees that the IRCON's right to demand payment of aforementioned full amount in one instance or demand payments in parts totalling up to the aforementioned full amount in several instances will be valid until either the aforementioned full amount is paid to the IRCON or the Bond is released by IRCON before the Expiry date.
10. The Surety agrees that its obligation to pay any amount demanded by the IRCON before the expiry of this Bond will continue until the amount demanded has been paid in full.
11. The expressions Surety, Contractor and IRCON hereinbefore used shall include their respective successors, administrators and assigns.
12. The Surety hereby undertakes not to revoke the Bond during its currency, except with the previous consent in writing of the IRCON. This Bond is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 758 except that the supporting statement under Article 15(a) is hereby excluded.
13. We, the Surety, further agree that the IRCON shall be the sole judge to decide as to whether the Contractor is in default of due and faithful fulfilment and compliance with the terms and conditions contained in the Contract Documents and the decision of the IRCON that the Contractor is in default as aforesaid shall be final and binding on us, notwithstanding any differences between the IRCON and the Contractor or any dispute pending before any Court, tribunal, arbitrator or any other authority or by the discharge of the Contractor for any reason whatsoever.
14. The Bond shall be in addition to and without prejudice to any other security Bond (s) of the Contractor in favour of the IRCON available with the IRCON. The Surety, under this Bond, shall be deemed as Principal Debtor of the IRCON.



15. This Surety Bond shall also be operable at our , branch at New Delhi, from whom, confirmation regarding the issue of this Surety Bond or extension/renewal thereof shall be made available on demand. In the contingency of this Surety Bond being invoked and payment hereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.
16. Any notice by way of request, demand or otherwise hereunder may be sent by post (courier or registered post) or by authorized e-mail addressed to the Surety at its above referred branches, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the IRCON that the envelope was so posted shall be conclusive.

Dated the day of 20--

Place.....

Surety's Seal and authorized signature(s)
 [Name in Block letters]
 [Designation with Code No.]

 [P/Attorney] No.

Witness

1.

2.

[Note: All italicized texts are for guidance on how to prepare this Insurance Surety Bond and shall be deleted from the final document.]



ANNEXURE-XII

(to be executed on a non-judicial stamp paper of Rs.100/- only)
BANK GUARANTEE FOR RELEASE OF 50% OF RETENTION MONEY

To

IRCON INTERNATIONAL LIMITED,

[Acting through _____ (Project In charge) & Address of the Project]

WHEREAS _____ [name and address of contractor*] (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated _____ to execute the work "_____ "[name of Contract and brief description of Works] (hereinafter called "the Contract.");

AND WHEREAS it has been agreed by you in the said Contract that the Contractor has option to get release 50% of the Retention Money against un-conditional Bank Guarantee from a Scheduled Bank acceptable to you as security for compliance with Contractor's obligation in accordance with the contract (Sub clause _____).

AND WHEREAS the Contractor has opted to get released the 50% of the retention money against an unconditional Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of _____ [amount of Guarantee], _____ [amount in words], such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [amount of Guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid upto _____ (till IRCON International Limited certifies repayment of retention money in accordance with Sub-clause 38 (d) of Special Conditions of Contract.

We, the _____ Bank further agree that, this guarantee shall be invokable at our place of business at New Delhi/NCR/Project HQ (Indicate detail address of branch with code No.)*. The branch at New Delhi/NCR/Project HQ is being advised accordingly.

This Bank Guarantee shall be operative only if it is accompanied by a separate advice sent by _____ (Name of issuing Bank, with address) on _____ (Name of Employer's Bank, with address) IFS Code _____ through Structured Financial Messaging system (SFMS) and authenticated by the Employer's Bank.

SIGNATURE AND SEAL OF THE GUARANTOR

Name of Bank:

Address

- The bank should indicate detailed address of New Delhi/NCR/Project HQ branch along with its code No



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 Mumbai - 400 018. E mumbai@ieema.org
 INDIA. W www.ieema.org

Cir. No. 35/DIV/ CAB/05/

24th April 2018

To Members of the Cable Division, Utilities, Railways & Listed purchasing organizations

Sub: Correction in PV formulae of LT XLPE Power Cable and addition of factors for HT XLPE Power Cables

We have recently published revised Price Variation Clause for LT&HT XLPE Power Cables and made it effective from 1st November 2017 vide Cir. No.111/DIV/CAB/05 dated 5th December 2017

While replying to a query of a buyer it is observed that the polymer factor for LT XLPE Power Cables (both aluminium and copper) was incorrectly represented by Table P2.

We have now corrected the anomaly by correcting the PV formulae of LT XLPE Aluminium and Copper Insulated Cables (Sl. No. D & E) by representing Polymer factor by Table L2.

We have also worked out factors for XLPE, Copper and Steel for 3 core HT XLPE Power Cables for 500 and 630 sq.mm.

We now enclose complete PV clause of Cable by including all the PV formulae of different types of power cable (Sl. No. A to I), polymer factor Table L2 and updated XL4, H2 and H5 Table of factors for your perusal & record.

We request to replace PV clause of Cable already circulated vide Cir. 111/DIV/CAB/05 dated 5th December 2017 with the enclosed PV clause in your records for future use.


 Senior Director
 Encl: as above

IEEMA (PVC)/CABLE(R-1)/2017**Effective from: 1st November 217****Material Price Variation Clause For PVC And XLPE Insulated Cables**

The Price quoted/confirmed is based on the input cost of raw materials/components as on the date of quotation, and the same is deemed to be related to the prices of raw materials as specified in the price variation clause given below. In case of any variation in these prices, the price payable shall be subject to adjustment up or down in accordance with the formulae provided in this document.

Terms used in price variation formulae:

P Price payable as adjusted in accordance with above appropriate formula (in Rs/Km)

Po Price quoted/confirmed (in Rs/Km)

ALUMINIUM

AIF Variation factor for aluminium

AI Price of Aluminium. This price is as applicable of first working day of the month, one month prior to the date of delivery.

Alo Price of aluminium. This price is as applicable on first working day of the month, one month prior to the date of tendering.

COPPER

CuF Variation factor for copper

Cu Price of CC copper rods. This price is as applicable on first working day of the month, one month prior to the date of delivery.

Cuo Price of CC copper rods. This price is as applicable on first working day of the month, one month prior to the date of tendering.

PVC COMPOUND

PVCC price of PVC compound. This price is as applicable on first working day of the month, one month prior to the date of delivery.

PVCCo Price of PVC compound. This price is as applicable on first working day of the month, one month prior to the date of tendering.

CCFAI Variation factor for PVC compound/Polymer for aluminum conductor cable.

CCFCu Variation factor for PVC compound/Polymer for copper conductor cable.

IEEMA (PVC)/CABLE(R-1)/2017
XLPE COMPOUND

Effective from: 1st November 217

Cc price of XLPE compound. This price is as applicable on first working day of the month, one month prior to the date of delivery.

Cco Price of XLPE compound. This price is as applicable on first working day of the month, one month prior to the date of tendering.

XLFAL Variation factor for XLPE compound for aluminum conductor cable.

XLFCU Variation factor for XLPE compound for Copper conductor cable.

STEEL

FeF Variation factor for steel

FeW Variation factor for round wire steel armouring

Fe Price of Steel Strips/steel wire. This price is as applicable on the first working day of the month, one month prior to the date of delivery.

Feo Price of steel strips/steel wire. This price is as applicable on first working day of the month, one month prior to the date of tendering.

The above prices and indices are as published by IEEMA vide Circular reference IEEMA (PVC)/CABLE R(1)/--/-- prevailing as on 1st working day of the month i.e. one month prior to the date of tendering.

The date of delivery is the date on which the cable is notified as being ready for inspection/dispatch (in the absence of such notification, the date of manufacturer's dispatch note is to be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto), whichever is earlier.

Notes

- All prices of raw materials are exclusive of GST amount.
- All prices excluding Aluminium & Copper are as on first working day of the month.
- The details of prices are as under:

- Price of Aluminium is LME average Cash SELLER Settlement price of Primary Aluminium in US\$ per MT as published by London Metal Bulletin (LME) including Premium for Aluminium Ingot in US\$ per MT is converted in Indian Rs./MT.
- Price of PVC Compound (in Rs/MT) is the ex-works price, as quoted by the manufacturer.
- Price of XLPE Compound (in Rs/MT) is the ex-works price, as quoted by the manufacturer
- Price of CC copper rods (in Rs/MT) is ex-works price as quoted by the primary producer.
- Price of galvanized steel strip / steel wire (in Rs/MT) is ex-works price as quoted by the manufacturer for Round steel Wire and Flat steel strip (the relevant price of steel strip or steel wire is to be selected depending upon the type of armouring of the cable).

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IEEMA (PVC)/CABLE(R-1)/2017**Effective from: 1st November 217****Price variation formulae for 'Power Cables'****A. Aluminum conductor PVC insulated 1.1 kV power cables**

$$P = P_o + AIF (AL - ALo) + CCFAI (PVCc - PVCco) + FeF (Fe - Feo)$$

For unarmoured multicore cables (without steel armour); $FeF = 0$ Table References:

ALP	Aluminium conductor in single core unarmoured & multicore cables
P1	Aluminium conductor aluminium armour in single core armoured cables
P2	PVC compound
P3	Steel armour

B. Copper conductor PVC insulated 1.1 kV power cables

$$P = P_o + CuF (Cu - Cuo) + CCFCu (PVCc - PVCco) + FeF (Fe - Feo) + AIF (Al - ALo)$$

For steel armoured cables; $AIF = 0$ For aluminium armoured cables; $FeF = 0$ For unarmoured cables; $FeF, AIF = 0$ Tables References:

CUP	Copper conductor
P2	PVC compound
P3	Steel armour
P4	Aluminium armour

C. Copper conductor PVC insulated 1.1 kV control cables

$$P = P_o + CuF (Cu - Cuo) + CCFCu (PVCc - PVCco) + FeF (Fe - Feo)$$

For unarmoured cables; $FeF = 0$ Tables References:

CUC	Copper conductor
P5	PVC compound
P6	Steel armour

D. Aluminum conductor XLPE insulated 1.1 kV power cables

$$P = P_o + AIF (AL - ALo) + XLFAL(CC-Cco) + CCFAI (PVCc - PVCco) + FeF (Fe - Feo)$$

For unarmoured multicore cables (without steel armour); $FeF = 0$ Table References:

ALP	Aluminium conductor in single core unarmoured & multicore cables
P1	Aluminium conductor aluminium armour in single core armoured cables
L2	Polymer (CCFAI)
P3	Steel armour
XL1	XLPE Compound (XLFAL)

E. Copper conductor XLPE insulated 1.1 kV power cables

$$P = P_o + CuF (Cu - Cuo) + XLFCU (CC-Cco) + CCFCu (PVCc - PVCco) + FeF (Fe - Feo) + AIF (Al - ALo)$$

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For steel armoured cables; $AIF = 0$ For aluminium armoured cables; $FeF = 0$ **HEAD OFFICE - DELHI**

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IEEMA (PVC)/CABLE(R-1)/2017**Effective from: 1st November 217**

For unarmoured cables; FeF, AIF = 0

Tables References:

CUP	Copper conductor
L2	Polymer (CCFCu)
P3	Steel armour
P4	Aluminium armour
XL1	XLPE Compound (XLFCu)

F. Copper conductor XLPE insulated 1.1 kV control cables

$$P = P_o + CuF (Cu - Cu_o) + XLFCU (CC-Cco) + CCFCu (PVCc-PVCco) + FeF (Fe-Fe_o)$$

For unarmoured cables; FeF = 0

Tables References:

CUC	Copper conductor
P5	PVC compound
P6	Steel armour
XL2	XLPE Compound

G. For Aluminium conductor XLPE insulated 3.3 to 33 kV power cables

$$P = P_o + AIF (Al - Al_o) + XLFAL(CC-Cco) + CCFAI (PVCc - PVCco) + FeF (Fe - Fe_o)$$

For unarmoured multicore cables (without steel armour); FeF = 0

Table References:

ALP	Aluminium conductor in single core unarmoured & multicore cables
H1	Aluminium conductor + aluminium armour in single core armoured cables
H2	Polymer
H3/H5	Steel armour (Flat/Round)
XL3/XL4	XLPE Compound (Single core /Multicore)

H. Copper conductor XLPE Insulated 3.3 to 33 kV power cables

$$P = P_o + CuF (Cu - Cu_o) + XLFCU (CC-Cco) + CCFCu (PVCc - PVCco) + FeF (Fe - Fe_o) + AIF (Al - Al_o)$$

For steel armoured cables; AIF = 0 For aluminium armoured cables; FeF = 0

For unarmoured cables; FeF, AIF = 0

Table References:

CUP	Copper conductor
H2	Polymer
H3/H5	Steel armour (Flat/Round)
H4	Aluminium armour
XL3/XL4	XLPE Compound (Single core /Multicore)

I. Copper conductor XLPE insulated 1.0 and 1.5 kV Solar PV DC cables

$$P = P_o + CuF (Cu - Cu_o)$$

Table CUcdc Copper Conductor


 Authorized Signatory

IEEMA (PVC)/CABLE(R-1)/2017

Effective from: 1st November 217

TABLE ALP

VARIATION FACTOR FOR ALUMINIUM (AIF)
POWER CABLES WITH ALUMINIUM CONDUCTOR
(EXCLUDING SINGLE CORE ARMoured CABLES)

Nominal Cross Sectional Area (in Sq. mm.)	1 core	2 core	3 core	3.5 core	4 core
2.5	0.007	0.014	0.021	-	0.028
4	0.011	0.023	0.034	-	0.046
6	0.017	0.034	0.052	-	0.069
10	0.029	0.053	0.087	-	0.116
16	0.046	0.091	0.137	-	0.183
25/16	0.073	0.146	0.219	0.262	0.292
35/16	0.101	0.202	0.302	0.345	0.404
50/25	0.137	0.273	0.410	0.478	0.547
70/35	0.197	0.395	0.593	0.687	0.791
95/50	0.274	0.548	0.821	0.949	1.095
120/70	0.346	0.691	1.036	1.221	1.382
150/70	0.425	0.853	1.279	1.464	1.706
185/95	0.533	1.070	1.605	1.861	2.140
225/120	0.655	1.310	1.965	2.287	2.620
240/120	0.703	1.400	2.099	2.421	2.799
300/150	0.879	1.757	2.635	3.033	3.514
400/185	1.126	2.249	3.374	3.873	4.498
500	1.418	2.838	4.256	-	5.675
630	1.828	3.663	5.494	-	7.326
800	2.340	4.679	7.018	-	9.357
1000	2.951	5.890	8.934	-	11.779

IEEMA (PVC)/CABLE(R-1)/2017

Effective from: 1st November 217

TABLE CUP

VARIATION FACTOR FOR COPPER CONDUCTOR (CUF)
POWER CABLES WITH COPPER CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm.)	1 core	2 core	3 core	3.5 core	4 core
2.5	0.023	0.046	0.069	-	0.092
4	0.036	0.076	0.112	-	0.151
6	0.056	0.112	0.171	-	0.227
10	0.095	0.174	0.286	-	0.382
16	0.151	0.299	0.451	-	0.602
25/16	0.240	0.480	0.720	0.862	0.960
35/16	0.332	0.664	0.993	1.135	1.329
50/25	0.451	0.898	1.348	1.572	1.799
70/35	0.648	1.299	1.950	2.260	2.602
95/50	0.901	1.802	2.700	3.121	3.601
120/70	1.138	2.273	3.407	4.016	4.545
150/70	1.398	2.806	4.207	4.815	5.611
185/95	1.753	3.519	5.279	6.121	7.038
225/120	2.154	4.309	6.463	7.522	8.617
240/120	2.312	4.605	6.904	7.963	9.206
300/150	2.891	5.779	8.667	9.976	11.558
400/185	3.703	7.397	11.097	12.738	14.794
500	4.664	9.334	13.998	-	18.665
630	6.012	12.048	18.070	-	24.095
800	7.696	15.389	23.082	-	30.775
1000	9.706	19.372	29.055	-	38.741

TABLE CUcdc

VARIATION FACTOR FOR COPPER CONDUCTOR (CUF)
1.0 & 1.5KV Solar PV DC Cables with Copper Conductor

Cable Size in sq.mm.	Copper content in MT/km
2.5	0.023
4	0.038
6	0.058
10	0.090

IEEMA (PVC)/CABLE(R-1)/2017

Effective from: 1st November 217

TABLE CUC

VARIATION FACTOR FOR COPPER CONDUCTOR (CUF)
CONTROL CABLES WITH COPPER CONDUCTOR

No of Cores	Core size 1.5 sq mm	Core size 2.5 sq mm
2	0.026	0.047
3	0.039	0.070
4	0.052	0.094
5	0.065	0.117
6	0.078	0.141
7	0.091	0.164
8	0.110	0.182
9	0.117	0.205
10	0.130	0.235
12	0.157	0.282
14	0.183	0.329
16	0.209	0.376
18	0.246	0.410
19	0.248	0.446
20	0.260	0.456
24	0.313	0.563
27	0.352	0.634
30	0.391	0.704
37	0.483	0.869
44	0.573	1.033
52	0.678	1.221
61	0.796	1.432

IEEMA (PVC)/CABLE(R-1)/2017

Effective from: 1st November 217

TABLE P1

VARIATION FACTOR FOR ALUMINIUM (AIF)
ALUMINIUM ARMoured SINGLE CORE PVC INSULATED 1.1 KV CABLES

Nominal cross sectional area (in Sq.mm)	Aluminium factor for Aluminium armoured cable with aluminium conductor
4	0.0685
6	0.0795
10	0.1017
16	0.1303
25	0.1693
35	0.2090
50	0.2597
70	0.3360
95	0.4567
120	0.5443
150	0.6427
185	0.7743
240	0.9737
300	1.2582
400	1.5502
500	1.8958
630	2.3650
800	2.9306
1000	3.7666

IEEMA (PVC)/CABLE(R-1)/2017

Effective from: 1st November 217

TABLE P2

VARIATION FACTOR FOR PVC COMPOUND (CCFAI/CCFCu)
PVC INSULATED 1.1 KV POWER CABLES WITH COPPER/ALUMINIUM CONDUCTOR

Nominal cross Sectional Area (in Sq. mm)	1 core	2 core		3 core		3.5 core		4 core	
	Unarm	Unarm	arm	Unarm	arm	Unarm	arm	Unarm	arm
2.5	0.079	0.125	0.139	0.141	0.157	-	-	0.161	0.179
4	0.094	0.140	0.156	0.164	0.182	-	-	0.188	0.209
6	0.101	0.154	0.171	0.179	0.199	-	-	0.198	0.220
10	0.114	0.194	0.216	0.214	0.238	-	-	0.249	0.277
16	0.142	0.234	0.246	0.279	0.290	-	-	0.328	0.345
25	0.171	0.288	0.303	0.364	0.383	0.422	0.444	0.443	0.466
35	0.189	0.321	0.338	0.403	0.429	0.489	0.515	0.498	0.524
50	0.211	0.411	0.433	0.508	0.535	0.613	0.645	0.647	0.681
70	0.241	-	-	0.613	0.645	0.707	0.744	-	-
95	0.284	-	-	0.795	0.811	0.908	0.927	-	-
120	0.339	-	-	0.866	0.884	1.024	1.045	-	-
150	0.388	-	-	1.070	1.092	1.289	1.315	-	-
185	0.450	-	-	1.310	1.337	1.499	1.530	-	-
225	0.521	-	-	1.586	1.618	1.840	1.878	-	-
240	0.534	-	-	1.649	1.683	1.990	2.031	-	-
300	0.653	-	-	2.007	2.048	2.361	2.409	-	-
400	0.770	-	-	2.437	2.487	2.616	2.669	-	-
500	0.936	-	-	3.117	3.181	3.687	3.762	-	-
630	1.175	-	-	-	-	-	-	-	-
800	1.433	-	-	-	-	-	-	-	-
1000	1.642	-	-	-	-	-	-	-	-

IEEMA (PVC)/CABLE(R-1)/2017

Effective from: 1st November 217

TABLE P3

VARIATION FACTOR FOR STEEL (FeF)
PVC INSULATED 1.1 KV POWER CABLES WITH COPPER/ALUMINIUM CONDUCTOR

Nominal Cross sectional Area (in Sq. mm)	2 core	Shape	3 core	Shape	3 ½ core	Shape	4 core	Shape
4	0.305	W	0.335	W	-	-	0.363	W
6	0.348	W	0.363	W	-	-	0.407	W
10	0.392	W	0.407	W	-	-	0.293	F
16	0.235	F	0.293	F	-	-	0.323	F
25	0.293	F	0.352	F	0.382	F	0.382	F
35	0.323	F	0.382	F	0.411	F	0.440	F
50	0.382	F	0.440	F	0.469	F	0.499	F
70	0.411	F	0.499	F	-	F	0.587	F
95	0.499	F	0.587	F	0.616	F	0.645	F
120	0.528	F	0.616	F	0.675	F	0.731	F
150	0.587	F	0.675	F	0.731	F	0.790	F
185	0.645	F	0.761	F	0.820	F	0.879	F
240	0.731	F	0.879	F	0.937	F	0.996	F
300	0.820	F	0.966	F	1.055	F	1.113	F
400	0.937	F	1.083	F	1.172	F	1.231	F
500	1.055	F	1.231	F	1.348	F	1.406	F
630	1.172	F	-	-	-	-	-	-

IEEMA (PVC)/CABLE(R-1)/2017
TABLE P3 (Additional)

Effective from: 1st November 217

VARIATION FACTOR FOR ROUND WIRE 'W' STEEL (FeF)
PVC INSULATED 1.1 KV POWER CABLES WITH COPPER/ALUMINIUM CONDUCTOR

Nominal Cross Sectional Area (in sq. mm)	2 Core	3 Core	3 .5 Core	4 Core
1.5	0.247	0.259		0.288
2.5	0.273	0.289		0.329
4	0.305	0.335		0.363
6	0.348	0.363		0.407
10	0.392	0.407		0.533
16	0.439	0.523	0.014	0.573
25	0.526	0.625	0.664	0.685
35	0.591	0.685	0.729	0.761
50	0.661	0.790	0.864	1.108
70	0.745	1.122	1.200	1.256
95	1.085	1.286	1.376	1.443
120	1.147	1.386	1.479	1.562
150	1.267	1.526	1.684	2.173
185	1.403	2.090	2.315	2.421
240	1.994	2.397	2.641	2.722
300	2.180	2.642	3.670	3.842
400	2.987	3.728	4.126	4.292
500	3.517	4.226	5.958	6.301
630	4.774	6.018	6.737	7.141

TABLE P4

VARIATION FACTOR FOR ALUMINIUM (AIF)
PVC INSULATED 1.1 KV POWER CABLES WITH COPPER CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm)	Aluminium Factor for Aluminium armoured cable with copper conductor
4	0.058
6	0.063
10	0.073
16	0.084
25	0.096
35	0.108
50	0.123
70	0.139
95	0.183
120	0.198
150	0.218
185	0.241
240	0.271
300	0.379
400	0.424
500	0.478
630	0.537
800	0.591
1000	0.816

TABLE P5

VARIATION FACTOR FOR PVC COMPOUND (CCFCu)
PVC INSULAYTED CONTROL CABLES WITH COPPER CONDUCTOR

No of cores	Core size 1.5 sq mm		Core size 2.5 sq mm	
	Unarm	Arm	Unarm	Arm
2	0.118	0.121	0.125	0.139
3	0.121	0.131	0.141	0.157
4	0.137	0.152	0.161	0.179
5	0.157	0.174	0.187	0.206
6	0.179	0.199	0.234	0.260
7	0.179	0.199	0.234	0.260
8	0.193	0.215	0.292	0.325
9	0.216	0.241	0.300	0.335
10	0.236	0.262	0.303	0.337
12	0.249	0.277	0.334	0.371
14	0.311	0.327	0.389	0.409
16	0.344	0.362	0.435	0.458
18	0.352	0.371	0.474	0.500
19	0.375	0.395	0.476	0.501
20	0.391	0.412	0.519	0.546
24	0.457	0.481	0.584	0.615
27	0.491	0.517	0.631	0.664
30	0.529	0.557	0.706	0.743
37	0.615	0.647	0.835	0.879
44	0.739	0.778	1.019	1.026
52	0.845	0.889	1.100	1.158
61	0.952	1.002	1.246	1.312

IEEMA (PVC)/CABLE(R-1)/2017

Effective from: 1st November 217

TABLE P6

VARIATION FACTOR FOR STEEL (FeF)
PVC INSULATED CONTROL CABLES WITH COPPER CONDUCTOR

No of cores	Core size 1.5 sq mm	Shape of armour	Core size 2.5 sq mm	Shape of armour
2	0.243	W	0.277	W
3	0.257	W	0.289	W
4	0.277	W	0.314	W
5	0.303	W	0.342	W
6	0.329	W	0.379	W
7	0.329	W	0.379	W
8	0.341	W	0.456	W
9	0.383	W	0.275	F
10	0.408	W	0.325	F
12	0.289	F	0.342	F
14	0.306	F	0.360	F
16	0.317	F	0.372	F
18	0.332	F	0.350	F
19	0.343	F	0.397	F
20	0.368	F	0.400	F
24	0.398	F	0.475	F
27	0.414	F	0.478	F
30	0.425	F	0.503	F
37	0.461	F	0.548	F
44	0.507	F	0.601	F
52	0.556	F	0.641	F
61	0.585	F	0.685	F

IEEMA (PVC)/CABLE(R-1)/2017
TABLE P6 (Additional)

Effective from: 1st November 217

VARIATION FACTOR FOR ROUND WIRE 'W' STEEL (FeF)
PVC INSULATED CONTROL CABLES WITH COPPER CONDUCTOR

No. of Cores	Core size 1.5 sq mm	Core size 2.5 sq mm
2	0.243	0.273
3	0.257	0.289
4	0.277	0.314
5	0.303	0.342
6	0.329	0.379
7	0.329	0.379
8	0.341	0.456
9	0.383	0.508
10	0.408	0.535
12	0.510	0.572
14	0.546	0.625
16	0.581	0.660
19	0.608	0.696
24	0.714	0.819
25	0.679	0.798
27	0.732	0.837
28	0.696	0.815
30	0.758	0.881
33	0.747	0.883
37	0.820	1.217
44	0.926	1.355
48	1.122	1.308
50	1.122	1.308
52	1.149	1.361
56	1.202	1.388
61	1.299	1.520

IEEMA (PVC)/CABLE(R-1)/2017

Effective from: 1st November 217

TABLE L2

VARIATION FACTOR FOR POLYMER (CCFAI / CCFCu)
XLPE INSULATED 1.1 KV POWER CABLES WITH COPPER / ALUMINIUM CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm)	1 core	2 core		3 core		3.5 core		4 core	
	Unarm	Unarm	Arm	Unarm	Arm	Unarm	Arm	Unarm	Arm
2.5	0.055	0.163	0.175	0.166	0.177	-	-	0.177	0.188
4	0.075	0.201	0.204	0.205	0.213	-	-	0.218	0.213
6	0.085	0.213	0.234	0.205	0.230	-	-	0.242	0.232
10	0.082	0.252	0.280	0.217	0.251	-	-	0.285	0.298
16	0.089	0.278	0.341	0.289	0.246	-	-	0.300	0.279
25	0.101	0.307	0.278	0.276	0.247	0.295	0.264	0.331	0.290
35	0.109	0.330	0.319	0.305	0.270	0.328	0.292	0.368	0.319
50	0.124	0.482	0.685	0.348	0.311	0.372	0.335	0.422	0.394
70	0.146	0.354	0.335	0.469	0.397	0.489	0.420	0.528	0.464
95	0.163	0.436	0.389	0.504	0.441	0.544	0.471	0.591	0.523
120	0.176	0.475	0.421	0.556	0.498	0.599	0.538	0.722	0.656
150	0.217	0.510	0.490	0.690	0.611	0.717	0.633	0.840	0.762
185	0.236	0.631	0.608	0.836	0.738	0.854	0.756	1.007	0.899
240	0.273	0.750	0.726	1.002	0.842	1.079	0.952	1.238	1.119
300	0.303	0.919	0.887	1.161	1.012	1.170	1.031	1.457	1.414
400	0.372	1.093	1.040	1.376	1.283	1.545	1.379	1.778	1.626
500	0.413	1.342	-	1.568	1.400	1.806	1.456	-	-
630	0.469	1.546	-	-	-	-	-	-	-
800	0.569	-	-	-	-	-	-	-	-
1000	0.667	-	-	-	-	-	-	-	-

IEEMA (PVC)/CABLE(R-1)/2017

Effective from: 1st November 217

TABLE XL1
VARIATION FACTOR FOR XLPE COMPOUND (XLFAL/XLFCU)
XLPE INSULATED 1.1 KV POWER CABLES WITH COPPER/ALUMINIUM CONDUCTOR

Nominal cross Sectional Area (in Sq. mm)	1 core		2 core		3 core		3.5 core		4 core	
	Unarm	Arm	Unarm	Arm	Unarm	arm	Unarm	Arm	Unarm	arm
2.5	0.007	0.010	0.014	0.014	0.021	0.021			0.028	0.028
4	0.009	0.012	0.018	0.018	0.027	0.027			0.036	0.036
6	0.010	0.015	0.022	0.022	0.033	0.033			0.043	0.043
10	0.013	0.018	0.025	0.025	0.039	0.039			0.053	0.053
16	0.016	0.023	0.034	0.034	0.049	0.049			0.065	0.065
25	0.021	0.030	0.048	0.048	0.070	0.070	0.084	0.084	0.093	0.093
35	0.025	0.035	0.059	0.059	0.084	0.084	0.099	0.099	0.112	0.112
50	0.033	0.044	0.075	0.075	0.108	0.108	0.130	0.130	0.144	0.144
70	0.042	0.054	0.095	0.095	0.137	0.137	0.160	0.160	0.179	0.179
95	0.048	0.062	0.110	0.110	0.160	0.160	0.190	0.190	0.211	0.211
120	0.060	0.076	0.138	0.138	0.200	0.200	0.239	0.239	0.266	0.266
150	0.078	0.095	0.180	0.180	0.259	0.259	0.296	0.296	0.344	0.344
185	0.097	0.116	0.224	0.224	0.324	0.324	0.369	0.369	0.430	0.430
240	0.116	0.137	0.266	0.266	0.388	0.388	0.446	0.446	0.518	0.518
300	0.138	0.164	0.325	0.325	0.467	0.467	0.540	0.540	0.620	0.620
400	0.175	0.214	0.357	0.357	0.536	0.536	0.619	0.619	0.714	0.714
500	0.217	0.260	0.440	0.440	0.660	0.660	0.769	0.769	0.880	0.880
630	0.265	0.318	0.542	0.542	0.814	0.814	0.941	0.941	1.085	1.085
800	0.323	0.389								
1000	0.375	0.444								

IEEMA (PVC)/CABLE(R-1)/2017

Effective from: 1st November 2017

TABLE XL2
VARIATION FACTOR FOR XLPE COMPOUND (XLFCU)
XLPE INSULATED CONTROL CABLES WITH COPPER CONDUCTOR

No of cores	Core size 1.5 sq mm		Core size 2.5 sq mm	
	Unarm	Arm	Unarm	Arm
2	0.010	0.010	0.012	0.012
3	0.016	0.016	0.018	0.018
4	0.021	0.021	0.025	0.025
5	0.026	0.026	0.031	0.031
6	0.031	0.031	0.037	0.037
7	0.036	0.036	0.043	0.043
8	0.036	0.036	0.043	0.043
9	0.042	0.042	0.049	0.049
10	0.052	0.052	0.061	0.061
12	0.062	0.062	0.074	0.074
14	0.073	0.073	0.086	0.086
16	0.083	0.083	0.098	0.098
18	0.094	0.094	0.110	0.110
19	0.099	0.099	0.116	0.116
20	0.104	0.104	0.123	0.123
24	0.125	0.125	0.147	0.147
27	0.140	0.140	0.165	0.165
30	0.156	0.156	0.184	0.184
37	0.192	0.192	0.227	0.227
44	0.229	0.229	0.270	0.270
52	0.270	0.270	0.319	0.319
61	0.317	0.317	0.374	0.374

IEEMA (PVC)/CABLE(R-1)/2017

Effective from: 1st November 2017

TABLE XL3

VARIATION FACTOR FOR XLPE(XLFAL/XLFCU)

SINGLE CORE ARMoured /UNARMoured XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH
CU / AL CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm.)	XLPE Factor for Armoured/ Unarmoured Cable with AL /CU Conductor					
	3.3 KV	6.6 KV (E)	11 KV (E)/ 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
25	0.110	0.131	0.170	0.279		
35	0.122	0.137	0.175	0.284	0.317	0.522
50	0.135	0.151	0.191	0.307	0.341	0.563
70	0.155	0.172	0.215	0.342	0.379	0.615
95	0.174	0.193	0.241	0.377	0.417	0.670
120	0.192	0.212	0.262	0.407	0.449	0.713
150	0.209	0.229	0.283	0.437	0.481	0.757
185	0.228	0.250	0.308	0.471	0.518	0.809
240	0.255	0.279	0.343	0.519	0.569	0.883
300	0.280	0.322	0.372	0.560	0.613	0.943
400	0.326	0.392	0.420	0.625	0.683	1.041
500	0.388	0.461	0.469	0.694	0.757	1.142
630	0.467	0.520	0.529	0.777	0.845	1.265
800	0.567	0.593	0.602	0.874	0.949	1.407
1000	0.656	0.665	0.660	0.955	1.036	1.525

Note : XLPE factors include Semicons for Conductor & Insulation screen

TABLE – XL4

VARIATION FACTOR FOR XLPE (CCF1AL / CCF1Cu)

3 CORE XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH COPPER / ALUMINIUM CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm)	3.3 KV ARM	6.6 KV (E) ARM	6.6 KV (UE) / 11 KV (E) ARM	11 KV (UE) ARM	22 KV (E) ARM	33 KV (E) ARM
25	0.315	0.394	0.511	0.838		
35	0.339	0.427	0.545	0.880	0.982	1.638
50	0.378	0.474	0.600	0.957	1.065	1.751
70	0.435	0.541	0.679	1.067	1.183	1.916
95	0.489	0.604	0.755	1.171	1.295	2.071
120	0.537	0.661	0.822	1.265	1.396	2.210
150	0.585	0.719	0.890	1.359	1.497	2.350
185	0.642	0.784	0.968	1.468	1.614	2.513
240	0.717	0.873	1.074	1.615	1.773	2.732
300	0.781	1.006	1.167	1.744	1.928	2.919
400	0.886	1.227	1.314	1.948	2.130	3.229
500	0.956	1.421	1.446	2.148	2.381	3.538
630	1.129	1.582	1.609	2.382	2.630	3.940

Note : XLPE factors include Semicons for Conductor & Insulation screen

IEEMA (PVC)/CABLE(R-1)/2017

Effective from: 1st November 217

TABLE H1
VARIATION FACTOR FOR ALUMINIUM (AIF)
ALUMINIUM ARMoured SINGLE CORE XLPE INSULATED 3.3 TO 33 KV CABLES

Nominal Cross Sectional Area (in Sq. mm.)	Aluminium Factor for Aluminium Armoured Cable with Aluminium Conductor					
	3.3 KV	6.6 KV (E)	11 KV (E)/ 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
35	0.251	0.284	0.301	0.344	0.358	0.473
50	0.312	0.336	0.352	0.397	0.408	0.672
70	0.385	0.409	0.423	0.469	0.501	0.723
95	0.476	0.500	0.518	0.637	0.656	0.856
120	0.561	0.586	0.601	0.726	0.744	0.949
150	0.653	0.678	0.696	0.823	0.842	1.050
185	0.773	0.797	0.893	0.949	0.965	1.183
240	0.997	1.063	1.083	1.139	1.154	1.387
300	1.209	1.271	1.283	1.333	1.307	1.753
400	1.438	1.556	1.565	1.620	1.636	2.046
500	1.873	1.901	1.910	2.110	2.128	2.484
630	2.337	2.361	2.369	2.580	2.595	2.978
800	3.007	3.071	3.080	3.145	3.163	3.588
1000	3.737	3.741	3.749	3.804	3.822	4.565

TABLE H2
VARIATION FACTOR FOR POLYMER (CCFAI / CCFCu)
3 CORE XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH COPPER / ALUMINIUM CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm)	3.3 KV ARM	6.6 KV (E) ARM	6.6 KV (UE) / 11 KV (E) ARM	11 KV (UE) ARM	22 KV (E) ARM	33 KV (E) ARM
35	0.374	0.990	1.142	1.604	1.782	-
50	0.445	1.119	1.260	1.834	2.046	2.864
70	0.547	1.290	1.396	2.011	2.284	3.219
95	0.594	1.440	1.647	2.269	2.428	3.367
120	0.732	1.692	1.877	2.498	2.715	3.646
150	0.812	1.906	2.061	2.767	2.931	3.927
185	0.960	2.086	2.406	3.028	3.180	4.166
240	1.130	2.484	2.744	3.398	3.580	4.589
300	1.219	2.912	3.161	3.840	4.016	5.029
400	1.313	3.530	3.664	4.353	4.666	5.736
500	1.652	3.925	3.971	4.621	4.878	5.913
630	1.949	4.487	4.982	5.225	5.477	6.696

Fillers added in PVC consumption

IEEMA (PVC)/CABLE(R-1)/2017

Effective from: 1st November 217

TABLE H3
VARIATION FACTOR FOR STEEL (FeF)
XLPE INSULATED 3.3 TO 33 KV POWER CABLES WITH COPPER / ALUMINIUM CONDUCTOR

Nominal Cross Sectional Area Sq. mm.	3.3 KV	6.6 KV (E)	11 KV (E) / 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
25	0.551	0.604	0.656	0.814		
35	0.645	0.645	0.731	0.879	0.937	-
50	0.675	0.703	0.761	0.937	0.966	1.181
70	0.761	0.761	0.849	0.996	1.055	1.289
95	0.820	0.849	0.907	1.083	1.113	1.348
120	0.879	0.907	0.966	1.142	1.172	1.406
150	0.966	0.966	1.055	1.201	1.259	1.494
185	1.025	1.055	1.113	1.259	1.318	1.553
240	1.142	1.142	1.231	1.377	1.406	1.641
300	1.231	1.259	1.318	1.465	1.524	1.758
400	1.348	1.406	1.435	1.582	1.641	1.876

IEEMA (PVC)/CABLE(R-1)/2017

Effective from: 1st November 217

TABLE H4
VARIATION FACTOR FOR ALUMINIUM (AIF)

XLPE INSULATED SINGLE CORE 3.3 TO 33 KV POWER CABLES WITH COPPER CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm.)	Aluminium Factor for Aluminium Armoured Cable with Copper Conductor					
	3.3 KV	6.6 KV (E)	11 KV (E)/ 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
35	0.153	0.187	0.204	0.247	0.258	0.372
50	0.179	0.203	0.220	0.262	0.275	0.425
70	0.196	0.219	0.233	0.278	0.311	0.444
95	0.213	0.237	0.254	0.373	0.392	0.470
120	0.228	0.253	0.268	0.393	0.410	0.488
150	0.243	0.269	0.287	0.414	0.432	0.504
185	0.261	0.285	0.381	0.437	0.455	0.526
240	0.324	0.389	0.410	0.465	0.480	0.556
300	0.365	0.428	0.440	0.490	0.510	0.737
400	0.432	0.471	0.480	0.536	0.552	0.783
500	0.489	0.517	0.526	0.726	0.744	0.844
630	0.544	0.568	0.572	0.787	0.801	0.902
800	0.706	0.787	0.797	0.862	0.880	0.982
1000	0.824	0.865	0.867	0.923	0.940	1.324

TABLE - H5
VARIATION FACTOR FOR STEEL (FeW)

XLPE INSULATED 3.3KV TO 33 KV POWER CABLES WITH COPPER / ALUMINIUM CONDUCTOR

Nominal Cross Sectional Area in Sq. mm	3.3/3.3 KV	3.3/6.6 KV	11 KV (E) / 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
25	1.258	1.457	1.612	2.509	1.503	--
35	1.361	1.569	1.853	2.644	2.797	2.517
50	1.682	1.687	2.321	2.800	2.921	4.569
70	2.033	1.979	2.503	3.219	3.347	4.809
95	2.202	2.507	2.718	4.019	4.200	5.437
120	2.371	2.675	2.882	4.241	4.416	6.713
150	2.870	2.847	3.265	4.447	4.621	6.976
185	3.121	3.309	4.148	4.726	5.289	7.356
240	3.758	4.227	4.442	5.442	6.651	7.718
300	4.099	5.024	5.182	6.894	7.084	8.187
400	5.750	6.572	6.658	7.433	7.657	8.760
500	6.716	6.777	6.861	7.588	7.797	8.830
630	7.492	7.465	7.477	8.209	8.386	9.413

SECTION-VI
SPECIFICATIONS AND STANDARDS

SPECIFICATIONS AND STANDARDS

1 Construction

The Contractor shall comply with the Specifications and Standards set forth in Annexure-I of this Section for construction of the Railway Project and RDSO latest Specifications.

2 Design Standards

Indian Railways Permanent Way Manual, Indian Railways Bridge Manual, Indian Railway Schedule of Dimensions & relevant IRS Specifications referred in the Manual, Indian Railway Telecom Manual, AC Traction Manual, Rules for Opening Railways, IE rules, MI & SMI issued from RDSO

Latest version of the Manuals, Specifications and Standards including the amendments notified/published by the Base Date shall be applicable.

3 Absence of specific provision

In the absence of any specific provision on any particular issue in the aforesaid Manuals, Specifications or Standards, the following standards shall apply in order of priority

Bureau of Indian Standards (BIS)

Euro Codes or British Standards or American Standards

Any other specifications/standards proposed by the Contractor and reviewed by the Employer's Engineer.

4 Alternative Specifications and Standards

The requirements specified in the Manuals are the minimum. The Contractor shall, however, be free to adopt international practices, alternative specifications, materials and standards to bring in innovation in the design and construction provided they are better or comparable with the standards prescribed in the Manuals. The specifications and techniques which are not included in the Indian Railway Manuals/ RDSO specifications shall be supported with authentic specifications and standards specified in paragraph 3 above. Such a proposal shall be submitted by the Contractor to the Employer's Engineer. In case, the Employer's Engineer is of the opinion that the proposal submitted by the Contractor is not in conformity with any of the international standards or codes, then he shall record his reasons and convey the same to the Contractor for compliance.

Annex - I

Specifications and Standards for Construction

1 Specifications and Standards

All Materials, works and construction shall conform to the following manuals:

1.1 For civil works:

- (a) Indian Railways Permanent Way Manual
- (b) Indian Railway Bridge Manual
- (c) Indian Railway Schedule of Dimensions
- (d) The relevant IRS Specifications referred to in the tender documents
- (e) Specifications of Works of concerned zonal railway
- (f) In case of any contradiction in the various codal provisions, the order of precedence shall be as follows: -
 - i) Provisions of this Annex-I.
 - ii) IRS Codal provisions
 - iii) IRC Codal provisions
 - iv) IS (BIS) Codal provisions

1.2 For electrification works:

- (a) Indian Railways Manual AC Traction, Volume-II Part-I and Volume-II Part-II.
- (b) Manual of Standards & Specification for Railway Electrification
- (c) Indian Railways Standards of Dimension
- (d) IE Rules
- (e) MI & SMI issued by RDSO

2 Deviations from the Specifications and Standards

Notwithstanding anything to the contrary contained in Paragraph 1 above, the following Specifications and Standards shall apply to the Railway Project, and for purposes of this Agreement, the aforesaid Specifications and Standards shall be deemed to be amended to the extent set forth below: Any calculations, designs, drawings, schedules, information, data, progress charts etc. required by the Employer's Engineer in connection with the contract shall be furnished by the Contractor at his own expenses. The Contractor will not be required to furnish drawings, designs and calculations etc. for basic designs and employment schedules provided by the Employer in case no modification/deviation is required for a particular basic design/ employment schedule. In case of new developments in designs, comments on Research Designs and Standards Organization

(hereinafter called RDSO's) and decision of Employer to implement the same basic drawings /designs/employment schedules will be submitted by the contractor to the Employer. If the RDSO's drawings/ designs/employment schedule is not revised, Contractor need not submit drawings/ designs/ employment schedules to the Railway Electrification. In the event of Contractor suggesting any alteration/ deviation in standard drawings, he shall submit the retraced drawings with full calculations and justification of the change to the Employer. The Employer if convinced of the need of the alteration shall approach RDSO for necessary approval. In case of any ambiguity in the interpretation of design and drawing, the decision of the Employer shall be final and conclusive. Any software developed for design will be provided to Employer for verification, validation and further use.

Note: Deviations from the aforesaid Specifications and Standards shall be listed out here. Such deviations shall be specified only if they are considered essential in view of project-specific requirements.

General Services Electrical Works

GENERAL

1.0 Introduction

All electrification works shall be carried out in accordance with Indian Electricity Rules, Railway Regulations, BIS Specifications and Code of Practices, National Electricity Code, Energy Conservation Building Code (ECBC), National Building Code, Energy Conservation Act 2001 with latest amendments. The specifications issued here are meant for guidelines and does not supersede any of the rules/regulations/codes/instructions issued by Railway Board/RDSO/CORE etc from time to time and they shall be followed accordingly. All the equipments and materials to be supplied shall be as per the specified approved makes and laid down specifications with latest amendments.

2.0 Scope of work

The scope of general electrical works broadly consists of:

- External electrification works pertaining to cabling/overhead alignment & associated works for extension of power supply, street lighting etc.
- Modification to existing electrical installations as per site requirement.
- Dismantling/relocation of electrical installations as per site requirement.
- Modification to supply Authority's power lines, up to & including 33 kV, to bring them in conformity with the Regulations for Crossing of Railway Track, 1987
- Provision of high mast lighting system with luminaries at circulating areas/yards etc.
- Availing new power supply connections/ augmentation of existing power supply connections to cater for new facilities including strengthening of power distribution system.
- Electrification of un-electrified level crossings.
- Provision of 11 kV/415 Volts electric sub-stations with equipments, panels etc.
- Provision of pumping system for water supply.
- Provision of battery charging and pre-cooling facilities.
- Provision of temporary arrangements for lights & fans during non-interlocking period.
- Coordination with supply authorities for modification of power line crossings & availing/augmentation of load as required.
- Survey of project section to identify electrical works.
- Provision of DG sets, air cooling system, escalators, elevators, travelators and lifts etc.

3.0 Standards

The following standards as amended from time to time, shall apply:

- i) Bureau of Indian Standards (BIS) specifications and Code of Practices.
- ii) Indian Electricity Act 2003 and rules framed there under.

Specifications-

- iii) Regulations laid down by the Chief Electrical Engineer of the concerned zonal railway/ Chief Electrical Inspector/local authorities.
- iv) Indian Electricity rules, 1956.
- v) Energy Conservation Act 2001
- vi) Energy Conservation Building Code
- vii) National Building code
- viii) Standards/specifications, Guidelines/directions issued by Railway Board/RDSO from time to time.

NOTE:

- a) In case of any conflict between the above standards, the decision of Employer shall be final.
- b) Henceforth in these Technical Specifications, wherever the BIS specification no. or any other specification, Code of Practice etc. are referred to, **they shall apply to the latest version of the relevant standard**, unless specifically stated otherwise.
- c) Only the latest version of rules/standards/drawings/instructions shall be applicable unless specifically stated otherwise. In case of any conflict between various instructions, decision of the Employer shall be final. In case of any conflict/discrepancy between specifications contained in this book and specifications as per above mentioned authorities, later shall prevail.
Notwithstanding any approval of drawing or work by RVNL, the contractor shall be finally responsible for following correct instructions and drawings as per latest amended details. In case any mistake is found in the work/drawing later on which is not carried out/prepared in accordance with laid down standards, rules and regulations, the Employer shall be free to reject it at any stage of the work. The contractor shall be liable to dismantle/modify/redo the rejected work without any extra cost as per directions of the Employer. The decision of the Employer shall be final in this regard.
- d) In this Technical Specification, the latest standards/drawings/instructions/letter/Code of Practice etc. means latest of above issued up to the date 28 days prior to the deadline for submission of bids.

3.1 Ratings of Components: All the equipments/components in the electrical system shall be of appropriate rating of voltage/current and frequency as required. All the conductors, switches and accessories shall be of such size as to be capable of carrying maximum current which will normally flow through them without getting them over burdened/overheated.

4.0 Earthing

Earthing shall be provided as per Indian Electricity (IE) Rules, 1956.

5.0 Safety Instructions

- 5.1 Indian Electricity Rules 1956, are to be followed in their entirety.
- 5.2 The detailed instructions on safety procedures given in BIS Specifications, Indian Electricity Rules, respective Supply Authority's regulations and Railway Rules, shall be applicable, all with their latest amendments.
- 5.3 The Electrical Contractor/ Sub-Contractor shall hold a valid and relevant Electrical Contractor's License for LT/HT/EHT Voltage issued by any State Government. All the work on electrical installations shall be done under the direct supervision of persons holding valid certificates of competency issued by any State Government.

Specifications

- 5.4 No inflammable materials shall be stored in places other than the rooms specially constructed for this purpose in accordance with the provisions of Indian Explosives Act.
- 5.5 Protective and Safety equipments such as rubber gloves, earthing rods, lineman's safety belt, high visibility jackets, portable artificial respiration apparatus etc., shall be provided to all the working staff.
- 5.6 Caution boards such as "Man working on line", "Do not switch on" etc, shall be provided on the HT/LT Panel Boards, for indication that the switch has been put to off position and person has been allowed to work on line.
- 5.7 "Permit to Work" shall be got issued from the person in-charge of the installation, prior to start of work, on energized electrical installations.
- 5.8 No work on live bus bar or switch boards shall be handled by a person below the rank of a Licensed Wireman and such work shall be done in the presence of a competent Engineer.
- 5.9 When working on or near live installations, suitable insulated tools shall be used, and special care shall be taken to ensure that tools do not drop on live terminals causing shock or dead short.
- 5.10 The electrical switch boards/ distribution boards shall be clearly marked to indicate the areas being controlled by them.

6.0 Man- Power

- 6.1 The contractor shall employ competent, licensed, qualified full time electrical engineers to direct the work of electrical installations in accordance with the applicable specifications, IE Rules, Acts and Railway Regulations. The Contractor's Engineer(s)/ technician(s)/ Workmen shall possess the necessary license/competency certificate issued by competent authority including RVNL/Railways as required under rules/law etc.
- 6.2 The Contractor's Engineer shall possess relevant knowledge/ experience in substation work/ wiring of residential/ service buildings, illumination of streets/ railway yards/ circulating areas, designing of distribution system, mains/ sub-mains/ individual distribution boards, modification of overhead power line crossings, stringing of overhead mains and laying of underground cables etc. as applicable to the works included in the scope of the contract.

7.0 Inspection of Equipments/ materials

- 7.1 The inspection of various Equipments/ materials as specified in relevant IS/Specifications shall be carried out by the agencies as specified below provided the value of material is more than specified limits as per Railway Board Letter No. 2000/RS(G)/379/2 dt 06/09/2017 (Rs. 5 Lakh as of now). In other cases, inspection shall be arranged by IRCON/ its Representative as per 7.3 below:

1	Power Distribution Transformers	RITES
2	H.T./ L. T Panels	RITES
3	High Mast Lighting Systems	RITES
4	Diesel Generating Sets	RITES
5	H.T./L.T Cables	RITES
6	Battery Chargers	RITES
7	APFC Panels	RITES

Specifications-

8	ACSR conductor	RITES
9	Tubular Poles	RITES
10	Luminaries and Lamps	RITES
11	Fans and Regulators	RITES
12	Wiring Cables and accessories	RITES
13	Feeder Pillar and Switch Boards	RITES
14	Meter Board, Meters	RITES
15	G.I. Pipes	RITES
16	HT End Terminations	RITES
17	Insulators and Stays	RITES
18	Glow Sign Boards	RITES
19	Battery Charging system and Pre Cooling Points	RITES
20	Pumps	RITES
21	All other materials	RITES

- 7.2 The inspection of the above items will be done at the manufacturer's works or other appropriate location decided by IRCON and inspection fees chargeable by Inspecting Authority will be borne by the contractor as per relevant instructions/agreement. The inspection charges reimbursed to contractor on submission of documentary proof.
- 7.3 OEM's certificate and other papers, such as material challans etc. shall be furnished by the Contractor, to establish the genuineness of the equipment/ material.
- 7.4 Nominated Inspector shall have free access to visit the manufacturer's works at all reasonable times to witness and inspect the testing of equipment/ materials. The contractor shall provide all reasonable facilities and equipments/lab at his cost for proper inspection of the material/equipment.
- 7.5 Item available as catalogued product in market like MCBs, MCCBs, wiring accessories, light fittings, fan etc. will be acceptable on factory routine test report for the batch, certificate from authorized dealer and manufacturer and visual inspection at site. However engineer may decide to get any item under the scope of supply inspected by any agency (RITES/IRCON/Rly) at manufacturer's work if so required. And the cost of such test shall be borne by contractor.
- 7.6 The Contractor shall ensure that all the equipments/materials supplied are tested as per relevant BIS/ BS Specification and comply with instructions on energy star rating issued by BEE wherever applicable. At per present RB instructions, all energy consuming equipments should be procured with min 3 star energy rating.
- 7.7 The Contractor shall ensure that all the equipments/materials supplied is procured from applicable approved list of sources. In case item is not featuring in approved list or approved itself is not available, prior approval of IRCON/Railway shall be taken before placing order. Detail guidelines of IRCON/Railways issued from time to time shall be applicable in this regard.

Specifications-

8.0 Pre- Commissioning tests on Equipment

- 8.1 The pre-commissioning tests on various equipments shall be carried out jointly by the Contractor with the Engineer.
- 8.2 The Contractor shall get the electrical installations checked and approved from the Concerned Chief Electrical Engineer of Railways, Electrical Inspector/ local Authority/ CEA/ any other regulatory authority, as per requirement. The work will not be treated as complete until such clearances are obtained by the Contractor. He shall also obtain any other clearances that may be required from time to time. The installation shall be energized, in the presence of the Engineer, only after the receipt of all such approvals.

9.0 Other Requirements

- 9.1 Care shall be taken by contractor to avoid damage to the building during execution of his part of work. He shall be responsible for repairing all damages and restoring the same to their original finish at his own cost. He shall also remove at his cost all the unwanted and waste materials arising out of his work from the site. The Contractor shall dress up/repair the site as per the existing surrounding ground/ floor/walls/ road surface etc. after completion of the work and make good any damages that occurred during the execution of works.
- 9.2 The work shall be carried out with minimum power shut downs. The required shut downs from railway/other agencies will be arranged by the Engineer, with the active assistance of Contractor, in consultation with user departments, and the charges if any & not mentioned otherwise, shall be borne by RVNL.

9.3 Coordination with other Agencies:

The contractor shall coordinate with all other agencies so that work is not hampered due to delay in his work. Recessed conduit and other works which directly affect the progress of the main work should be done in time and on priority.

Wherever approval is to be taken from other department (s) of state/central government, standards of work and approved list of equipments /materials should be followed as per their requirement and approvals obtained.

9.4 Work in Occupied Buildings:

While working in the occupied buildings, there should be minimum inconvenience to the occupants. Work should be programmed in coordination with the engineer and occupying department. If required, work may have to be planned beyond normal working hours. The contractor shall be responsible to abide by the regulations/restrictions regarding entry into and movement within the premises.

- 9.5 The rates are deemed to be inclusive of all lead (except as otherwise specifically provided in the description of the particular item), lifts ascend descend, handling, re-handling, crossing of nullahs/streams/tracks or any other obstructions.
- 9.6 All enabling works for executing the work e.g. approach road to site, launching arrangements, procuring right of way: arrangement of water and electricity etc. is to be arranged by the contractor at his own cost and is deemed to be included in the quoted rates.

Specifications

- 9.7 **Storage of Material:** All the material at site shall be properly stacked & stored so as to facilitate inspection. The material should be properly protected from detrimental effects of nature, fire, theft etc. The contractor shall be responsible for watch & ward and any loss or deterioration on account of above shall lead to rejection of material. In this eventuality, the contractor shall have to replace the same at this own cost.
- 9.8 All minor items viz. hardware items, foundation bolts clamps, termination lugs for electrical connections etc. as required and necessary for proper working of the equipment shall be deemed to have been included in the Bill of Quantities, whether such items are specifically mentioned or not. All hardware & M.S components should be either Galvanized or Electroplated.
- 9.9 If any activity of work is essential for the satisfactory completion of the work but is not mentioned specifically in the Bill of Quantities or elsewhere in the bidding documents, the same shall be deemed to be included In the scope of work and shall be executed by the contractor within the accepted cost. The work shall be handed over in a functional manner complete in all respects.

10.0 Approval of Drawings and completion drawings

- 10.1 On award of contract, the successful bidder shall visit the site and prepare working drawings as per site requirements. Drawings shall conform to the relevant standards and details given in Indian Railway works Manual and prepared in Auto CAD. The drawings which require prior approval shall be first prepared and submitted in three copies with one soft copy as check drawings. The comments and corrections received back shall be incorporated while preparing the final drawing on RTF sheets for signatures and approval.
- 10.2 The drawings of all equipments including HT/ LT panels, transformer, DG set, distribution boards, pre-cooling/battery charging points, battery charger, wiring plan, route of laying of cables, poles , and other items shall be got approved from the Engineer. Manufacturing of the items can be taken in hand only after the approval of the drawings and samples. The Contractor shall supply six copies in addition to one copy on RTF and soft copy of each of these approved drawings before commencement of work.

After completion of the work, as erected completion drawings shall be submitted in four copies in addition to two copies on RTF and soft copy.

11.0 Commissioning of Completed Works:

- 11.1 After completion of work, the Contractor shall ensure that the installations have been commissioned only after due testing and approval of the Engineer.

12.0 Completion Plan and Completion Proforma: :

- 12.1 After completion of works, the Contractor shall submit required sets of 'As Erected' drawings as per para 10.2 above in respect of all the electrical installation works.
- 12.2 Completion Proforma in the following format, shall be jointly signed by the Engineer and Contractor.

Specifications-

I/ We certify that the installation detailed below has been installed by me/ us and tested and that to the best of my/ our knowledge and belief it complies with Indian Electricity Rules, 1956,
Electrical installation at -----
Voltage and system of supply-----

Particulars of work:**(a) Internal Electrical installation :**

No.	Total load	
	System of wiring	
i	Light point	
ii	Fan point	
iii	Plug point	
iv	3 pin 5 Amp.	
v	3 pin 15 Amp	
vi	Other points	

(b) Motors

No	Total load	HP/KW	Type of starting
i			
ii			

(c) Other Plants

No			
i			
ii			

(d) Installation of over head line and underground cable

	Overhead line	
	Total length and No. of spans.	
	No. of street lights and its description	
	Underground cable Make and Year	
	Total length of underground cable and its size.	
	Number of joints	
	End point	
	Tee Joint	
	St. through Joint	

(e) Earthing

No.	Details	Qty with unit
a	Description of earthing electrode	
b	No. of earth electrodes	
C	Size of main lead	

(f) Test results- Insulation resistance

I	Insulation resistance of the whole system of conductors to earth in Mega ohms	----- Mega ohms
ii	Insulation between the phase conductor and neutral.	----- Mega Ohms

Specifications-

iii	Between Phase R and neutral	----- Mega Ohms
iv	Between phase Y and neutral	----- Mega Ohms
v	Between phase B and neutral	----- Mega Ohms
vi	Between phase R and phase Y	----- Mega Ohms
vii	Between phase Y and phase B	----- Mega Ohms
vii	Between phase B and phase R	----- Mega Ohms

(g) Polarity test- Polarity of non-linked single pole branch switches.

(h) Earth Continuity test –Maximum resistance between any point in the earth continuity conductor including metal conduits and main earthing lead---- Ohms.

(i) Earth electrode resistance – Resistance of each earth electrode:

No.	
i)	 Ohms
ii)	 Ohms

Signature of the Engineer

Signature of Contractor

Note: For obtaining EIG approval for energizing HT installations, the EIG application format of the concerned Railway shall be followed.

13.0 Concrete and Cement

- (a) All the foundations [except as per details given in (b)], for masts of street lighting, solar lighting, LT/HT over head conductors, Guy wires, stays, steel/GI Tubular poles, Battery charging poles and pedestals, protective fencing shall be as per the approved drawings of the RVNL. In these type of foundations, normally M-10 cement concrete (except where specified otherwise) conforming to IS-456 with 20 mm coarse aggregates shall be used. The cement to be used shall be ordinary Portland cement of 43 grade (conforming to IS-8112) or 53 grade (conforming to IS-12269) or PPC conforming to IS 1489(Part 1/Part 2) as approved by RVNL based on requirement and availability and date of manufacturing shall not be older than three months.
- (b) Where foundations of equipments are to be laid as per OEM recommendations/standard drawings of the Railway/SEB, grade of cement, size of aggregate, concrete grade and foundation dimensions etc shall be as per their recommended standard such as High mast lighting system, H pole structures used for power line crossings.

The contractor shall use concrete mixer, proper shuttering and vibrators for compaction for foundations of high mast lighting system, large pumping installations etc as directed by Engineer. For smaller foundations detailed at (a) above, manual concrete mixing and compaction may be adopted.

**INTERNAL
ELECTRIFICATION
WORKS**

INTERNAL ELECTRIFICATION WORKS

1.0 Scope

This specification pertains to internal electrification of residential and service buildings on 3 phase, 415 volts or single phase, 230 Volts, 50 Hz Ac supply system, including provision of conduits with accessories, metal boxes and Boards, wiring, metering, protection, switchgear, UPS, stablizers, energy savers, provision of fans & luminaries, pre-commissioning/ commissioning tests and handing over. Separate conduits shall be laid for:

- i) Emergency and non emergency circuits
- ii) Power and lighting circuits

1.1 Regulations and standards

The system shall be governed by IS:732, I.E. Rules 1956, National Electric Code (NEC), ECBC, National Building code, relevant BIS Standards and Codes applicable to internal electrification and distribution works.

- 1.2 The definitions of terms shall be in accordance with IS: 732-1989 (Indian Standard Code of Practice for Electrical Wiring), except for the definitions of point wiring, circuit, sub-main and main wiring.

The conventional signs & symbols for technical work shall be indicated in the working and as erected drawings.

1.3 GENERAL CONDITIONS:

- a. Before starting wiring work approval of site drawings shall be obtained regarding layout, no. of points to be wired and location of switchboards etc.
- b. All switchboards shall be of GI box type/ PVC box compatible with modular switches/plug points. No wooden switchboards shall be used.
- c. The wiring shall be done from a distribution system through main and/or branch distribution boards. The system design and location of boards will be properly worked out and approved by site supervisor.
- d. Each main distribution board and branch distribution board shall be controlled by an incoming circuit breaker. Each outgoing circuit shall be controlled by a circuit breaker/switch with fuse. All Main/sub distribution boards shall be double door recess type.
- e. For non-residential buildings, as far as possible, DBs shall be separate for light and power. Only MCCB/MCB type DBs shall be used. Kitkat fuse, glass fuse, Re-wirable type fuses shall not be used.
- f. Three phase DBs shall not be used for final circuit distribution as far as possible.
- g. 'Power' wiring shall be kept separate and distinct from light wiring, from the level of circuits (Sub-main), i.e., beyond the branch distribution boards. Conduits for light/power wiring shall be separate.
- h. Essential/non-essential/UPS distribution each will have a completely independent and separate distribution system starting from the main, switchboard up-to final wiring for each system.
- i. Generally, no switchboard will have more than one source of incoming supply.
- j. Each MDB/DB/Switch Board will have spare outgoing ways for future expansion.
- k. All M.S clamps/structures/hardware should be hot dip galvanized. If not possible special structures cold galvanization paint shall be applied.

Specifications-

1.4 Wiring

1.4.1 (a) Main wiring: Main wiring shall mean the wiring from one main/distribution switchboard to another.

(b) Sub-main wiring: Sub main wiring shall mean the wiring from the distribution board to the 1st tapping point inside the switch box, from where point wiring starts.

(c) PVC insulated, multi stranded, Heat resistant fire retardant (HFR), low smoke, flexible copper conductor cables of 1.1 kV grade, conforming to IS: 694/1990, ISI marked shall be used. The size/s shall be as specified in the Bill of Quantities (BOQ).

(d) Minimum size of wiring cable/s for light and power points shall be as below:

- Light/ Fan wiring - 1.5 Sq. mm
- Light plug point - 2.5 Sq. mm
- Circuit wiring for Light/ Fan Point - 2.5 Sq. mm
- Circuit wiring for Light plug point - 4.0 Sq. mm
- Group Point wiring - 2.5 Sq. mm
- Power wiring - 4.0 Sq. mm
- Power wiring with more than 1 kW load – the size shall be assessed by the contractor based on load calculations and approved by the Engineer.

(e) **Flexible cable** – Copper conductor, 3 core flexible cables shall be used for connecting single phase appliances etc.

Sizes of single core (copper conductor) cable for point, circuit and sub main wiring, circuits, distribution board/s etc. for Qrs.

Wire Loc	Nos. of points and size of wiring cables														Size of Sub main wiring cable	
	Size of point wiring cable (copper conductor)									Size of circuit wiring cable (copper conductor)					For L & F Load	For Power load
	LP	TLP	FP	CBP	EFP	PP 5A	PP 15A	GP	PP32A (ACP)	For L&F	For 5A Plug	For 15A Plug	For 32A AC	For geyser		
Phases and Neutral	1.5 sq.mm					2.5sq mm	4sq mm	6sq mm	6sq mm	2.5sq mm	4sq mm	4sq mm	6sq mm	6sq mm	4 sq mm	10 sq mm
Continuous earth	1.5 sq.mm					2.5 sq mm	4 sq mm	6sq mm	6sq mm	2.5sq mm	4sq mm	4sq mm	6sq mm	6 sq mm	4 sq mm	10 sq mm

Specifications-

1.4.2 Point wiring:

- (i) **Definition:** A point (other than plug point) shall include all work necessary in complete wiring to the following outlets from the controlling switch or MCB:
- Ceiling rose or connector (in the case of points for ceiling/exhaust fan points, prewired light fittings, and call bells).
 - Ceiling rose (in case of pendants except stiff pendants). Standard specification for Electrical (General) Works
 - Back plate (in the case of stiff pendants).
 - Lamp holder (in the case of goose neck type wall brackets, batten holders and fittings which are not prewired).
 - Main and sub-main wiring as described above.
 - Distribution boards of reputed make as required, modular switchboard, RCCBs in Main distribution board of adequate capacity of ABB/Siemens/Legrand/L&T make.

(ii) **Scope:**

Point Wiring shall include:

- Conduit/channel as the case may be, accessories for the same and wiring cables between the switch box and the point outlet, loop protective earthing of each fan/light fixture.
- All fixing accessories such as clips, screws, Phil plug, rawl plug etc. as required.
- Metal or PVC switch boxes for control switches, regulators, sockets etc., recessed or surface type, and phenolic laminated sheet covers over the same.
- Outlet boxes, junction boxes, pull-through boxes etc. but excluding metal boxes if any, provided with switchboards for loose wires/conduit terminations.
- Control switch or MCB, as specified.
- 3 pin or 6 pin socket, ceiling rose or connector as required.
- Connections to ceiling rose, connector, socket outlet, lamp holder, switch etc.
- Bushed conduit or porcelain tubing where wiring cables pass through wall etc.
- Main and sub main wiring of appropriate size.
- Pre wired MDB and DBs of ABB/Legrand/L&T make as required including MCBs. RCCBs for MDBs will not be paid separately.
- Earth wire run as per requirements.

(iii) **Point wiring for plug points:**

- 16A plug points shall be mounted on separate modular board. 6 A plug point can be mounted on light/fan point switchboard or separately. Not more than 1(one) 6A plug point will be allowed on common switchboard.
- The 6A plug point wiring shall include, controlling switch, socket and necessary wiring from sub main including earthing of third pin.
- The 16A plug point wiring shall include separate board as approved consisting of controlling switch, socket, MCB, earthing.

1.4.3 System of wiring :

- Wiring shall be done only by the looping system. Phase/live conductors shall be looped at the switch box. For point wiring, neutral wire/earth wire looping for the 1st point shall be done in the switch box; and neutral/earth looping of subsequent points will be made from point outlets.
- In wiring, no joints in wiring will be permitted anywhere, except in switch box or point outlets, where jointing of wires will be allowed with use of suitable connector.
- The wiring throughout the installation shall be such that there is no break in the neutral wire except in the form of linked switchgear.
- Colour coding:- Following colour coding shall be followed in wiring:-

Phase	Red/Yellow/Blue. (Three phase wiring)
Live	Red (Single phase wiring)
Neutral	Black
Earth	Green/Yellow-green.

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- e. Termination of Sub main circuit into switchboard:-Sub-main (Circuit) will consist of phase/neutral/earth wire. Sub-main (Circuit) will terminate in a switch board (first tapping point, where from point wiring starts) & the switchboard will have phase, neutral and earth terminal to receive phase/ neutral/earth wire.

1.4.4 Run of wiring:

- a. The type of wiring shall be as specified in the tender documents/detailed at site namely, surface conduit/concealed conduit, MS/PVC, channel (Casing/Capping).
- b. Surface wiring shall run as far as possible along the walls and ceiling, so as to be easily accessible for inspection.
- c. Above false ceiling, in no case, open wiring shall be allowed. Wiring will be done in recessed conduit or surface steel conduit.
- d. In concealed conduit system, routes of conduit will be planned, so that various inspection boxes provided don't present a shabby look. Such boxes can be provided 5 mm above plaster level, and they can be covered with plaster of Paris with marking of junction boxes.
- e. Generally conduits for wiring will not be taken in floor slabs.

1.4.5 Passing through walls or floors :

When wiring cables are to pass through a wall, these shall be taken through a protection (steel/PVC) pipe of suitable size such that they pass through in a straight line without twist or cross in them on either end of such holes. The ends of metallic pipe shall be neatly bushed with PVC or other approved material.

All floor openings for carrying any wiring shall be suitably sealed after installation.

1.4.6 Joints in wiring :

- a. No bare conductor in phase and/or neutral or twisted joints in phase, neutral, and/or protective conductors in wiring shall be permitted.
- b. There shall be no joints in the through-runs of cables. If the length of final main or sub-main is more than the length of a standard coil, thus necessitating a through joint, such joints shall be made by means of approved mechanical connectors in suitable junction boxes.
- c. Termination of multi stranded conductors shall be done using suitable crimping type thimbles.

1.4.7 Capacity of Circuits (Sub-main) :

- a. Lighting circuit from each sub main shall feed light/fan/call bell/6A outlet points. Each circuit shall not have more than 800 Watt connected load or more than 8 points.
- b. Power sub main circuit will have only one 16A outlet per circuit. Not more than 4 Nos. 6A outlets outlet shall be allowed from one sub-main.
- c. All Loads more than 1 KW each shall be controlled by suitably rated MCB and cable size shall be decided as per calculations.

1.4.8 Measurements

Measurement of point wiring for light points, fan points, exhaust fan points, group points, light plug points, power plug points & call bell points shall be done on unit basis by counting only. Measurement of twin control point wiring shall be done on unit basis by counting.

1.4.9 Circuit Wiring

Circuit Wiring shall mean the wiring from the distribution board to the first tapping point inside the switch Board, from where point wiring starts. Looping of switch boards in the same circuit shall also be measured along the length of conduit for circuit wiring as per relevant BOQ item.

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1.4.10 Sub main Wiring

- (a) Sub main wiring shall mean the wiring from the meter board or main board/ sub main board to Distribution board/ Sub distribution board as the case may be. Looping of distribution boards/ sub distribution boards shall also be provided along the length of conduit for Sub Main wiring.
Main Distribution Boards, Sub Distribution Boards shall be double door recess type. MCB and LCCBs of requisite rating should be provided in the distribution board.
- (b) Circuit Wiring/ Sub main wiring cable/s along with earth wire cable/s shall be of the capacity specified in Bid document/RVNL standard. Wiring of each circuit wiring/ sub/ main wiring cable/ s along with earth wire cable/s shall be drawn into an independent conduit. Drawn boxes of suitable size shall be provided at convenient locations to facilitate easy drawing of the circuit wiring/ sub main wiring cable/s. Cost of junction Board/ draw Boxes are deemed to be included in the rates of circuit wiring/ sub main wiring cables along with earth wire cable/s. **Single phase circuits shall have single earth wire whereas three-phase circuits shall be provided with two earth wires.**
- (c) Where sub- main, circuit wiring and point wiring cables are connected to the switch/ switchgear etc, sufficient extra length of cable/s (not less than 150 mm) shall be provided to facilitate easy connection and maintenance.

1.5 Joints in the Wiring

All joints in the wiring shall be made at main switch boxes and distribution boards only. No joint shall be made in conduits and junction Boxes or in the length of wiring cable. Wiring cable shall be continuous from outlet to inlet. All joints shall be made by use of connectors and lugs. All wire ends to be provided with lug and connected with requisite fasteners. Lugs should be crimped properly with crimping tools.

1.6 Conduit System

1.6.1 Type and Size of Conduit

1.6.1.1 The Conduit wiring shall be carried out as under:

All the non-metallic conduit pipes and accessories shall be of suitable materials complying with IS-2509:1973 and IS-3419:1989 for rigid conduits and IS-9573 (Part 5):2000 for flexible conduits. Internal wiring in the buildings shall be done with ISI marked PVC rigid conduit of size not less than 25 mm diameter and thickness 2.0 mm (Nominal size). PVC conduit shall be used with all its associated accessories such as bends, couplers, saddles, metal deep boxes (100 mm deep for ceilings), PVC bends etc.

1.6.1.2 Normally, concealed wiring shall be provided in all the buildings. Surface conduit wiring shall be provided if specifically given in BOQ or where it is not practicable to provide concealed wiring with approval of the RVNL.

1.6.1.3 Limitations

The maximum number of PVC insulated 650/1100 V grade copper conductor cables that can be drawn in conduit pipes shall be limited to 45 % of the capacity of the conduit. Table indicating the capacity is as under:-

S. No.	Size of Conduit	100 % capacity in Sq mm	45% capacity in Sq mm
1.	25 mm	490	220
2.	32 mm	804	362

1.6.1.4 Conduit joints :

Conduits shall be joined by means of screwed or plain couplers depending on whether the conduits are screwed or plain. For conduit fittings and accessories reference may be made to the good practice (IS : 2667, IS:3419, IS:9537 Part-I II III).

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1.6.1.5 Fixing of conduits :

Conduit pipes shall be fixed by heavy gauge saddles, secured to suitable PVC plugs with screws in an approved manner at an interval of not more than 600mm, but on either side of couplers or bends or similar fittings, saddles shall be fixed at a distance of 300 mm from the center of such fittings except that the spacing between saddles or supports is recommended to be 600 mm for rigid non-metallic conduits.

1.6.1.6 Bends in conduits :

Wherever necessary, bends or diversions may be achieved by bending the conduits or by employing normal bends, inspection bends, inspection boxes, elbows or similar fittings. Conduit fittings shall be avoided, as far as possible, on outdoor systems.

1.6.1.7 Outlets :

In order to minimize condensation or sweating inside the conduit, all outlets of conduit system shall be properly drained and ventilated, but in such a manner as to prevent the entry of insects.

1.6.1.8 Heat may be used to soften the conduit for bending and forming joints in case of plain conduits. As the material softens when heated, sitting of conduit in close proximity to hot surfaces should be avoided.

1.6.1.9 Fixing of conduit in chase (concealing in plaster of wall):

The conduit pipe shall be fixed by means of staples or by means of non-metallic saddles placed at not more than 80 cm apart or by any other approved means of fixing. Fixing of standard bends or elbows shall be avoided as far as practicable and all curves shall be maintained by sending the conduit pipe itself with a long radius which will permit easy drawing in of conductors. At either side of bends, saddles/staples shall be fixed at a distance of 15 cm from the center of bends.

1.6.1.10 Inspection boxes (for concealed wiring):

Suitable inspection boxes to the nearest minimum requirements shall be provided to permit periodical inspection and to facilitate replacement of wires, if necessary. The inspection/junction boxes shall be mounted flush with the wall or ceiling concrete. Where necessary deeper boxes of suitable dimensions shall be used. Suitable ventilating holes shall be provided in the inspection box covers, where required.

Table 1
Maximum No. of single core cables in Rigid metallic/non metallic conduit

Size of wires		Size of conduit (dia in mm)						
mm ²	no. & dia	16	20	25	32	40	50	60
1.5	1/1.4	3	5	10	14			
2.5	3/1.06	2	5	8	12			
4	7/0.85	2	3	8	10			
6	7/1.06		2	5	8			
10	7/1.40			3	5			
16	7/1.70				3	6		
25	7/2.24				2	6		
35	7/2.50					4	6	7
50	19/1.80					3	5	6

Specifications-

Table 2
Maximum Number of Single-Core Cables that can be Drawn into Casing and Capping

Size of wires		Size of Casing					
Mm ²	no. & dia	10/15mm x 10 mm	20mm x 10 mm	25mm x 10mm	30mm x 10mm	40mm x 20mm	50mm x 20mm
1.5	1/1.4	3	5	6	8	12	18
2.5	3/1.06	2	4	5	6	9	15
4	7/0.85	2	3	4	5	8	12
6	7/1.06		2	3	4	6	9
10	7/1.40		1	2	3	5	8
16	7/1.70			1	2	4	6
25	7/2.24				1	3	5
35	7/2.50					2	4
50	19/1.80					1	3
70						1	2

1.6.2 Surface Conduits

- Surface or open conduit pipes shall be fixed by heavy gauge saddles, secured to suitable approved plugs embedded in walls/ firmly secured with tresses etc. with screws in an approved manner at an interval of not more than 60 cm on either side of the coupler or bends or similar fittings. The saddles shall be fixed at a distance of 30 cm from the center of such fittings. Open conduit wiring shall be laid parallel/ perpendicular to the walls and suitable clamps shall be fixed properly. For 25 mm diameter conduit, width of clamp shall be 19 mm and of 20 SWG wall thickness. For conduits of 32 mm and above, width of clamp shall be 25 mm and of 18 SWG wall thickness.
- Where conduit pipes are to be laid along trusses, steel joints etc., the same shall be secured by means of special clamps made of mild steel. Where it is not possible to drill holes in the truss members, suitable clamps with bolts and nuts shall be used.
- Where conduit pipes are to be laid above false ceiling, conduit pipes shall not be clamped to false ceiling frame work and shall be suspended with suitable supports from the suffix of slab. For conduit pipes to run along with wall, the conduit pipe shall be clamped to wall above false ceiling in uniform pattern with special clamps approved by the Engineer at site.

1.6.3 Installation of Conduit system :

1.6.4 Common aspects for both concealed and surface conduit works:

- The erection of conduits of each circuit shall be completed before the cables are drawn in.
- All joints shall be sealed/ cemented with approved cement. Damaged conduit pipes/fittings shall not be used in the work. Cut ends of conduit pipes shall have neither sharp edges nor any burrs left to avoid damage to the insulation of conductors while pulling them through such pipes.
- Bends in conduit :** All bends in the system may be formed either by bending the pipes by an approved method of heating, or by inserting suitable accessories such as bends, elbows or similar fittings, or by fixing non-metallic inspection boxes, whichever is most suitable. Where necessary, solid type fittings shall be used.
- Radius of bends in conduit pipes shall not be less than 7.5 cm. No length of conduit shall have more than the equivalent of four quarter bends from outlet to outlet.
- Care shall be taken while bending the pipes to ensure that the conduit pipe is not damaged, and that the internal diameter is not effectively reduced.
- Outlets:** All switches, plugs, fan regulators etc. shall be fitted in flush pattern. The fan regulators can be mounted on the switch box covers, if so stipulated in the tender specifications, or if so directed by the Engineer.
- Painting:** After installation, all accessible surfaces of metallic accessories shall be painted.

Specifications

1.7 Casing and Capping:

PVC casing and capping shall conform to BIS Specification No.14927 Part 2 and for wiring application with the required accessories viz. bends and tees etc., as per site conditions. They should be properly fitted along with the required accessories viz. couplers, junction box, bends, tees, PVC round blocks, sockets, clamps, bolts, nuts, screws etc., as per the site conditions. They shall be used in suitable size to accommodate the wiring and shall be laid straight horizontally/vertically on the wall/roof etc.

1.8 Accessories

1.8.1 Control Switches for lights/ fans etc.

- a) All 5/6 and 15/16 Amp switches/ sockets (5 pin/6 pin) including bell push shall be modular type suitable for use on 230 Volts A.C. supply system. Switch plate shall be matching with modular switches/sockets. All switches, sockets, etc., shall normally be of white finish or as approved considering matching with the colour of walls/surface.
- b) All the switches controlling the lights/fans etc. shall be connected to the phase wire of the circuit. Switches for lights and 5/6 Amp & 15/16 amp outlets shall be located at 1250 mm above finished floor level and the sub distribution boards (SDB), distribution boards (DB) shall be at 1500 mm above finished floor level, unless otherwise instructed by the Engineer.

1.8.2 Ceiling Rose

The ceiling rose shall be of Bakelite, 5 amps, 250 volts, conforming to latest version of IS:371/1999(ISI marked). The colour shall normally be of white finish or as approved considering matching with the colour of wall.

1.8.3 Lamp Holder

The lamp holder shall be Polycarbonate of model as approved (ISI Marked). The colour shall normally be of white finish or as approved.

1.8.4 Call Bell

Call bell shall be fixed on metal box of approved size with 3mm Phenolic laminated sheet on top (conforming to IS: 2036:1995) fixed with brass screws and brass cup washers and shall be suitable to work on 230 V AC, single phase 50 cycle. Piano type bell push shall be fixed at the entrance door.

1.8.5 Attachment of fittings and accessories :

- a. Conduit wiring system: All accessories like switches, socket outlets, call bell pushes and regulators shall be fixed in modular sheets in boxes. Accessories like ceiling roses, brackets, batten holders etc. shall be fixed on outlet boxes.
- b. Steel/iron screws shall be used to fix the accessories to their bases.
- c. Fixing to walls and ceiling: Wooden plugs for fixing to wall/ceiling will not be allowed. Fixing will be done with the help of PVC sleeves/Rowel plugs/ dash fasteners as required.
- d. Drilling of holes shall be done by drilling machines only. No manual drilling of hole will be allowed.
- e. PVC spacers shall be provided during fixing of fittings and other items on wall.

- 1.9** For termination of cables, crimping type cable socket/lugs shall be provided and soldered if necessary/ instructed.

1.10 Load Balancing:

Balancing of circuits in three-phase installation shall be planned before the commencement of wiring and shall be strictly adhered to.

1.11 Colour code for Wiring:

Colour code for wiring installation shall be maintained as Red, Yellow and Blue for three phases, Black for neutral and green only for earth in case of insulated earth wire.

Specifications

1.12 Earthing of Non- current Carrying Part

All the non-current carrying metal parts of electrical installations shall be earthed properly. All metal enclosures, cable armour, switchgear, distribution boards, light fittings and all other parts made of metal shall be bonded together and connected by means of specified earthing conductors to an efficient earthing system.

1.13 Earth Conductor

Every earthing conductor shall be of copper single core pvc wire / G. I of suitable size.

1.14 Testing of Wiring:

Wiring system shall be tested as per IS:732 for:

- i) Continuity of all circuits,
- ii) Earthing after the wiring is completed and before energizing,
- iii) Polarity test of switches etc.

1.15 Testing

After completion of work, the entire installation shall be subjected to the following tests:

- Insulation Resistance Test.
- Earth Continuity Test.
- Earth Resistance Test.

Besides the above, any other tests specified in BIS Standards or as required by the local Authority/ Engineer shall also be carried out.

1.15.1 Insulation Resistance Test

- a) The insulation resistance shall be measured by applying between earth and the whole system of conductor or any section thereof with all fuses/MCB in place and all switches closed and except in earthed concentric wiring, all lamps in position of both poles of the installation otherwise electrically connected together, a direct D. C. Voltage not less than twice the working voltage, provided that it does not exceed 500 Volts for medium voltage circuits. Where the supply is derived from 3 wires (AC or DC) or polyphase system, the neutral pole of which is connected to earth, either direct or through added resistance the working voltage shall be deemed to be that which is maintained between the outer or phase conductor and the neutral.
- b) The insulation resistance in mega ohm of an installation measured as in 'a' above, shall not be less than 50 divided by the number of points on the circuit, provided that the whole installation need not be required to have a insulation resistance greater than one meg ohm.
- c) The entire installation shall be tested and shall comply with the requirements of specifications, IS code and IE norms.

1.15.2 Testing of Earth Continuity Path:

The earth continuity test of metallic envelopes shall be done for electrical continuity. Electrical resistance of the same, along with the earthing lead, excluding any added resistance of earth leakage circuit breaker, measured from the connection with the earth electrode to any point in the earth conductor in the completed installation, shall not exceed one Ohm.

1.15.3 Polarity Test of switch

In a two-wire installation, a test shall be made to verify that all switches in every circuit have been fitted in the same conductor through out, and such conductor shall be labeled or marked for connections to the phase conductor or to the non-earthed conductor of the supply.

In a three or four wire installation, a test shall be made to verify that every non-linked single pole switch is fitted in a conductor which is labeled or marked for connection to one of the phase conductors of the supply.

1.15.4 Earth Resistance Test

Earth Resistance Test shall be carried out in accordance with Indian Standard Code of Practice for earthing IS 3043 – 1966. All tests shall be carried out in the presence of the Engineer.

LUMINARIES & EQUIPMENTS
FOR
INDOOR/OUTDOOR
ELECTRIFICATION WORKS

LUMINARIES & EQUIPMENTS FOR INDOOR/OUTDOOR ELECTRIFICATION WORKS

2.0 Scope

This specification covers supply and fixing of various electrical luminaries and other equipments for installing inside/outside the service buildings, staff quarters, platforms, passenger shelters, sheds, foot-over bridges (FOB) etc. The luminaries to be provided include compact fluorescent lamps (CFL), LED Lighting System, T-5 type energy efficient luminaries, metal halide luminaries etc. Electrical equipment includes fans, geysers, water coolers, Meter boards etc.

2.1 Ceiling Fan

- a) Ceiling fans shall be provided with suspension hook arrangement in the concrete slab/roof members at appropriate stage before casting of roof at locations indicated on the working drawings prepared by the contractor. Co-ordination has to be maintained with civil engineering contractor authorities for the dates of casting of roof in order to provide fan box with MS hook as approved.
- b) Ceiling fans shall be continuous duty type with double ball bearings, copper wound motor, complete with canopies, down rod, 3 blades, capacitor etc (as per BOQ item) conforming to IS 374/1979, suitable for operation on 230 Volt +/- 10 %, 50 Hz, A. C. supply and star rated. Fans shall be generally off-white.

2.2 Normally 1400 mm ceiling fans shall be provided in service buildings/ passenger shelters/waiting halls or rooms and 1200 mm sweep ceiling fans in residential buildings.

2.3 Stepped type electronic regulator (as per BOQ item) shall be provided for control of speed of fan at locations other than passenger shelters/ sheds as per Engineer's decision.

2.4 Exhaust fans

2.4.1 Exhaust fans shall be heavy-duty type, suitable sweep (as specified in BOQ.) , 900 rpm (as per BOQ item), noise free with fibre/steel body, star rated (if available in India), double ball bearing and conforming to IS 2312-1967. Exhaust fan shall be complete with copper wound motor, capacitor and louver/shutter, frame and mounting bracket and shall be suitable for operation on 230 volt +/- 10 %, 50 Hz, single phase AC supply system. The color of the exhaust fan shall be preferably matching with the wall or as decided by engineer.

2.4.2 A suitable hole shall be provided in the wall to suit the size of the frame, which shall be fixed by means of rag bolts embedded in the wall. The size of the rack bolt and spacing shall match with the holes on the frame of exhaust fans. The hole shall be neatly finished to the original shape of the wall.

2.5 Light fittings

Light fittings shall conform to IS-10322 and RDSO specification RDSO/PE/SPEC/PS/0100(REV.1)-2011. Light fittings shall be fixed on 3mm thick round phenolic laminated cover provided on conduit junction Board. Adequate length of copper conductor PVC insulated cable shall be provided for pendant fittings connections and earthing.

Specifications

2.6 Surface type T-5, Energy Efficient Luminary with Tube/s

2.6.1 The surface type luminary shall be epoxy white powder coated, CRCA sheet housing with reflector, pre-wired, indoor type, single/double 28 watts (as per BOQ item) suitable to operate on 230 volts, 50 c/s AC supply system. Luminary shall be complete with T-5 tube/s, electronic ballast/s, holder/s, etc. conforming to IS-15111.

2.6.2 The connections and earthing of the fitting shall be done with 1.5 sq. mm single core, PVC insulated, multi stranded, flexible copper conductor cable/s of 1.1 kV grade with FR properties as per IS: 694/1990.

2.6.3 The fitting shall be fixed to the wall by suitable approved arrangement. The fitting, if required to be suspended from the roof, shall be suspended with 2 numbers of 19.0 mm diameter 16 SWG MS conduit pipes (conforming to relevant latest IS) with ball and socket arrangements, double check nuts to hold the luminary in position, non-metallic bushing at cable entry to prevent damage to the flexible cable. The other end of the conduit tubes shall be fitted with the luminary.

2.6.4 Where false ceiling is being provided, the luminaries shall be recess type with mirror optic reflector and LED / CFL / T5 lamps with complete fittings of 1 feet/ 2feet/ 4 feet length as approved by engineer.

2.7 Street Light Type T-5 Energy Efficient Luminary with T-5 Fl. Tube Light/s

2.7.1 Weather proof, street light luminary shall be of aluminium housing with epoxy white powder coated CRCA sheet steel tray, clear acrylic cover, pre-wired, outdoor type with degree of protection not less than IP-54. It shall be provided with T-5 tubes and electronic ballast (as per BOQ item) suitable to operate on 230 volt 50 c/s, AC supply system. The luminary shall also be provided with holder/s, etc. as required and shall conform to the latest version of the relevant BIS specification.

2.7.2 The connections of the fitting shall be done with 1.5 sq. mm single core PVC insulated, multi stranded, flexible copper conductor cable/s of 1.1 kV grade, with FR properties as per IS: 694/1990.

2.7.3 The earthing to the fitting shall be done with 1.5 sq mm single core PVC copper conductor cable of 1.1 kV grade, flame retardant as per IS: 694/1990.

2.7.4 The luminary shall be mounted on the pipe bracket of pole/wall and connection to luminary shall be done from junction box of pole/over head line/ ceiling rose of point wiring etc., as the case may be.

2.7.5 In case, the luminary is to be provided on a wall, 450/600 mm long shaped G.I. pipe bracket of class "B" ISI marked of diameter matching with the inlet hole of the luminary shall be provided.

2.8 Street Light Metal Halide (MH) Luminary with Lamp

a) The metal halide luminary shall be single piece, deep drawn aluminium housing, POT optics with toughened heat resistant glass cover. The lamp compartment shall consist of electrochemically brightened and anodized aluminium reflector with center ribs for better uniformity and high optical efficiency. It shall consist of stainless steel toggles for fixing cover with housing. It shall have degree of protection not less than IP 54 for lamp and gear compartments and conform to the relevant BIS specifications.

Specifications-

- b) The metal halide luminary shall be suitable for operation on 230 volt AC, single phase, 50 Hz supply and complete with all accessories, toughened heat resistance glass including copper wound polyester ballast, power factor improvement capacitor, electronic ignitor, terminal block, lamp holder and metal halide lamp etc (as per BOQ item).

2.9 Low Bay Metal Halide (MH) Luminary with Lamp

The housing of the luminary shall be fabricated from CRCA MS sheet and finished in white stove enamel both from outside and inside with scientifically designed aluminium reflector. The control gear compartment shall house a removable gear tray prewired with a copper wound polyester ballast, power factor improvement capacitor and mains connector. The housing shall be fitted with a toughened heat resistant clear glass cover. It shall be suitable for operation on 230 volt AC, single phase, 50 Hz and shall be complete with metal halide lamp etc.

2.10 High Bay Metal Halide (MH) Luminary with Lamp

The housing of the luminary shall be of cast aluminium, LM6 with spherical control gear housing, finished in stove enamel gray and shall be provided with a spun aluminium reflector. The control gear housing shall be prewired with replaceable copper wound VPIT ballast, power factor improvement capacitor etc. mounted on a serviceable gear tray for ease of maintenance. For suspension, an eye bolt shall be provided on capsule cover with anti-loosening arrangement with a rubber bushing to damp vibrations. The luminary shall be suitable for operation on 230 volt AC, single phase, 50 Hz and shall be complete with Metal Halide lamp etc. Reflector shall be electrochemically brightened and anodized for longevity and high photometric performance.

2.11 LIGHTING on PLATFORMS:

- 2.11.1 All the luminaries having light spread more than 75 degree angle from vertically down outside COP shall be provided with additional 1.2 mm Stainless / 2 mm thick Anodised Aluminium reflector outside covering luminare with top surface painted black as per approved design.
- 2.11.2 The orientation of luminaries outside COP shall be perpendicular to track whereas the luminaries inside COP shall be parallel to track to avoid bright glare to loco pilots of approaching trains.

2.12 LED type luminaires:

The LED luminaires with lamp should generally be in line with the RDSO draft Specification No. RDSO/PE/SPEC/PS/0123 (Rev'0')-2009 enclosed separately. The luminaire should be suitably fitted based on the type of LED fitting such as lamp type, recess type, street light type as per details given for respective type fitting given above. The electrical connections etc also shall be as per respective fitting details mentioned above.

2.13 Solar Photovoltaic LED based Street light system:

Refer detail specifications in relevant chapter of this specification.

2.14 Geyser

- a) Geyser (storage type water heater) shall be suitable to operate on 230 V AC, single phase, 50 Hz supply. Geyser shall have copper/SS inner shell and fibre body outer shell. Geyser orientation shall be of vertical / Horizontal type as per site requirement and shall be of specified capacity (as per BOQ item) conforming to IS:2082, ISI marked of approved make and star rated. It should be provided with inlet and outlet PVC (with steel mesh) water connections. The geysers shall be provided with a suitable thermostat control on which the range of temperature is indicated. The thermostat control shall have an adjusting knob for setting the temperature of water to the desired level. The water temperature indicator shall be available on geyser body. At the set temperature, the thermostat shall cut off the power supply automatically. The geyser shall be provided with an LED/ LCD lamp to indicate that the power supply is ON/ OFF. The body of the geyser shall be provided with an earth connection to protect leakage of current.

Specifications-

- b) The geyser shall be mounted vertically /horizontally on the wall by providing rack bolts embedded in the wall. The water connection shall be provided to the inlet port from the nearest water pipe line in order to maintain water supply to the geyser continuously. The outlet of the geyser shall be connected to water pipe line for drawing hot water.
- c) The geyser shall be provided with suitable length of 3 core flexible cord and power plug of 16 A. The power supply shall be through MCB provided in the SDB to protect the geyser from overloads and short circuits.

2.15 Water Cooler

- a) Water cooler conforming to IS-1475 (Part-I)/2001 shall be complete with hermetically sealed type, suction cooled compressor (conforming to IS 10617/Part-I/2013), with overload protection and and star rated and all connected standard fittings, accessories, etc. It shall be suitable to operate on 230 volt AC, single phase, 50 Hz supply.
- b) Cooling capacity of water shall be 150 liter per hour or as specified in the relevant BOQ item. The tank shall be manufactured from stainless steel of minimum 0.8 mm thickness. The cabinet of the water cooler shall be made of stainless steel sheet not less than 1.0 mm thick. The front panel below the water outlet & drain pan shall be made of stainless steel of 0.8 mm thickness. The bottom pedestal shall be made of thickness not less than 2.65 mm. Power factor of water cooler shall not be less than 0.85 at the rated capacity of the cooler. The thermostat shall conform to IS 113338/1985 and the setting shall be adjustable through rotary switch from 10 to 25 degree C which shall be marked suitably. The thermostat control shall have an adjusting knob for setting the temperature of water to the desired level. At the set temperature, the thermostat shall cut off power supply automatically. The body of the water cooler shall be distinctly provided with an earth connection to protect from leakage of current.
- c) The water cooler shall be provided with a suitable length of 3 core flexible cord and a power plug of 16 A and earthing. The power supply shall be through MCB provided in the SDB to protect the water cooler from overloads and short circuits.
- d) The water cooler shall be placed on brick masonry platform. The water connection to be given shall be provided to the inlet port from the nearest water pipe line in order to maintain water supply to the water cooler continuously.
- e) Water cooler shall be provided with 5 KVA electronic auto voltage stabliser, suitable for operation on single phase 160 to 260 volts input supply,with provision for time delay start, voltmeter, instant start etc.

2.16 Meter Board

- a) The meter Board shall be suitable to operate on 230/415 volts Ac, single / three phase, 50 Hz supply system (as per BOQ item) and complete with all equipments including meter/s, MCB's etc. (as per BOQ item).
- b) The meter Board shall be out door type, weather proof, fabricated with 1.6 mm CRCA sheet & compartmentalized for accommodating each unit. It shall be flush mounting type with degree of protection not less than IP-54. Each compartment shall have its own door with insulated thumb screw. MCB compartment shall be suitable to accommodate each MCB directly mounted on DIN channel in its own chamber. Meter compartment shall be suitable to accommodate each energy meter in its own chamber and have provision of concealed lock for sealing the individual compartment. Suitable provision shall be made on the front of the door to record the meter reading by providing a glass window 6 mm thick. The provision to be made for padlock/ seal. Meter and meter box should be provided with anti temper single use seal with sr no. Provision of suitable glass/fiber window shall be made for meter reading with out opening the meter board.

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- c) The meter compartments shall be with vertical formation and cable alley shall be in the centre of the meter Board. Bus bar compartment shall be on the lower side of accommodate incoming cable for termination on incoming MCB. Outgoing MCB compartment/s for each quarter shall be on upper side (on top).
- d) Connections from bus bars to meters and from meter to MCB shall be housed in flexible MS/ PVC conduit through cable alley.
- e) The meter Board shall be provided with detachable gland plates on top & bottom with knock outs and earthing terminal etc. as required. Bottom plate shall be provided with cable gland for incoming cable. Suitable knock outs shall also be provided on upper portion and on back side of MCB compartment to connect outgoing wiring/conduit.
- f) The bus bar chamber, incoming and each outgoing MCB chamber shall have double doors. It shall be possible to operate the MCBs only after opening of the outer door.
- g) Neutral supply to be provided with link in the all distribution boards. No MCB or fuse should be provided in the neutral circuit.

Meter board shall be manufactured to meet the requirement/s as per site conditions i.e. for one/two/three/four unit blocks etc.

NOTE:

Prior to bulk manufacturing, one sample of each type of meter Board shall be got approved from the Engineer.

2.17: Air Circulators:

Air circulators shall be Heavy duty wall mounting, oscillating type fan 600 mm sweeps (24") complete with guard without regulator. Air-circulators should be supported on wall, pillars/poles with suitable mounting arrangements like brackets, clamps and hardware as approved by employer with all connected accessories viz. pipes, brackets, hook/clamps, bolts, nuts, washers, split pins, rubber pads etc. The fan shall be electrically connected to 3 terminal ceiling rose and from the ceiling rose to the Air Circulator by 3 core flexible copper cable run in suitable size PVC flexible hose.

2.18 Evaporative Air Coolers:

Air coolers should be evaporative type fibre body conforming to IS 3315:1994 (Reaffirmed 2004) Edition 3.2 incorporating Amendt.Nos 1&2, ISI Marked, to operate on 230V, 1Ø 50Hz AC supply, with all connected accessories viz. clamps, bolts, nuts, washers, rubber packing, honeycomb cooling pads and full function remote. It should have arrangement for water level indicator, low water alarm, air direction control in horizontal and vertical directions, indication for power ON with independent switches for exhaust fan and pump. The fan shall have three speed control viz low/medium and fast. Fan, filter pads, water pump etc. should conform to IS 3315:1994(Reaffirmed 2004) admtd 1&2., The water pump shall conform to IS: 11951:1987(Reaffirmed 2007) with admtd 1 to 4.

Depending on need, these can be room, window or tower type.

2.19 Window and Split Air Conditioners:

Window and split type AC shall conform to IS-1391 pt I/1992 (amtd 1,2) and IS-1391 pt-II/1992 (Amdt-1) respectively and star rated, remote control suitable to operate on 230V 1Ø 50Hz AC supply and includes all connected accessories viz. clamps, bolts, nuts, washers, angulars, iron stand/frame, rubber packing, brackets, copper pipe etc. The AC shall be fitted

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with adequate length of copper pipe which should be covered with insulation of suitable thickness. Suitable draw pipes should be provided for draining out condensate water in PVC pipes or G.I / Plastic / Fibre trays as per site conditions and as per instructions of employer.

The AC shall be installed with suitable rated voltage stabilizer. The windows shall be properly sealed with insulating material after installation of AC.

2.20 Cassette type Air Conditioner:

These ACs are designed to be installed on ceiling. They should operate on 230V, 1Ø or 440V, 3Ø 50Hz AC supply depending on its rating. AC should be star rated, remote controlled with suitable mounting arrangements on ceiling. The AC shall be fitted with adequate length of copper pipe which should be covered with insulation of suitable thickness. Suitable draw pipes should be provided for draining out condensate water in PVC pipes or G.I / Plastic / Fibre trays as per site conditions and as per instructions of employer.

The AC shall be installed with suitable rated voltage stabilizer to protect it from voltage fluctuations.

2.21 Package type Air Conditioner:

These ACs are designed to be installed inside room on the floor. The AC should be suitable to work on 440V, 3Ø 50Hz AC supply and shall be suitably rated. AC should be star rated, remote controlled. The AC shall be fitted with adequate length of copper pipe which should be covered with insulation of suitable thickness. Suitable draw pipes should be provided for draining out condensate water in PVC pipes or G.I / Plastic / Fibre trays as per site conditions and as per instructions of employer. The package units may be air/water cooled type as specified in BOQ.

2.22 AIR COOLING SYSTEMS

- (a) The air-cooling system is provided in the waiting halls, station buildings, service buildings, running rooms and rest houses etc.
- (b) The air cooling system in Waiting Room and Lounge at stations shall conform to RDSO Specification No. RDSO/2009/EM/SPEC/0001, (Rev.'0')Amdt-1.
- (c) The air cooling system in other places like service buildings, running room and rest house shall also generally conform to above RDSO Specification. Prior approval of RVNL should be taken for any changes in the RDSO specification suiting to local requirement and specific to the building.

2.23 ENERGY SAVERS:

The ENERGY SAVERS consists of Street light /High Mast controller complete with infrared sensors, contactors and MCB, terminal board etc. for 25 KW load. Energy Pack, should be a lighting control device for outdoor luminaries. It should optimize the switching ON/OFF cycle, automatically, using Nature Switch having space grade infra red sensor, as per seasonal variation of daylight. It should be suitable for automatic, group control of outdoor luminaries, eliminating the need for any manual operation. Auto switch 'ON' of light at dusk Auto switch 'OFF' at dawn or after selected duration. No clock setting or clock tuning should be required. It should have operating voltage range from 185 to 275 V. the enclosure shall be IP 54 protected.

2.23.1 Constructional Features

Metallic/plastic molded housing to accommodate power contactor, overload protection devices, terminal blocks, MCB for three phases etc. Front opening door shall be with clear transparent window for sensing variation of daylight by the nature switch.

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MS plates should be fixed to the housing for pole mounting. Front door shall be provided with unique lock and key arrangement for safety.

2.23.2 Technical Specifications

Sr No	Parameter	Details
1	Operating Voltage Range	185 - 275V AC, 50-60 Hz
2	Maximum Load	15KW (3 Phase)
3	Endurance at rated load	Minimum 5000 cycles
4	Operating Illuminance Levels	
	a) For Switching ON	<60 lux for >30 sec (As per Std Test Procedure)
	b) For Switching OFF	>10 lux for >30 sec (As per Std Test procedure)**
5	Max. Device Power Consumption	1 Watt at 230V AC
6	Insulation Resistance	Minimum 5 Mega Ohms
7	Operating Temperature Range	-10 C to +60 C
8	Operating Humidity Range	Up to 95% RH at 40 C
9	Over Voltage trip levels A) Auto High Voltage Sense and Trip B) Auto High Voltage Sense and Reset	Above 270V Below 255V AC AC
10	Under Voltage trip levels (a)Auto Low Voltage Sense and Trip (b)Auto Low Voltage Sense and Reset	Below 150V AC Above 165V AC
11	Selectable res. for switching off from dusk	4 Hrs to 8 Hrs with a resolution of half an hour
12	Override facility for continuous 'ON' and continuous 'OFF' for maintenance	Yes

**OVERHEAD WORKS
&
STEEL/GI TUBULAR POLES**

OVERHEAD WORKS & STEEL/GI TUBULAR POLES

3.0 SCOPE

The scope covers overhead power lines, including stays and poles, MS cross arms (brackets), ACSR conductors, insulators, earth wire (GI wire), guarding etc. All materials, fittings, etc, used in the installation shall conform to relevant BIS specifications, wherever they exist. In those cases, where there are no BIS specifications available, the items shall conform to specifications approved by the Engineer.

3.1 Route of overhead Line

- 3.1.1 As far as possible, the route of distribution line as well as the location of stay sets shall be decided taking into consideration the present and future requirements of other agencies and utility services affected by it.
- 3.1.2 The route of distribution line shall generally follow the route of roads.
- 3.1.3 Poles for distribution lines may be located alongside the road on the road berm, a little away from the road edge and drain.
- 3.1.4 Normally there shall be a pole located at road junction.
- 3.1.5 The route shall be so chosen as to avoid use of struts and continuous curve as far as possible.
- 3.1.6 Junction of main road and service lane shall be preferred for location of pole to facilitate street light of service lane as well.
- 3.1.7 Front of entrance to building shall be avoided for locating poles.
- 3.1.8 The clearances shall be in accordance with the Indian Electricity Rules, 1956.
- 3.1.9 Normally, no road crossing shall be done by overhead lines in Railway Area. Road crossing by cable is given in chapter 4.

3.2 Spacing of Poles

Spacing shall be in accordance with Indian Electricity Rules **1956**. Normally poles shall be erected at distances as indicated below *:-

i	For platform lighting	20 meters
ii	For street /Road lighting	30 to 35 meters
iii	For distribution line	35 meters
iv	For other location	as decided by the Engineer and approved by employer

* Note:-These are general guidelines. However spacing of poles should be chosen judiciously so as to ensure specified lux levels is achieved and lighting is uniform as per RB letter no-2004/Elect(G)/109/1 dt 18/5/2007 for station area and as per the requirement of the Division.

- 3.2.1 Where distribution line and street lighting fixtures are erected on the same support, the span shall not normally exceed 40 m.
- 3.2.2 Spans shall be chosen such that in a residential area adequate street lighting is provided as per IS and as approved by Railway/Employer.

3.3(a) Excavation and back filing for foundation

3.3.1 General

- 3.3.1.1 The excavation work shall be taken up after the locations of poles/stays are decided.
- 3.3.1.2 Every care shall be taken to see that the pits are not oversized while digging.
- 3.3.1.3 Suitable caution signals/boards, red lights and other protective measures, as decided by the Engineer, shall be provided near the pit to warn the pedestrians/vehicular traffic till such time the pit is back filled and surface leveled.
- 3.3.1.4 The size of the pit shall be made as per approved drawing of the foundation OR as specified in the standard tables given below. Wherever specific depth of foundation is not specified, the depth of the pit shall be such that **normally 1/6th of the length of pole is buried in the ground as specified in IS: 2713.**
- 3.3.1.5 The foundation pit shall be generally excavated in the direction of the lines.
- 3.3.1.6 All supports shall be correctly aligned before concreting or the back filling of the pit with excavated earth.
- 3.3.1.7 The pit for support/stay/strut shall be filled up or concreted only in the presence of the Engineer.

3.3 (b) Foundation

- (i) While erecting the poles on platforms and within station limit/area, the latest schedules of dimensions (SOD) as per IRSOD-2004 with latest ammendments shall be strictly followed.
- (ii) Foundation for erection of pole shall be constructed at the approved location. **Drawing of pole foundation shall be got approved from the Engineer prior to casting of the foundation and erection. However, the responsibility of adequate design & drawing shall rest with the contractor.**
- (iii) After excavation of pit of suitable size, cement concrete bed of approx. 50mm thickness, using cement concrete of M-10 grade shall be first provided at the bottom of the pit. Square foundation shall be made with cement concrete of M-10 grade of size given below:
 - (a) For hot dip Galvanized Pole- as specified in the table of standard dimensions of pole given below. The foundation shall be made up to **150mm above ground level**
 - (b) For Steel/GI Tubular poles- as per approved drawing. If approved drawing is not available, square foundation of such size where edge of foundation shall not be less than 150mm from edge of the pole. The depth of the foundation shall be 1/6th of the length of pole. Circular muffing of 150 mm thickness around the mast shall be made for 300 mm height above ground and sloped at the top.
- (iv) It shall be ensured that the GI/HDPE pipe/s for the cable/s entry is/are placed in position. Muffing shall be plastered, finished and also cured.
- (v) After foundation work, the pit shall be filled with excavated earth. During back filling of earth, ramming and watering shall be done.

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3.3 (c) ERECTION OF POLE:

- (i) The pole shall be erected in plumb and top of all the poles shall be at the same level to maintain uniformity.
- (ii) The Hot Dip Galvanized poles shall be erected and bolted on casted foundation with a set of four bolts.

3.4 Stays and Staying Arrangement

- 3.4.1** A stay shall consist of stay rod, anchor plate, bow tightener, thimbles, stay wire and strain insulator. The entire stay assembly shall be galvanized. The stay wire shall be hard drawn galvanized of 7/3.15 mm dia GI (as specified in the relevant BOQ item) conforming to IS 2141-2000. The anchor plate shall be of galvanized MS and not less than 30 cm x 30 cm x 8 mm thick and the size of stay rod shall be not less than 1.80 m (6 ft.) long and 19 mm dia.
- 3.4.2** The position of pit shall normally be such that the stay makes an angle within the range of 45 degree to 60 degree with the ground. If the site conditions are such that the angle as stated may not be possible, special stays such as foot stays, flying stays or struts may be used.
- 3.4.3** The depth and size of the pit shall be suitable for the foundation of stay.
- 3.4.4** A stay shall be provided at all angle or terminal poles.
- 3.4.5** The stay rod shall be set in position in the excavation pit.
- 3.4.6** Stay rod shall be embedded in cement concrete of M-10 grade vertically with square foundation 300 mm x 300 mm above the anchor plate lying over 15 cm thick cement concrete base. The stay rod shall be bent only at the unthreaded portion such that the stay wire and the bent portion of stay rod are in correct alignment. Care must be taken to avoid sharp bend or danger to galvanization.
- 3.4.7** After concrete has set, back filling shall be done with excavated earth and ramming in layers of 20 cm using water as required.
- 3.4.8** The surface of foundation above ground shall be finished and cured.
- 3.4.9** The stay clamp shall be located near about the centre of gravity of the load of the overhead conductors.
- 3.4.10** One end of stay wire shall be fixed to the bow tightener of the stay grip of the stay rod and the other end to the stay clamp fixed to the pole. By means of well spliced joint units, GI thimbles. A strain insulator shall be provided at a height of 3 meters above ground level. For high voltage lines, however, the stays may be directly anchored.
- 3.4.11** The stay wire shall also be connected and bonded properly to the continuous earth wire.
- 3.4.12** Normally one stay shall be provided at angle pole.
- 3.4.13** Double stays shall be provided at all dead ends and at any other place as required by the Engineer. In such cases, these shall, as far as possible, be set parallel to each other at a distance of approx. 600 mm or as approved by the Engineer.

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3.4.14 If the stay rod cannot be erected in accordance with the above clauses due to roadways or obstructions of buildings etc. bow stay, fly stay or strut whichever is suitable to the location, shall be used.

3.5 Cross Arm (Bracket)

3.5.1 Cross arm shall be made of MS angle iron of size not less than 50 mm x 50 mm x 6 mm thick (for LT overhead)/ MS channel iron of size not less than 75mm x 40 mm x 6.4 kgs per meter/100x50x6.4 mm for V-type cross arm (for modification of power line track crossings/HT lines) as specified in the BOQ item. The length of the cross arm shall be suitable for accommodating the required number of insulators with the spacing of the conductors being in accordance with the clearances required. A minimum distance of 8 cm for LV/ MV lines and 10 cm for HT lines shall be left from the centre of the extreme insulator pin hole to the end of the cross arm. The cross arm shall be complete with clamp made of MS flat of size not less than 50mm x 6mm with necessary bolts of 16 mm and nuts & washers. The cross arm shall have holes as required to accommodate insulator pin etc.

3.5.2 The length of cross arm for carrying guard wire shall be such that the guard wire shall always run not less than 30 cm beyond the outer most conductor of the configuration.

3.5.3 The cross arm and the pole clamp shall be treated with one coat of red oxide primer before erection and finished with two coats of approved paint after erection along with other hardware. Iron nuts and bolts shall be used for fixing of clamps.

3.5.4 The cross arms shall be clamped to the support properly, taking into consideration the orientation of the lines.

3.6 Insulators

3.6.1 The porcelain insulator shall conform to IS 1445-1977 suitable for overhead power lines below 1000 volts and IS 731-1971 for overhead power lines with a nominal voltage greater than 1000 volts. The insulator shall be complete with galvanized iron hardware etc. as required.

3.6.2 The insulators shall be of the following types as specified in the relevant BOQ item:

- a) Pin and shackle insulator for LT & MV lines.
- b) Pin and disc type for HV lines.

3.6.3 The minimum size of shackle insulator shall be 90 mm dia x 75 mm high and shall be complete with GI clamps, nuts & bolts etc.

3.6.4 The minimum size of pin insulator shall be 65 mm dia x 100 mm high and complete with GI pin, nuts and bolts etc.

3.6.5 Pin insulator/ shackle insulators/disc insulators shall be erected on the cross arms, as specified in the BOQ or as directed by the Engineer.

3.6.6 Shackle insulators shall be erected on cross arms at intermediate support in case of long lines, deviation from straight line, terminal positions, junction poles etc.

3.7 ACSR Conductors

3.7.1 All conductors shall conform to IS: 398/pt. II/1996. Conductors shall be strung with permissible sag and the profile shall be got approved from the Engineer.

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3.7.2 Jumpers

3.7.2.1 Sufficient length of conductor shall be kept at shackle termination and Parallel Groove (PG) clamp shall be used for making jumper connections.

3.7.2.2 Jumpers used shall be of the same material as the line conductor and be of adequate current carrying capacity.

3.7.3 Binding of Conductors

3.7.3.1 The binding of conductor to insulator shall be sufficiently firm and tight to ensure that no intermittent contacts develop.

3.7.3.2 The ends of binding wire shall be tightly twisted in a closely spaced spiral around the conductor to ensure good electrical contact and to strengthen conductors.

3.7.4 Binding Material

The insulators shall be bound with the line conductors with the help of aluminum binding wire or tape for ACSR/Aluminium conductors. The size of binding wire shall not be less than 2 mm dia and it shall be of galvanized iron conductors for galvanized conductors.

3.7.5 Guarding

3.7.5.1 General

At all road crossings, crossing of overhead lines, crossing with other lines (telephone lines etc) and between HV and LV/ MV lines carried on the same support, guard shall be provided.

3.7.5.2 The guard wires shall be bonded to earth wire.

3.7.6 Earth Wire

3.7.6.1 The size of the continuous earth wire shall not be less than 8 SWG GI.

3.7.6.2 All metal supports and all reinforced and pre-stressed cement concrete supports of overhead and metallic fittings attached there to shall be permanently and efficiently earthed.

3.7.6.3 The continuous earth wire shall be connected to an earth. There shall be not less than 3 connections with earth (earth electrode) per kilometer spaced equi-distantly, as far as possible.

3.7.6.4 Where continuous earth wire cannot be provided, every pole shall be earthed and all metal parts shall be bonded.

3.7.6.5 Junctions at terminal locations and all special structures shall be connected to earth.

3.7.6.6 The lead from earth electrode shall be suitably bonded to the continuous earth wire.

3.8 Danger Notice Plate and Anti- Climbing Devices

3.8.1 Danger Notice Plate

All supports carrying HV lives shall be fitted with danger notice plates conforming to IS: 2551-1982 at suitable height from ground indicating the voltage of lines.

3.8.2 Anti Climbing Devices.

For preventing unauthorized persons from ascending any of the supports carrying HV lines without the aid of a ladder, arrangement for special appliances shall be made as directed by the Engineer. Barbed wire conforming to IS 278-1978 having 4 point barbs spaced 75+/-12 mm apart shall be wrapped helically with a pitch of 75 mm around the limb of the support and tied firmly, commencing from a height of 3.5m up to a height of 5 meters or as directed by the Engineer.

3.9 Steel/GI Tubular Poles

3.9.1 Steel/GI tubular poles shall be swaged type with single/double bracket/s for platform/road/level crossing lighting etc. The constructional details shall be as per IS 2713/Pt 1 to 3. The length and designations shall be as per the relevant BOQ item. The diameter of bracket for mounting of luminary shall match with the inlet diameter of the luminary. In case of GI pole, the pole with base plate along with the bracket shall be hot dip Galvanized 80 to 90 microns thickness after the fabrication, as per I.S 2629. The pole shall be with single/double arm bracket of length 1.0mtr and with base plate complete. Dimensions of the pole shall be as per IS, reproduced in table given at 3.9.4. Foundation bolts and base plate sizes shall be:

Base plate of size 300 X 300 X 16 mm

Foundation Bolts: 700x20mm- 4 Nos. with double nut, washer & template.

3.9.2 General

- (a) The uncovered platform/road etc. shall be provided with swaged type steel/GI tubular pole/s and the luminary shall be weather proof, outdoor type as specified in the relevant BOQ item. Luminary shall be complete with control gear, lamps, accessories, fixing arrangements etc. The make and type of luminary & lamp shall be as specified in the BOQ item.
- (b) Single core FR, PVC insulated copper conductor cable (2 x 1.5 sq mm size for connections to each luminary and 1 x 1.5 sq.mm for earthing), multi stranded, conforming to IS 694 (latest), ISI marked shall be supplied and provided for connections from junction box/overhead/light point as the case may be. Each luminary and junction box shall be suitably earthed.
- (c) Separate wiring shall be provided for each luminary from junction box.

3.9.3 Steel Tubular pole with Canopy Type Single/Double Bracket/s (7 m for platform lighting and 9m for Level Crossing/ circulating area Lighting/Road lighting etc)

3.9.3.1 (a) Steel tubular pole shall be swaged type made from steel of ultimate tensile strength 410 MPa (42 kg/mm. sq) as per IS: 2713(Pt. I,II and III) 1980 amended up to date. The pole shall be as per IS designation 410 SP-3 for 7 meter and 410 SP-30 for 9 meter length. The portion to be inserted in the ground shall be about 1/6th of total length as per IS: 2713. Pole shall be supplied with canopy type brackets, base plate etc. A hole of 25 mm dia and a rubber bush at required height from the bottom of the pole shall be provided in the lower limb (above the muffing) for drawing/taking the PVC wire from junction box to inside the pole for the

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connection of luminary. Each pole shall be provided with 16 mm dia GI earth terminals of suitable length for earth connection.

- (b) MS square base plate of size 300 x 300 mm and 10 mm thick shall be welded at the bottom of the pole. The base plate shall have a hole of dia. Approx. 50 mm in the centre, for draining out of water.
- (c) Hot dip galvanised double arm Conicle poles with foundation bolts, base plate and bracket can also be used in above place. The pole with base plate along with the bracket shall be hot dip Galvanized 80 to 90 microns thickness after the fabrication, as per I.S 2629.

3.9.3.2 Bracket

Bracket for accommodating of luminaries shall be canopy type with single/double G.I. pipe class "B" 200 mm long (ISI marked), welded at an angle of 15 degree (horizontal plane). Bracket shall be removable type and adjustable in horizontal plane. Fixing arrangement with pole shall be with 4 nos. bolts & nuts of dia not less than 10 mm. Fixing Arrangements shall be suitable to bear the wind pressure. The dia. Of the bracket pipe shall match with the inlet hole of proposed luminary to be provided on the pole.

Note: The drawing of canopy with pipe bracket/s, fixing arrangement and sample shall be separately got approved from the Engineer.

3.9.3.3 Junction Box

- (a) Pole Mounting Type Ms Junction Box of size 300 x 200 x 125 mm deep, shall be double doors, outdoor type, weather proof with degree of protection no less than IP54 and conforming to IS:8623 & IS:13032, suitable for operation on single phase, 230 Volts Ac, 50 Hz supply system. The Junction Board shall be manufactured with CRCA sheet steel 1.6 mm thick, duly powder coated and complete with 4 nos. copper bus bars of rating 100 amp (for cable terminations/ loop-out system) for looping 4 core 3 nos. LT cables, one no. ~~16~~ 6 amp 10 kA, SP MCB, earthing studs etc. Outer door shall be hinged on top in vertical formation, with provision of holding arrangement horizontally. The front cover of the junction box shall be provided with a lock which can be opened with a special key.
- (b) The junction box shall be earthed as instructed by the Engineer. Junction box shall be mounted with pole with 2 nos. galvanized Ms flat 40 x 5 mm clamps and Nut and bolts not less than 10 mm dia.
- (c) Detachable gland plate shall be provided on the bottom of the junction box for entry of incoming and outgoing cables.
- (d) The junction box shall be fixed with the pole at a suitable height above ground level as per instruction of the Engineer.
- (e) Holes shall be suitably protected with rubber bushes to prevent entry of rain water inside the pole.

3.9.3.4 Earthing

Earth electrode shall be provided at approved location as per IE rules. Pole/s shall be earthed to an earth electrode with 4 mm dia. G. I. Wire/armouring of laid cable as required.

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3.9.3.5 Painting

Steel Poles shall be given 2 coats of red oxide primer and after erection painted as under:

3.9.3.5.1 The bottom portion of poles up to a height of 1.5 m above the finished muffs shall be painted with superior quality of black ISI marked paint.

3.9.3.5.2 The remaining portion of poles as well as the clamps shall be painted with 2 coats of superior quality of Aluminium Paint (ISI marked).

3.9.4 Table below indicates dimensions of swaged type steel tubular pole as per IS2713/Pt 1 to 3:

SN	Designation	Overall length (m)	Length of Sections (m)			Planting depth (m)	Outside diameter & thickness of sections (mm)		
			Bottom	Middle	Top		Bottom	Middle	Top
1	410-SP-3 (Wt.85 Kg)	7.00	4.00	1.50	1.50	1.25	114.3 x 5.4	88.9 x 4.85	76.10 x 3.25
2	410-SP-30 (Wt.133 Kg)	9.00	5.00	2.00	2.00	1.50	139.7 x 5.4	114.3 x 4.5	88.90 x 3.25

3.10 HOT DIP GALVANIZED OCTAGONAL POLE

3.10.1 GENERAL:

Octagonal Pole shall be manufactured in single section. Manufacturer shall be ISO: 9001/2000 & ISO: 14001 certified. **Drawing of pole and bracket/s shall be got approved from the RVNL.**

3.10.2 DESIGN:

The structure shall conform to IS: 875-part 3: 1987(latest version) relating to wind load on structures. Pole shall be designed for wind speed 169Km/hr.

The grade of steel used shall be as per BSEN-10025 grade S-355JO. or equivalent standards. Yield strength shall be minimum 355N/mm. sq and tensile strength 490-630N/mm.sq.

3.10.3 POLE SHAFT:

The pole shaft shall have octagonal cross section & shall be continuously tapered with single longitudinal welding. There shall not be any circumferential welding. The welding of pole shaft shall be done by submerged arc welding process. The base plate shall be fixed by welding to the pole shaft at two locations i.e. from inside and outside.

Bending of the sheet into polygonal shape shall be done through a CNC controlled. Laser aligned will be as per IS : 1367.

3.10.4 DOOR OPENING:

The octagonal pole shall have door of approximate 500mm length at the elevation of 500mm from the base plate. The door shall be weather proof to ensure safety to inside connections. The door shall be flush with locking facility. There shall also be suitable arrangements for earthing. The pole shall be additionally reinforced with a welded steel section so that the section at door is unaffected and undue buckling of the cut section is prevented.

The base compartment of the built in connector control box shall have provision to have 6 mm thick Bakelite sheet of suitable size to accommodate the required electrical accessories

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with compression gland for termination of incoming & out going supply cables. The connector box shall be provided with 2 Nos. 32 Amp heavy duty connectors (3way) for loop in and loop out of cables, 6 Amp C-Series DP MCB for individual fitting with din channel, earth stud and other required accessories.

3.10.5 GALVANIZING:

Internal and external surface of the octagonal pole shall be single dip, hot galvanized as per IS: 2629 / IS: 2633 / IS: 4759 standards with minimum coating thickness of 65 microns.

3.10.6 BASE PLATE:

Material of base plate shall be Fe 410 conforming to IS: 226/IS: 2062

3.10.7 Standard Dimensions of pole shall be as under:-

STANDARD DIMENSIONS OF Hot Dip Galvanized POLE

Height (Meter)	Top Dia (mm)	Bottom Dia (A/F) (mm)	Sheet Thicknes s (A/F) (mm)	Base Plate Dimensions (LxBxT)	FOUNDATION BOLT				Anchor Plate Thicknes s (mm)	Foundati on
					Bolt Size (no.xdi a) (mm)	Pitch Circle Dia. (mm)	Bolt Lengt h (mm)	Project ed Length (mm)		
5.00	70	130	3	200X200X12	4X16	200	600	80	3	500x500x1000 (depth)
7.00	70	130	3	220X220X12	4X20	205	700	100	3	500x500x1250 (depth)

3.10.8 BRACKETS:

Bracket for accommodating of luminaries shall be **canopy type** with Galvanized single / double arm 200mm long to suit the inlet dia of luminary as per requirement of BOQ, welded at an angle of 15 degree (horizontal plane). Bracket shall be removable type and adjustable in horizontal plane. Fixing arrangement with pole shall be with 4 nos. bolts & nuts of dia not less than 10 mm. Fixing arrangements shall be suitable to bear the wind pressure. The dia. of the bracket pipe shall match with the inlet hole of proposed luminary to be provided on the pole.

CABLE LAYING

CABLE LAYING

4.0 General

- (a) LT XLPE cables shall be of 1/2/3/3.5/4 core/s (as specified in the relevant BOQ Item). With aluminium conductor, armoured/unarmoured (as specified in the relevant BOQ item). PVC outer sheathed, conforming to IS: 7098 Pt.1(ISI Marked).
- (b) HT XLPE (earthed) cable shall be of 3 core, aluminum conductor, screened, armoured shielded and PVC sheathed, conforming to IS: 7098/Pt 2 (latest version)(ISI Marked).
- (c) IS 1255-1983 shall be followed in general for laying of cables.

4.1 The minimum safe bending radius for all types of cables shall be at least 15 times the diameter of the cable up to 11 kV grade and 20 times the diameter for cables above 11 KV grade.

4.2 Route

The route of the cable shall be decided before the work of cable laying is undertaken. The drawing indicating the route of the cable shall be prepared by the contractor and got approved from the Engineer. Cable runs/routes shall generally follow the fixed development such as roads, pathways, track etc.

4.3 Cables of different voltage grading shall be generally laid in different trenches. In case it is not possible to lay them in separate trenches, due to site constraint, the same trench may be used, but adequate separation within the trench shall be ensured. Specific approval shall be obtained from the Engineer.

4.4 There shall be adequate distance between HT & LT cables. In case it is unavoidable to separate HT < cables, the high tension Ht cable shall be laid below LT cable.

4.5 Wherever the power and telecom cables are to cross each other the same shall be laid at right angles to avoid interference. Wherever it is unavoidable to lay them in proximity, horizontal and vertical clearance between the two shall not normally be less than 600 mm

4.6 Laying of Cable

The cable shall be laid in ground, in pipes, under road/railway track, recess in wall/on surface/clamping with erected pole etc. depending upon the requirement and site conditions.

4.6.1 Laying in Ground

The cable shall be laid in ground, wherever it is passing through open country/along road/lanes etc.

4.6.2 Laying of Cables under road/ Railway track/Bridge etc.

- a) Wherever the cable is to cross road/railway track/ Bridge, Nalla etc. the cable shall be laid through suitable size of pipes as per instructions of the Engineer.
- b) GI/CI/RCC/HDPE pipe etc as specified in the BOQ item shall be used for the purpose. Pipes shall be continuous with couplers etc. and clear of any debris. Before drawing of cables, sharp edges at ends shall be smoothened to prevent injury to cable insulation and/or sheathing.

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- c) All the road crossings to be done by UG cables with spare cable provision. One spare duct with same size dia HDPE/GI/CI/RCC pipe also to be made along with crossing for future use.

4.6.3 Laying of Cables under Passage/Wall etc.

Passage/wall used for the laying of cables, shall be cut as required and repaired to match with the original finish. In case cable is being laid on the wall, cable should be well supported by J clamp/hooks.

4.6.4 Erection along Erected Pole

For erection of cable along the pole, the cable shall be held vertically with protective G. I. pipe. The diameter of the pipe shall be adequate for the cable size and length of pipe shall be 3 meters. Cable & G. I. pipe shall be clamped with the erected pole with 40 x 6 mm Ms flat clamps, not more than 2m apart. End of the pipe should be sealed with suitable putty to avoid entry of moisture and rodents.

4.6.5 Width of Trench

- (a) The width of cable trench shall be approx. 350 mm. Wherever one additional cable is laid in the same trench in horizontal formation, the width shall be increased such that inter axial distance between the cables shall be at least 200 mm. There shall be clearance of 150mm between the end cables and sides of the trench.
- (b) In addition to the protective cover over the cables laid in the underground trench, a brick on edge shall be laid in between the two juxtaposed cables along the direction of lay of the cables for providing separation.
- (c) Minimum width of cable trench for laying of LT/ HT cable at various locations shall be as indicated here under:

Width of Trench for LT Cables

Location	Width of cable trench	Width of cable trench for one additional cable	
		Width	Remarks
Under-ground	350mm approx.	550 mm approx.	Additional bricks on edge shall be laid in between the two juxtaposed cables.
On platform	350 mm approx.	550 mm approx.	
Under Railway Track/road	350 mm approx.	--	Through pipe
In wall/floor	To be recessed as per instructions of the Engineer	-	-
Other than above	As per instructions of the Engineer	As per instructions of the Engineer	As per instructions of the Engineer

Width of Trench for HT Cables.

Location	Width of cable trench	Remarks
		Additional cable not permitted in trench
Under-ground	350mm approx.	
On platform	350 mm approx.	
Under Railway Track/road	Through pipe.	With trenchless method/or digging method as decided by engineer
Other than above	As per instructions of the Engineer	As per instructions of the Engineer

Specifications-

4.6.6 Depth of Trench

Normally cables shall be laid in single tier formation and the minimum depth of top of laid cable/pipe at various locations from the ground surface/bottom of sleeper shall not be less than as indicated here under:

Depth of Trench for LT Cable

Location	Minimum Depth of top of laid cable/pipe from the ground surface/bottom of sleeper	Remarks
Under road	1000 mm from ground surface	Cables to be laid in single tier formation
Under-ground	1000 mm from ground surface	--do--
On platform	750 mm from platform level	--do--
Under Railway Track	Not less than 1200 mm from bottom of laid sleeper at locations where ground & track formation are in same level (with manual digging)	New Lines
	Not less than 3000 mm from ground level at locations where track formation level is above ground surface. (with trenchless method)	
	Not less than 1200 mm (with manual digging) and 3000 mm (with trenchless method) from bottom of laid sleeper at locations where ground & track formation are in same level.	Locations other than New Lines (as approved by Engineer)
	Not less than 1200 mm (with manual digging) and 3000 mm (with trenchless method from ground level at locations where track formation level is above ground surface.	
In wall/floor	To be recessed	---do--
Other than above	As per instructions of the Engineer	---do--

Depth of Trench for HT Cable (above than 440 V)

Location	Minimum Depth of top of laid cable/pipe from the ground surface/bottom of sleeper	Remarks
Under-ground	1100 mm from ground surface	Cables to be laid in single tier formation
Under road	1100 mm from ground surface	--do--
Under Railway Track	Not less than 1200 mm from bottom of laid sleeper at locations where ground & track formation are in same level (with manual digging)	New Lines
	Not less than 3000 mm from ground level at locations where track formation level is above ground surface. (with trenchless method)	
	Not less than 1200 mm (with manual digging) and 3000 mm (with trenchless method) from bottom of laid sleeper at locations where ground & track formation are in same level.	Locations other than New Lines (as approved by Employer)
	Not less than 1200 mm (with manual digging) and 3000 mm (with trenchless method from ground level at locations where track formation level is above ground surface.	
Other than above	As per instructions of the Engineer	--do--

Specifications-

4.6.7 Excavation of Trench

- a) To the extent possible, the trenches shall be excavated in straight lines. Wherever a change in line is required, due to site conditions, suitable curvature shall be provided. As far as possible, mechanical means shall be employed for undertaking excavation. Manual excavation method shall be used if adequate working area is not available. The soil shall be stacked on the side of the trench in such a manner that it does not fall back into the trench.
- b) Due care shall be taken to avoid damage to any existing cables, pipes or other such installations in the proposed route during execution. While excavating, if route markers, bricks, tiles, bare or protective covers are encountered, further excavation shall not be carried out without the approval of Engineer.
- c) In case existing property gets exposed during trenching, the same shall be temporarily supported or propped adequately as directed by the Engineer. The trenching in such case shall be limited to short lengths. Protective pipes shall be laid for passing the existing cables therein, and the trench shall be refilled, in case there is a danger of collapse, or the trench is endangering existing structure the same shall be sufficiently supported before proceeding with the excavation work. The bottom of the trench shall be level, free from brick bats and gravel etc.

4.6.8 Laying of Cable

Before and after the cable is laid, the individual cores shall be tested for continuity and insulation resistance and ends of cables shall be sealed suitably to avoid ingress of moisture. Surplus length of approx. 3.0 meters shall be left in the shape of a loop at each termination/joint etc. unless otherwise approved by Engineer.

4.6.9 Protection and Sand Cushioning

- a) The cable shall be protected to provide warning to future excavators and also for avoiding any accidental mechanical damage by pickaxe blows etc.
- b) The cable shall be protected with well-burnt 2nd class bricks. The quality of bricks shall be checked visually to the satisfaction of Engineer. The bricks on face shall be so provided that the width of the brick is in the direction of lay of cable. The bricks shall be provided throughout the length of the cable. Wherever more than one cable is laid in the same trench, the protection cover for cable shall protect at least 50 mm on the side of end cables.
- c) Protective covering, sand cushioning of LT/ HT Cable & making good surface at various locations shall be as indicated here under:

Protection and Sand Cushioning for LT Cable

Location	Protective Covering	Sand cushioning	Surface
Underground	2 nd class Bricks 225 x 100x60 mm (nominal size) width wise on top	Base cushion 80 mm under cable & 100 mm above laid cable	Making good damages and finishing as per original
On platform	--do--	--do--	--do--
Under Road	Through laid pipe	---do--	--do--
Under Rly Track	--do--	--do--	--do--
In wall/floor	Plastering	--do--	--do--
Other than above	As per instructions of the Engineer	As per instructions of the Engineer	As per instructions of the Engineer

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Protection and Sand Cushioning for HT Cable

Location	Protective Covering	Sand cushioning	Surface
Underground	2 nd class Bricks 225x 100x60 mm (nominal size) width wise on top & length wise on both sides	Base cushion 80 mm under cable & 100 mm above laid cable	Making good damages and finishing as per original
Under Road	Through RCC/HDPE/GI pipe	---do--	--do--
Under Rly Track	--do--	---do--	--do--
Other than above	As per instructions of the Engineer	As per instructions of the Engineer	--do--

4.6.10 Back Filling of Trench

- After excavation and laying of cables, the trench shall be back filled with the excavated earth, free from stone or other sharp-edge debris and shall be watered if necessary. A 100 mm crown of earth shall be left in the center, tapering towards the sides of the trench to allow for subsidence. The trench shall be inspected at regular intervals particularly during wet weather and any settlement of soil shall be made good by the contractor by further filling, if required.
- Due to cable laying work, if any disturbance to existing equipments in the area, like roads, pavements and garden takes place, the same shall be made good to original standard /finish after the cable laying work is over.

4.6.11 Cable Route Marker and Joint Indication Marker

4.6.11.1 Route markers shall be provided along straight runs of the cables at locations approved by the Engineer and generally at intervals not exceeding 50 meters. Wherever the cable route is changing or it is entering a fixed installation, route marker must be provided. Route markers shall be properly grouted in concrete or laid along with the cable securely to avoid theft as per directions of the engineer.

4.6.11.2 Joint indication marker shall also be provided at joints of cable.

4.6.11.3 The word cables, the level of voltage, size of cable, depth shall be inscribed on the route marker and joints.

4.6.12 Normally no joints are permitted. Under the circumstances, if joints can not be avoided, specific approval shall be obtained from the Engineer.

4.6.13 Cable Testing

All cable shall be tested jointly at site by the contractor with the engineer, before laying, to ensure that the insulation values of the cable are within limits. The insulation test on the cable shall be conducted with 500 V megger up to and including 1.1 kV grade and with 5000 V megger for cables of higher voltage. The cable cores shall be tested for continuity, insulation resistance etc. All cables shall be again tested after laying and before covering.

4.7 GI Cable trays:

GI Trays of size of suitable size as per BOQ may be used for neatly laying cables where it is not feasible to make them underground.

4.7.1 DESIGN REQUIREMENTS:

The hot dip galvanized steel perforated cable trays having rectangular channel section with appropriate depth shall be designed for a uniform load of at least 400N per 1000 mm ladder length tray. The trays shall be fabricated in a length of 2.5 m to 3m.

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The perforated cable trays shall be manufactured from good commercial, high grade strength sheet steel having minimum thickness of 2mm and shall be hot dip galvanized according to IS-2629 and IS-4759 suitable for indoor/out door use having moderate humidity and air pollution. The zinc coating thickness shall works out by applying a 610 gm of zinc per square meter surface with approximate thickness of 80 micron. The zinc coating shall be smooth, clean and uniform thickness and free from defects like ash and dross inclusions, bare patches, black spots, pimples, lumpiness, rust stains, blisters etc. The galvanizing shall not adversely affect the mechanical properties of the coated materials; the quality of the coating will be established by tests as per IS-2633. All manufacturing process including punching, cutting, bending and welding of perforated cable trays shall be completed and burrs shall be removed before the application of galvanization process is applied. Zinc conforming to at least Grade Zn 98 as specified in IS-209-1966 shall be used for the purpose of galvanizing.

The joints of two trays shall be butt construction and shall be made with the help of coupler plates by nuts and bolts. The coupler plate and nuts and bolts shall also be properly hot dip galvanized, where the bends of the trays are required at site the same shall be supplied by the bidder without any extra cost.

While adopting the modules at site if cutting of any length is required the same shall be cut at site and joined by nuts and bolts with the help of coupler plates.

The perforated cable trays shall be supported on the solid supporting arrangement made from channel of minimum size 100x50mm and angle iron of size 50x50x6mm thick angle approximately at a distance of 0.1 to 1.2m center to center either from ground/wall or ceiling. However, the supporting system shall be designed by bidder suitable to bear the uniform load of 400N per 1000mm ladder length for 300mm wide tray. The calculations in respect of this design shall be supplied by the successful bidder during design stage. M.S. angle iron brackets shall be further supported/anchored either to wall or ceiling/ground as per the site requirement. The brackets and supporting system shall be painted with two coats of zinc chromate primer followed by two coats of synthetic enamel paint of approved colour conforming to relevant Indian standard.

Bends, tees and cross connections shall also be designed properly as per site requirement.

The free vertical distance between parallel perforated trays/racks/ladder shall be at least 250mm and the perforated trays shall be 50mm away from the walls. The trays shall be fixed to the brackets with proper nuts and bolts system.

The perforated trays shall be free from sharp edges and burns etc. so that joint between two trays shall be without any clearance and matched in proper shape.

At the bends the curvature in all axis of perforated trays/racks shall be 20R or maximum size of cable. The supporting brackets/fixing bolts size shall be so calculated that the design load as specified in Design Requirements does not exceed. The perforated trays shall be installed in such a way that as far as possible the cables can be laid directly in place rather than be pulled through.

The current carrying cables as HT cables, LT cables; and DC cables shall be laid in different tray. The cables shall be fixed in the perforated trays by means of plastic ties or plastic coated wires etc.

The number of perforated tray shall be sufficient in order to accommodate all the power cables indicated in the specification for cables. However, the approximate quantity of different trays have been given under clause 2.21, which can be ensured by the bidder by visiting the site before filling the tender.

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4.7.2 EARTHING:

The perforated cable trays along with their supporting arrangements shall be properly earthed by the contractor with nut and bolts from the earthing risers generally in the vicinity of the tray routing. The earthing shall be as per latest I.E. rules and IS/IEC recommendation. The size of earth connection shall be such that its conductance should be more than the conductance of 14 sq. mm. Copper conductor.

4.7.3 FABRICATION OF TRAYS

All fabrication of trays shall be in accordance with IS: 800 and as per the approved drawings unless otherwise specified.

The trays should have min 2mm thickness with all connected accessories viz. vertical bends, reducers, tees, cross members etc. as required according to the site conditions including painting besides clamping firmly to support the tray with MS angular legs fabricated with 40x40x6mm angular of 1 1/2' length, fixed in CC bed blocks (including casting) for holding the angular, on the RCC / Cover Over Platforms including painting etc. The trays should be fixed with suitable Clamps/ GI angles/ GI flats and with necessary connected hardware to the Trusses or Columns. The running/ arranging of the cables in these trays should be done by duly clamping at regular intervals and undertaking numbering by sticker to the cables for easy identification.

HIGH MAST LIGHTING SYSTEM

HIGH MAST LIGHTING SYSTEM

5.0 Scope

The scope covers supply and erection of the high mast lighting system of specified height including foundation and other civil works. High Mast System includes all components and accessories, foundation bolts with nuts, washers, anchor plates, templates, Metal Halide luminaries (degree of protection IP65), etc. and provision of luminaries on the head frame of high mast with manual/electrical operation arrangements to lower/raise for maintenance purposes.

5.1 Codes and Standards

Design, manufacture and performance of the High Mast lighting system shall comply with all currently applicable statutory regulations and safety codes and standards in the locality where the equipment is being installed and generally in accordance with the following standards for the loading of the High Mast.

S. No.	CODE	TITLE
1	IS 875 (Part III) 1987	Code of practice for design loads for structures
2.	BSEN 10025/DIN 17100	Grades of MS plates
3.	BS5135/AWS	Welding
4.	BS ISO 1461	Galvanizing
5.	TR. No. 7 1996 of ILE UK	Specification for masts foundations
6.	BS 5135/AWS	Longitudinal weld

5.2 Structure

The High mast shall be of continuously tapered, polygonal cross section, presenting an standards to give assured performance and reliable service. The structure shall be suitable for wind loading as per IS 875 Part III of 1987.

5.3 General Constructional Features

The mast shaft shall be made of best steel grade in compliance with BS-EN 10025/DIN 17100 or equivalent, cut and folded to form a polygonal section and shall be telescopically jointed and welded. The welding shall be in accordance with BS 5135/AWS. The top section shall have a flange plate bolted to the head frame. The mast shall be fabricated and butt welded longitudinally to form a tapered section with telescopic friction slip joints. The procedural weld geometry and workmanship shall be exclusively tested on the completed welds. Mast shall be delivered at site in multiple sections. Each section shall be hot dip galvanized (single dip) inside and outside, having uniform coating thickness of 85/65 microns for bottom/top sections respectively. At site the sections shall be jointed together by slip- stressed-fit method. No site welding or bolted joint shall be done on the mast.

- 5.4** The mast shall have fully penetrated flange, which shall be free from any lamination or incursion. The base plate shall be of single flange and constructed with holes jig- drilled for anchor bolts passage for fixing the high mast on to the concrete foundation. The base flange will be provided with supplementary gussets between the bolt holes to ensure elimination of helical stress concentration of the environmental protection of the mast. The entire fabricated mast shall be hot dip galvanized, internally and externally, having a uniform thickness of 70 microns for the bottom section and 65 microns for the top section.

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5.5 The welded connection of the base plate to the mast section shall fully develop the strength of the section. Ultrasonic testing procedure shall be considered as the minimum permissible testing method. The wall thickness of each section shall be designed to withstand the loads to which the high mast will be subjected but in any case it shall not be less than 3 mm and 4 mm at top and bottom respectively. Shaft section shall not be jointed by circumferential weld or bolting.

5.6 All mast components shall be hot dip galvanized, as per British Standard 729/1971 (1986). Earthing and earthing terminal shall be provided within the access door area of each high mast. Galvanizing shall be inspected for
(a) Adhesion (b) Mass of zinc coating and (c) Uniformity.

5.7 Mast Design Criteria

- (a) The high mast and the lowering system with the required number of flood lights and lamp control gears etc. shall be capable of withstanding a sustained basic wind speed the area as per IS-875.
- b) The design shall be such that the high mast with accessories is capable of withstanding external forces exerted by wind pressure and shall have a minimum wind load factor of 1.25 and material factor of 1.15.

5.8 Foundations

The mast shall be erected on suitably designed foundation as per high mast manufacturer's design with following typical details:

Type of foundation	as specified by high mast manufacturer.
Size of foundation	As per high mast manufacturer's design
Load bearing capacity of soil	As per soil report of the site at 2 meters depth.
Considered wind pressure (Kg per meter sq)	As per IS-875-1987 or latest
Considered wind speed (KMPH	As per IS-875-1987 or latest

The rate quoted for the high mast shall include the cost of testing of soil bearing capacity and laying of foundation. The contractor shall get the foundation designed accordingly from OEM/other reputed firm as decided by the RVNL.

5.9 Lantern carriage

5.9.1 The mobile luminaries' carriage ring shall be of steel tube construction in two segments. The unit shall be joined by bolted flanges with stainless steel bolts and nyloc type nuts to enable easy installation or removal from the erected mast. All mobile components of the system shall be located on the mobile part in order to allow visual inspection during each operation. Proper luminary carriage ring support arms shall be provided for supporting the luminaries ring when the latter is lowered for maintenance.

5.9.2 The mobile luminary carriage shall be designed to carry the 9/12 number of luminaries and control gears as specified in the relevant BOQ item and shall be evenly balanced. Nylon paddle Guide Ring shall be incorporated as a buffer arrangement between mobile luminaries carriage and mast shaft. This is to prevent damage to mast Surface during lowering and raising operation of mobile luminaries' carriage.

5.10 Winch

- (a) For installation and maintenance of luminaries and lamps, it is necessary to lower and raise the luminary carriage by means of suitable winching arrangement at the base of the mast. The speed of raising and lowering of lantern carriage ring shall be at least 3.0 meters per minute.

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- (b) The winch must be of robust design and fully sustaining type without the need of brake shoe, springs or clutches. Winching system with the exception of driving unit shall remain permanently inside the mast with pendant switch control. Each mast shall be provided with a double drum winch suitable for raising and lowering the luminaries ring, with gear ratio 53:1 self lubricating type. It can be removed from the mast for maintenance if the need arises in future. The reduction gear of the winch shall be of endless work gear opening in an oil bath and gear shall be made up of High Carbon steel/ phosphor bronze. The minimum safe working limit of the winch shall not be less than 750 kg at 200 RPM. The operating speed of the winch shall be 180 RPM mechanical Or 1400 RPM electrical motor.
- (c) The capacity and the operating speed of the winch shall be clearly marked on each winch on an indelible label together with the recommended specification of the lubricant. A minimum of 6 turns of wire rope shall be on the grooved drum when the mobile luminaries ring is fully lowered to rest on the luminaries supporting arms.
- (d) The winch shall be entirely sustaining under all normal circumstances and it is not independent on the brake or restraining device that uncontrolled or dangerous runaway speeds will occur in the event of total failure of this device. Slip test on winch is to be carried out by the manufacturer. All manufacturer's test certificates and reports shall be submitted by the contractor to the Engineer.

5.11 Head frame

The head frame shall include a pulley system to accommodate three stainless steel hoisting wire ropes at any one time and separate pulleys for the passage of electrical cables. The pulleys shall be of non corrosive material and shall run on self-lubricating bearings with stainless steel axles. The complete head frame chassis shall be hot dip galvanized. The pulley assembly shall be fully protected by a galvanized (both internally and externally) canopy. Close fitting guides and sleeves shall be provided to ensure that the ropes and cables do not get dislodged from their respective positions in the grooves. The head frame shall be provided with guides & stops with PVC buffer for docking the lantern carriage.

Note: Pulleys made of synthetic material such as plastic or PVC shall not be accepted.

5.12 Hoisting and Suspension Wire Ropes

5.12.1 The high mast shall be fitted with 6 mm dia flexible standard stainless steel hoisting wire ropes of 7/19 construction, with a minimum breaking strength of 2350 kg. The combined lifting capacity of the hoisting wire rope shall have a factor of safety of 7 times the Safe Working Load (SWL) of the winch and shall be entirely suitable for the design application. Center material shall be conforming to DIN 3060.

5.12.2 A transition plate shall be incorporated to:

- a) Connect the three suspension wire ropes to the two stainless winching wire ropes.
- b) Allow fixing of electrical wire cables.
- c) Ensure even distribution of loads between the two stainless steel winching wires by means of an equalizer (necessary thimbles and terminals shall be provided for the steel wire ropes).
- d) Ensure even distribution of loads between the two stainless steel winching wires by means of an equalizer (necessary thimbles and terminals shall be provided for the steel wire ropes).

5.13 Electrical Cable

- a) Electrical cable shall be copper, anti-twisting, round and multi cored. The cable shall be suitable to carry the current of the fittings provided. A suitable terminal Board shall be provided at the base compartment of the high mast for terminating the incoming cable. The electrical connections from the bottom to the top shall be made by a special trailing cable. The cable shall be EPR FR PVC insulated and PCP sheathed to get flexibility and endurance. Size of the copper cable shall not be less than 2.5 sq. mm. At the top there shall be weather proof junction Board to terminate the trailing cable. Connections from the top junction Board to the individual luminaries shall be made by using 3 core 1.5 sq. mm flexible PVC cables of

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reputed make. The system shall have in-built facilities for testing the luminaries while in lowered position.

- b) Suitable provision shall be made at the base compartment of the mast to facilitate the operation of internally mounted, electrically operated power tool for raising and lowering of the lantern carriage assembly. The trailing cables of the lantern carriage rings shall be terminated by means of specially designed, metal clad, multi-pin plug and socket provided in the base compartment to enable easy disconnection when required.

5.14 Winch Driving Power Tool

- a) A suitable high powered, electrically driven internally mounted power tool, with normal over ride, together with an operating stand, shall be provided for the raising and lowering of the lantern carriage for maintenance purposes. The power tool shall be of single speed to suit the requirements provided with a motor of required rating, so that vibrations associated with high speed operation are avoided.
- b) The power tool shall be suitable for lifting of the designed load installed on the lantern carriage and shall also be designed such that it will be not only self supporting, but also align perfectly with respect to the winch spindle during the operation. The power tool shall be supplied complete with push button type remote control switch and six meters of additional power cable, so that the operation can be carried out from a safe distance. In case of failure of electrical supply, provision for manual operation shall exist and shall incorporate a torque limiting device. The power tool shall be reversible. Necessary protection against over load, short circuit, earth fault and single phasing etc. shall be provided.

5.15 Control Panel

5.15.1 Control of raising and lowering operations shall be carried out from the mast base by means of a portable control panel. The control panel shall be suitable for 3 phases, 415 volts A. C. supply system and shall consists of:

- a) A power supply and control cable of not less than 5.0 meter length.
- b) A pendant type control panel equipped with push button for raising and lowering of the mobile part. The push buttons shall operate on the " dead man" principle i.e. action shall cease as the button is released.
- c) Steel sheet iron control panel of suitable size and built in type, shall be provided and fixed in the high mast at a suitable height.

5.15.2 The panel board shall consist the following:

- 1 x 63 A TPN MCB switch for incoming.
- 1 no. of multiple plug socket 16 amps.
- 3x32 A, SPN MCB for outgoing.
- Automatic timer switch with contactor of suitable rating for control of 50 % & 100% lighting OR as approved.

5.16 Torque Limiter

- | | |
|-------------------------------|----------------|
| a. Model | - Electric TD2 |
| b. Lifting Capacity | - SWL 750 kg. |
| c. Adjustable/ Non-adjustable | - Adjustable. |

5.17 Fencing Panel

High mast shall be provided with suitable fencing panel of size 2mX2mX1.5m duly painted for protection of erected high mast as specified in BOQ and as directed by Engineer.

5.18 Earthing:

Two pipe electrode earthing shall be provided for each High mast system.

**MODIFICATION
OF
POWER LINE CROSSINGS
ON
RAILWAY TRACKS**

MODIFICATION OF POWER LINE CROSSINGS ON RAILWAY TRACKS

7.0 General

- a) The scope covers modification of existing power line crossings of Railway track as per the regulations applicable to electrical overhead crossings and/or underground cables crossing the railway tracks operated by the Indian Railways, Railway companies and port commissioner's railways, including assisted and private sidings on which rolling stock of Indian Railway may work, unless any special section or railway tracks are exempted from these regulations by specific written orders of the Electrical Inspector.
- b) Detailed drawing of the proposed modification work of crossing shall be prepared and approval obtained from the Railway and concerned State Electricity Authority.
- c) Revised agreement as per the regulations applicable to electrical overhead crossings and/or underground cables crossing the railway tracks shall be got signed from the concerned State Electricity Authority.

7.1 Compliance to Rules:

- a) All the crossings shall be modified to comply with the latest Regulations for Electrical Crossings of Railway Track 1987 with up to date amendments issued from time to time thereto.
- b) Except where otherwise provided for in the regulations, the contents of relevant sections of the Indian Electricity Act 2003, Indian Railway Act 1890 and the rules made under these and as amended from time to time thereto and the relevant provisions of Indian Railway's Schedule of Dimensions (IRSOD) for Broad/ Meter / Narrow Gauges together with the latest amendments shall apply to the modified crossings.

7.2 Standard Specifications

All materials used in the construction of the crossing shall comply with the relevant latest BIS Specifications.

7.3 Method of crossing – Overhead Line Underground Cables:

All low, medium and high voltages up to and including 11 kV crossings shall normally be by means of underground cables. While for voltages higher than 11 kV, crossing may be through overhead lines or underground cables. The use of underground cable to the extent possible would be advantageous particularly up to and including 33 kV systems.

7.4 Overhead Power Line Crossing

7.4.1 Angle of Crossing

An overhead line crossing shall normally be at right angles to the railway track. In special cases a deviation of up to 30 degree may be permitted. Deviations larger than 30 degree shall have to be specifically authorized by the Electrical Inspector of the Railway.

7.4.2 Structures

- a) Steel poles/masts, fabricated steel structures or reinforced/pre-stressed cement concrete poles either of the self supporting type or guyed type conforming in all respects to the Indian electricity Rules, 1956 (as amended till date) and complying with the latest editions of Codes of Practice, IS: 800-1984 for "Code of Practice for use of Structural steel in General Building Construction, IS: 1678 of 1998: Specification for 'Pre-stressed Concrete Poles for Overhead Power, Traction and Telecommunication Lines', shall be used on either side of the track to

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support the crossing span. These structures shall be of the terminal type. For arriving at the crippling load, the wind loads as detailed in the latest edition of IS: 802 (Part I) – 1995 for "Loads and Permissible Stresses" shall be adopted. The steel structures shall normally be galvanized in accordance with IS:2629-1985 for "Recommended practice for hot-dip galvanizing of iron and steel"

- b) The minimum distance of the structures (supporting the crossing span) from the center of the nearest railway track, including new proposed and considering for future, shall be as per para-11(iv) of IRSOD-2004 and given at para 7.5.2(C)
- c) The crossing span shall be restricted to 300 m or to 80% of the normal span for which the structures are designed, whichever is less.
- d) **Wind pressure**
The maximum wind pressure for design of the structure shall be as prescribed in IS: 802/Pt.I/1995 for loads and permissible stresses.

7.4.3 Temperature

The maximum and minimum temperatures for design of the conductors and other wires shall be as prescribed in the latest edition of IS: 802 (pt. 1, Clause-10) with necessary correction for maximum temperature.

7.4.4 Factor of Safety

The factor of safety of all structures, conductors, guards, guys and ground wires used in the crossing shall be as stipulated in the Indian Electricity Rules, 1956 as amended and the relevant code of practice. Ground wires used in the crossing shall be as stipulated in the Indian Electricity Rules, 1956 (as amended till date) and the relevant Codes of Practice.

7.5 Clearance between the Overhead Line and Railway Track

An overhead line crossing over electrified railway track shall be located at the middle of overhead equipment span supported by two adjacent traction masts/structures. The distance between any of the crossing conductors and the nearest traction mast or structure under the most adverse conditions shall not be less than 6 m.

Note: If, in unavoidable circumstances, the crossing span cannot be so located, the minimum clearance between any of the crossing conductors of the crossing and the nearest traction mast or structure shall not be less than that specified for buildings in Rule 80 of the Indian Electricity Rules, 1956 (as amended till date). Specific permission in this regard shall be obtained from the Employer, prior to execution of work.

- 7.5.1** No overhead line crossing shall be located over a booster transformer, traction switching station, traction substation or a track cabin in an electrified area.

7.5.2 Clearance for Power Line Crossings including Telephone Line Crossings of Railway Tracks

Clearances shall be kept as per IRSOD with latest amendment issued from time to time.

7.5.3 Clearance between Power Line & Communication Line:

The minimum clearance to be maintained between a power line and a communication line shall be as prescribed in the "Code of Practice for the Protection of Telecommunication Lines at Crossings with Overhead Power Lines other than Electrical Traction Circuits" (latest edition) issued by Central Electricity Authority (CEA), Telecommunication Directorate, Power and Telecommunication Co-ordination Committee (PTCC Unit), Govt. of India.

7.6 Insulators

A double set of strain insulator strings shall be used in crossing span in conjunction with a yoke plate where necessary. Each string of such strain insulators shall have one insulator more than the number used in a normal span of the overhead line. The factor of safety of each string of insulators under the worst conditions shall be not less than 2.

7.7 Guarding

- a) All overhead power line crossings upto and including 33 kV shall be provided with guarding under the power line. Guarding need not be provided for overhead power line crossings of voltages above 33 kV if the transmission/ distribution line is protected by circuit breakers of modern design with total tripping times of 0.20 seconds for voltage below 220 kV and 0.10 seconds for voltages of 220 kV and above, from the time of occurrence of the fault to its clearance. Wherever, guarding is adopted for the crossing span, cradle guards shall be provided.
- b) Minimum height above rail level to the lowest level of cradle guard or guard wires under condition of maximum sag shall not be less than the values specified in the clause 7.3.1.8 above.
- c) The minimum height between any guard wire and a live crossing conductor under the most adverse conditions shall not be less than 1.5 meters.

7.8 Anti-climbing Devices and Warning Notices:

Where the voltage exceeds 650 V, the supporting structures (of the overhead line crossing) on railway land shall be provided with anti-climbing devices. Besides, suitable caution/warning notices shall be erected on all such structures, in the regional language and in English, as may be prescribed for the purpose. The anti-climbing devices and the caution/warning notices shall be got approved from the Railway by the Engineer.

7.9 Earthing

- (a) Each structure on either side of the crossing span supporting the transmission line conductors shall be earthed effectively by two separate and distinct earths and connections. At least one separate earth electrode shall be provided for each earth connection. Earth resistance of the independent electrode shall be less than 5 ohms.
- (b) All guard and stay wires shall be properly clamped to the structures connected to earth so as to maintain proper electrical continuity to earth.
- (c) Where struts are provided, they shall also be effectively connected to earth separately as well as to the main structure earths.
- (d) Where the earth resistance of the independent tower/structure is higher, the owner shall take necessary steps to improve the earth resistance either by providing multiple earth electrodes or by suitably treating the soil surrounding the earth electrode or by resorting to counterpoise earthing. The method of earthing the transmission/distribution line structures etc., for the crossing span shall be got approved from the Railway by the Engineer.
- (e) The cross section of the earth conductor/ connections for the earthing system shall be adequate for the application. They shall not be liable to be damaged or overheated or melted while carrying the short circuit current.

7.10 Cable Crossing

7.10.1 General

As far as possible, cable crossings shall make use of any existing culverts, sub-ways etc. In case of electrified track(s), the crossing shall be provided at locations at least 5 meters away from any traction substation or switching station or mast or structure erected or proposed to be erected by the railway for the purpose of supply and distribution of power to the traction overhead equipment. The exact locations of such traction substation or switching station or mast or structure in any particular area shall be obtained by the Engineer/Employer from the Railway.

7.10.2 Cathodic Protection

Cathodic protection of the cables shall normally not be adopted, unless specifically required by the Railway or any other organization having assets nearby to which interference is likely to be caused by currents flowing through the crossing.

7.10.3 Method of Laying cable under Railway Track(s)

- a) Cable shall be laid through cast iron or spun concrete pipes/ HDPE pipe etc. as per BOQ item, of suitable diameter and strength. Long lengths of pipe shall be laid with a gradient to facilitate drainage of water. The pipe shall be laid up to the Railway boundary at both ends or up to the point as approved by the Railway/ Engineer. The laying of the cable shall be in accordance with the latest edition of IS: 1255-1983" Code of practice for Installation and Maintenance of Power Cables up to and including 33 kV"
- b) The armouring and sheathing of the underground cable laid across or near any electrified railway track shall be earthed by independent earths at the two sealing ends of the cable.
- c) No further earthing of the armouring and sheathing of the cable shall be done within 500m of the electrified track. The scheme and method of earthing shall specifically be approved by the Railway.

7.10.4 Termination of cable with structure

- a) Where the ends of a cable of an underground crossing are terminated on structures for connection to an overhead line, such structures shall comply with the Regulations in so far as they are applicable to overhead line crossings in respect of structures.
- b) The pole on which the cable is terminated shall be provided with strut/stays to take the load of overhead mains. The crossing cable shall be inserted in a GI pipe of suitable diameter. The GI pipe shall be supported to the termination pole with proper clamps, bolts and nuts. The clamps shall be provided to support the GI pipe at an interval of not more than 2.0 meter. The supporting GI pipe shall be provided along the structure up to a height of 2 m above the ground level. The open ends of the GI pipe shall be sealed to prevent extraneous matter causing damage to the cable. The exposed portion of the cable above the GI pipe shall be clamped to the pole at an interval of not more than 2 m.
- c) The cable end shall be provided with termination kits on either ends of the crossing. Suitable jumper connections shall be provided between the overhead mains and the cable end terminations.

7.10.5 Marking of Crossings

Each cable crossing shall be indicated by at least two cable route markers, one at each end of the crossing within the railway boundaries. The cable route marker shall be fixed at both ends of the underground crossings. The following information shall be clearly displayed on the markers.

Electrical Cable	-- kV
Number of Cables	-- Nos.

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Danger Notice Plate	-- In English, Hindi and the Vernacular language of the District
Depth of Cable	-- mm below track level.
Depth of Cable	-- mm below ground level between the toe of bank and railway fencing

7.11 Coordination with SEBs and standards:

The contractor shall coordinate with State Electricity Board authorities for smooth working and shall arrange required approvals if any. Contractor shall also follow standards and specifications, approved list of concerned SEB for proper energisation.

**MEDIUM VOLTAGE
FEEDER PILLAR
&
SWITCH BOARD
(OTHER THAN SUB- STATION WORK)**

MEDIUM VOLTAGE FEEDER PILLAR & SWITCH BOARD (OTHER THAN SUB- STATION WORK)

9.1 Feeder Pillar

9.1.1 General

- a) Medium voltage feeder pillar shall be cubicle type, floor mounted, free standing type, dust and vermin proof, totally enclosed, of uniform height and for outdoor utilization and suitable for 3-phase, 4 wire, 415 V, 500 Hz AC, solidly earthed neutral, electric supply system complete with 4 nos. pedestals, accessories, inter-connections, bus bar chamber with copper/aluminium bus bar (as specified in the relevant BOQ item), ON/OFF indication, CTs, switchgears (as specified in the relevant BOQ item), timer etc. in position duly wired up with copper conductor cable with colour coding, etc. and other accessories though not mentioned here but necessary to complete the equipment in all respects.
- b) The manufacturer shall have ISO: 9001 certification with testing arrangement and powder coating facilities in the works.

9.1.2 Digital Time switch (Timer) of suitable rating and contactors (as specified in the relevant BOQ item) shall be provided in the feeder pillar to operate pump/street lights etc. and this shall be controlled with independent switchgear/s.

9.1.3 Construction

9.1.3.1 The feeder Pillar shall be fabricated from 2.0 mm thick CRCA sheet steel. The shroud & partitions shall be of minimum 1.6 mm thickness and shall be fabricated from CRCA sheet steel. The feeder pillar shall be powder coated in approved shade by seven tank process. The degree of protection shall not be less than IP 54 as per IS: 13942/Pt.1.

9.1.3.2 Pedestals and base frame shall be of MS angle of 75mm x 75mm x 8 mm (nominal size). The Feeder Pillar shall have the provision of flush doors on front and back in two equal parts with hinges and concealed lock openable with special key.

9.1.3.3 The following minimum clearances shall be maintained:

- | | | |
|------|--------------------------|---------|
| i) | Between Phases | - 32 mm |
| ii) | Between Phases & Neutral | - 26 mm |
| iii) | Between Phases & Earth | - 26 mm |
| iv) | Between Neutral & Earth | - 26 mm |

9.1.3.4 All functional units shall be arranged in multi-tier formation & each such unit shall be fully compartmentalized. Vertical cable alley shall be provided. Each compartment shall have its own individual door with concealed hinges & the door shall have interlocking so that it can only be opened after switching off the module.

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9.1.4 Bus Bars

9.1.4.1 The bus bars shall be made of high conductivity aluminium/copper (as specified in BOQ) conforming to the requirement of IS 5082/1998 for aluminium and IS: 1897/1983 for copper. The bus bars shall have uniform cross section (basis of bus bar cross section will be maximum of 1000 A/sq. inch for copper and 630A/sq. inch for aluminium). The cross-section of the neutral bus bar shall be same as that of the phase bus bar for bus bars of capacity up to 200 Amp. For higher capacities, the neutral bus bar shall not be less than half (50 %) the cross-section of that of the phase bus bars.

9.1.4.2 Bus bars shall be supported on suitable non-hygroscopic, non- combustible, material such as DMC/SMC.

9.1.4.3 Bus bars shall be insulated with PVC tapes/ tubes (heat shrink type) with colour coding (Red/Yellow/Blue/ Black) to withstand the test voltage of 2.5 kV for one minute.

9.1.5 Molded Case Circuit Breakers (MCCB)

9.1.5.1 MCCB shall be TPN of rating as specified in the relevant BOQ item and shall conform to IS-13947/Pt-2/1993 ($I_{cs} = 100\%I_{cu}$ or as specified in relevant BOQ item) with thermal release setting 70/80%-100% or fixed type (as specified in the relevant BOQ item) with breaking capacity of not less than 25 kA for load currents up to 200 amp. & 35 kA for load currents above 200 amp rating. MCCBs shall be suitable for three phase, 415 Volt, AC supply.

9.1.5.2 Tripping unit shall be of thermal – magnetic type provided in each pole and connected by a common trip bar such that tripping of any one pole operates all the poles and they open simultaneously.

9.1.6 Fuse Switch/ Switch Fuse Unit

Fuse switch/switch fuse unit shall be heavy duty, TPN double break of rating (as specified in the relevant BOQ item), utilization category AC 23, conforming to IS: 13947/Pt. III/1993 with 3 HRC fuses conforming to relevant IS and one neutral link

9.1.7 Current Transformers

9.1.7.1 Current transformers shall be in conformity with IS: 2705 (Part I, II & III). Current transformers shall be rated for 1 kV. Current Transformer shall have rated primary current, rated burden and class of accuracy. The rated secondary current shall be 5 A. The acceptable minimum class of various applications shall be as given below:

Measuring : Class 1
Protection : Class 5 P10.

9.1.7.2 The VA rating of the CTs shall be not less than 5 VA.

9.1.8 Cable Termination

9.1.8.1 Cable entries shall be provided with metal glands to prevent damage to the insulation of the cable and terminals shall be provided to suite the number, type and size of aluminium conductor power cables.

9.1.8.2 Provision shall be made for bottom entry of cables through removable gland plates.

9.1.9 Tests at Manufacturers' Works

9.1.9.1 All routine tests shall be carried out in the presence of the inspecting Engineer.

9.1.9.2 Original test certificates of all equipments/ instrument shall be submitted by the contractor along with the supply of panel board after the Inspecting Officer passes the feeder pillar.

Specifications-

9.1.10 Testing and Commissioning at Site

Following tests shall be carried out prior to Commissioning:

- a) Insulation test
- b) Trip Tests & Protection Tests

9.1.11 Erection

Brick masonry platform of suitable size with 450 mm height (approximate) shall be constructed in the specified location and cement finish. Feeder pillar shall be erected on this platform by grouting of pedestals as approved by the Engineer.

9.2 SWITCH BOARD

9.2.1 General

- a) Medium voltage switch board shall be cubicle type, floor mounted, free standing type, dust and vermin proof, totally enclosed, of uniform height and for indoor utilization and suitable for 3- phase, 4 wire, 415 V, 50 Hz Ac, solidly earthed neutral, electric supply system complete with accessories, inter connections, bus bar chamber with copper/ aluminium bus bar (as specified in the relevant BOQ item), ON/OFF indication, CTs, switchgears (as specified in the relevant BOQ item) timer etc. in position duly wired up with copper conductor cable with colour coding and other accessories though not mentioned here but necessary to complete the equipment in all respects.
- b) The switch board manufacturer shall have ISO: 9001 certification with testing and powder coating facilities in the works.

9.2.2 Digital time switch (Timer) of suitable rating and contactors (as specified relevant BOQ item) shall be provided in the panel to operate pump/street lights etc. and shall be controlled with independent switchgear/s.

9.2.3 Construction

9.2.3.1 The panel shall be fabricated from 2.0 mm thick CRCA sheet steel. The shroud & partitions shall be minimum 1.6 mm thickness and shall be fabricated from CRCA sheet steel. The panel shall be powder coated in approved shade by seven-tank process. The degree of protection shall not be less than IP 42 as per IS: 13942/Pt.1.

The following minimum clearances shall be maintained:

- i) Between Phases - 32 mm
- ii) Between Phases & Neutral - 26 mm
- iii) Between Phases & Earth - 26 mm
- iv) Between Neutral & Earth - 26 mm

9.2.3.3 All functional units shall be arranged in multi-tier formation & each such unit shall be fully compartmentalized. Vertical cable alley shall be provided. Each compartment shall have its own individual door with concealed hinges & the door shall have interlocking so that it can only be opened after switching off the module.

9.2.4 Bus Bars

9.2.4.1 The bus bars shall be made of high conductivity aluminium/copper (as specified in BOQ) conforming to the requirement of IS 5082/1998 for aluminium and IS: 1897/1983 for copper. The bus bars shall have uniform cross section (basis of bus bar cross section will be maximum of 1000 A/sq. inch for copper and 630A/sq. inch for aluminium). The cross-section of the neutral bus bar shall be same as that of the phase bus bar for bus bars of capacity up to 200 Amp. For higher capacities, the neutral bus bar shall not be less than half (50 %) the cross-section of that of the phase bus bars.

9.2.4.2 Bus bars shall be supported on suitable non-hygroscopic, non-combustible, material such as DMC/SMC.

Specifications-

9.2.4.3 Bus bars shall be insulated with PVC tapes/ tubes (heat shrink type) with colour coding (Red/Yellow/Blue/ Black) to withstand the test voltage of 2.5 kV for one minute.

9.2.5 Molded Case Circuit Breakers (MCCB)

9.2.5.1 MCCB shall be TPN of rating as specified in the relevant BOQ item and shall conform to IS-13947/Pt-2/1993 ($I_{cs} = 100\%I_{cu}$ or as specified in the relevant BOQ item) with thermal release setting 70/80%-100% or fixed type as specified in the relevant BOQ item) with breaking capacity of not less than 25 kA for load currents up to 200 amp. & 35 kA for load currents above 200 amp rating. MCCBs shall be suitable for three phase, 415 Volt, AC supply.

9.2.5.2 Tripping unit shall be of thermal – magnetic type provided in each pole and connected by a common trip bar such that tripping of any one pole operates all the poles and they open simultaneously.

9.2.6 Fuse Switch/ Switch Fuse Unit

Fuse switch/switch fuse unit shall be heavy duty, TPN double break of rating (as specified in the relevant BOQ item), utilization category AC 23, conforming to IS: 13947/Pt. III/1993 with 3 HRC fuses conforming to relevant IS and one neutral link

9.2.7 Current Transformers

9.2.7.1 Current transformers shall be in conformity with IS: 2705 (Part I, II & III). Current transformers shall be rated for 1 kV. Current Transformer shall have rated primary current, rated burden and class of accuracy. The rated secondary current shall be 5 A. The acceptable minimum class of various applications shall be as given below:

Measuring : Class 1
Protection : Class 5 P10.

9.2.7.2 The VA rating of the CTs shall be not less than 5 VA.

9.2.8 Cable Termination

9.2.8.1 Cable entries shall be provided with metal glands to prevent damage to the insulation of the cable and terminals shall be provided to suite the number, type and size of aluminium conductor power cables.

9.2.8.2 Provision shall be made from bottom for entry of cables through removable gland plates.

9.2.9 Tests at Manufacturers' Works

9.2.9.1 All routine tests shall be carried out in the presence of the inspecting Engineer.

9.2.9.2 Original test certificates of all equipments/ instrument shall be submitted by the contractor along with the supply of panel board after the Inspecting Officer passes the feeder pillar.

9.2.10 Testing and Commissioning at Site

Following tests shall be carried out prior to Commissioning:

- a) Insulation test
- b) Trip Tests & Protection Tests

DISTRIBUTION BOARD

DISTRIBUTION BOARD

10.0 GENERAL

- a) Distribution boards for power and light circuit distribution shall be pre-wired, factory built, duty powder coated and complete with copper bus bars, MCB/MCCB/RCBO/RCCB etc. (as specified in the relevant BOQ item) and shall be suitable for 415 V, 3 – phase or 230 V, single-phase supply (as per BOQ item). The distribution boards shall conform to IS: 8623 and IS: 13032 as applicable
- b) However, if none of the types readily available from the approved makes meets the requirements, alternative makes may be offered with technical literature and test certificates, for approval of the Engineer.
- c) **Separate distribution board shall be provided for light and power circuits in quarters of category Type- IV and above & in service buildings, as approved by the Engineer.**

10.1 Type

The Distribution Board shall be single/double door type (as specified in the relevant BOQ item) suitable for flush installation. The boards shall be of cabinet design, totally enclosed and shall have a degree of protection not less than IP42 (indoor type) and IP54(outdoor type) as per IS: 13947/Part1/1993.

10.2 Miniature Circuit Breakers (MCB)

10.2.1 Miniature Circuit Breakers for lighting circuits shall be of "B" series and for inductive loads shall be of "C" series. Circuits feeding discharge lamps (HPMV/MH/HPSV) halogen lamps, all power outlet points, equipment/machinery shall be of "C" series (Motor Circuit) type. All miniature circuit breakers shall be of 10 KA rated rupturing capacity unless otherwise specified. MCBs shall generally conform to IS: 8828. They shall be suitable for snap fixing on a standard DIN rail.

- 10.2.2 Three phase MCBs shall have common trip bar so that all the poles make and break simultaneously. Miniature circuit breakers shall be quick make & quick break type with trip free mechanism. They shall have thermal & magnetic short circuit protection.

10.3 Residual Current Circuit Breakers (RCCB), Residual Current Circuit Breaker with Overload, short circuit & earth leakage Protection (RCBO)

- 10.3.1 RCCB/RCBO shall be used in distribution boards as per BOQ item. The RCCB/ RCBO shall be rated for 30/100/300 mA fault circuit tripping as specified in the relevant BOQ item or as per site requirement. **RCCB and RCBO** shall conform to relevant IS.

10.4 Molded Case Circuit Breakers (MCCB)

MCCB shall be TPN and of rating as specified in the relevant BOQ item. It shall conform to IS: 13947/Pt-3/1993(I_{cs} -100% I_{cu}) with thermal release (fixed type) and breaking capacity of not less than 25 KA. MCCBs shall be suitable for 3-phase, 415 V, AC supply.

- 10.4.1 Tripping unit shall be of thermal-magnetic type provided in each pole and connected by a common trip bar such that tripping of any one pole results in simultaneous operation of all the poles.

EARTHING SYSTEM

EARTHING SYSTEM

11.0 GENERAL

The earth system shall conform to IS: 3043 and as per approved drawing of the Zonal Railway.

Types of earth systems:

- a) Pipe Earth Electrode: Shall be normally provided for earthing of installations other than sub-station equipments.
- b) Plate Earth Electrode : Shall be normally provided for earthing of sub-station equipments.

11.1 Pipe Electrode Earth System

- 11.1.1** The earth electrode shall be made of G.I. pipe of 50 mm dia, medium class (class B) conforming to relevant IS. It shall be 3.0 meter long and tapered at the lower end. The pipe shall be drilled with 12 mm dia. holes at intervals of 75 mm from each other, up to 2.0 meter from the bottom end.
- 11.1.2** The pipe electrode shall be buried in the ground vertically with its top nearly 200 mm below the top of the enclosure.
- 11.1.3** A funnel with mesh shall be provided on top of this pipe for watering. Funnel attachment shall be housed in the masonry enclosure.
- 11.1.4** The top of pipe electrode shall be housed in a masonry enclosure (finished) of not less than 400mm x 400 mmx300mm (internal size). The covers of the masonry enclosures shall be of concrete with handle for lifting.
- 11.1.5** Normally an earth electrode shall not be situated less than 1.5m from any building. Care shall be taken that the excavation for the earth electrode may not affect the column footings or foundations of the building. In such cases, the electrode may be located further away from building. The location of earth shall be such that the soil has reasonable chances of remaining moist. Building entrances, pavements, roads etc. shall be avoided for location of earth electrodes.
- 11.1.6** Earth resistance shall be reduced by artificial chemical treatment of the soil with sodium chloride (common salt) mixed with soft coke or charcoal in suitable proportion in layers of 150mm. When this treatment is resorted to, the electrode shall be surrounded by the mixture of charcoal/coke and salt.
- 11.1.7** The earth lead from earth electrode to equipment/pole/main switch etc. shall be of GI wire of size (8 SWG or 25mm X 4mm GI strip). The earth lead for LT panel/feeder pillars shall be of GI strip of size (25mm X 4mm GI strip). Earthing of internal wiring (point wiring, power plug wiring, SDB etc) shall be done by means of PVC sheathed copper wire of same size as that of wire used for relevant point wiring.
- 11.1.8** Earth lead shall be connected to pipe earth electrode by means of galvanized bolts, nuts, washers & cable sockets.
- 11.1.9** All materials used for connecting the earth lead with electrode shall be of GI.

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- 11.1.10** The earth lead shall be securely connected at the other end i.e. main board/pole/structure/equipment/feeder pillar etc. with nuts, bolts, washers etc.
- 11.1.11** The earth lead from electrode shall be suitably protected from mechanical injury and shall be buried in ground at minimum 300mm depth when located outdoors. The portion within the building shall be recessed in walls/floors at adequate depth.
- 11.1.12** No earth electrode shall have resistance greater than 5 ohms. In rocky soil, the resistance may be up to 8 ohms.
- 11.1.13** Locations having more than one electrode shall be connected in parallel to reduce the resistance.
- 11.1.14** In locations where the full length of pipe electrode is not possible to be installed due to meeting a water table, hard soil or rock, the electrode may be of reduced length, provided the required earth resistance result is achieved with or without additional electrodes, or any alternative method of earthing may be adopted, with the prior approval of the Engineer-in-charge.

11.2 PLATE EARTH ELECTRODE

- a) Substation equipments shall be earthed using Plate Earth Electrode. Metallic frame of all equipments such as transformers, HT/LT switchgears/DG sets etc. shall be earthed at two distinct points with GI Plate earth electrodes and neutral points of the transformer/s and DG set/s shall be earthed at two distinct points with copper plate electrodes.
- b) Electrodes shall be connected in parallel to minimize resistance.

11.2.1 G.I. Plate Earth Electrode

For earthing HT/LT equipments/DG sets, GI plate earth. Electrode shall be 600mmx 600mmx6mm thick and shall be held vertical in ground with its top not less than 3.0 m below ground level. The earth plate shall be embedded in alternate layers of coke and salt of 150mm thickness so as to avail earth resistance not greater than 1.0 ohm.

- 11.2.2** A watering pipe of 20mm dia of medium class GI pipe shall be provided and attached to the electrode. A funnel with mesh shall be provided on top of this pipe for watering the earth. The watering funnel attachment shall be housed in masonry enclosure of not less than 40cm x 40 cmx30 cm inner size and shall be provided with hinged MS sheet/CI plate 10 mm thick and having locking arrangement.
- 11.2.3** One end of GI earth strip of size 40mmx6mm or as specified in the relevant BOQ item shall be securely bolted on the GI earth plate with two bolts, nuts, check nuts and washers, all CADMIUM PLATED. Other end shall be brought above ground level vertically. The portion of this strip that runs in ground shall be buried 500 mm below ground level to guard against mechanical damage. The portion within the building shall be recessed in walls/floors at adequate depth.
- 11.2.4** The strip shall be connected to the earth terminals of various HT/LT equipments/DG sets etc. by means of cadmium plated nuts, bolts and washers.

11.3 Copper Plate Earth Electrode

11.3.1 For earthing of neutral of transformers/DG sets, 600mm x600mmx3mm thick copper plate earth electrode shall be held vertical in ground with its top not less than 3.0 m below ground level. The earth plate is embedded in alternate layers of coke and salt of 150mm layers each, to avail earth resistance ~~less~~ not greater than 1.0 ohm.

11.3.2 A watering pipe of 20mm dia of medium class GI pipe shall be provided and attached to the electrodes. A funnel with mesh shall be provided on top on this pipe for watering the earth. The watering funnel attachment shall be housed in masonry enclosure of not less than 400 mm x 400mm x300mm inner size and shall be provided with hinged MS sheet/CI plate 10mm thick and having locking arrangement.

11.3.3 One end of copper strip of size 40x5mm or as specified in the relevant BOQ item shall be securely bolted on the copper earth plate by means of two nos. of tinned brass bolts, nuts, check nuts and washers as required. Other end shall be brought above ground level vertically through GI pipe of 50 mm dia. or as specified in the relevant BOQ item. The portion of this strip that runs in the ground shall be taken through medium class GI pipe 50 mm dia or as specified in the relevant BOQ item, buried 500 mm under ground level to guard against mechanical damage. The portion within the building shall be recessed in walls/floors at adequate depth.

11.3.4 The strip shall be connected to the neutral terminals of transformer/DG set by means of tinned brass bolts, nuts and washers, as required. To bring down the earth resistance, every earth electrode shall be surrounded by charcoal and salt.

11.4 Every individual earth electrode shall be allotted a serial number and an earth plate of size 10x22 cm of 14 SWG sheet steel (painted black) fixed in a conspicuous position near the earth. The following information shall be displayed with white or yellow paint on the earth plate.

- i) Earth No.....
- ii) Individual earth resistance.....ohms.
- iii) Overall earth resistance.....ohms.
- iv) Date of testing.....

11.5 The following tests shall be carried out before the installation is commissioned.

- i) Earth resistance test.
- ii) Earth continuity test.

11.6 Materials and Sizes of Earth Electrodes

Type of Electrode	Material	Size
Pipe	GI medium class	50 mm dia 3.0 m long (without any joint)
Plate	(i) GI	60 cm x 60 cm x 6 mm thick
	(ii) Copper	60 cm x 60 cm x 3 mm thick
Strip	(i) GI	40X6 mm section
	(ii) Copper	40X5 mm section
Conductor		4 mm dia (8 SWG)

ELECTRICAL DRIVEN SUBMERSIBLE PUMPS

ELECTRICALLY DRIVEN SUBMERSIBLE PUMPS

12.0 System of Supply

The pump shall be, suitable to operate on single phase, 230V or 3-phase, 415 V, (+/- 10%), 50 Hz, AC supply system depending upon rating.

12.1 General Requirements

Electrically driven submersible pump set shall be ISI marked and star rated multi-stage, suitable for operation in the specified diameter of bore well and capable of continuously pumping clear water at specified capacity at the indicated head. Pump set shall be of 2900 rpm (nominal) submersible electrical motor, suitable to operate on 415 V, 3 –phase, 50 Hz, AC supply system equipped with integral non-return valve and all necessary accessories for the application, whether specifically stated or not.

12.2 Pump

The Pump shall be of centrifugal type, fitted with multistage impellers, generally conforming to IS: 8034/2002, suitable for trouble free operation in the bore well when submerged and capable of easy installation in bore hole without damage to bore hole lining.

12.2.1 The pump shall be constructed with casing of high-grade cast iron of sufficient strength and hardness for long lasting. Impellers shall be manufactured from high quality bronze and shall be dynamically balanced. The shaft of the impeller shall be of hardened stainless steel for long life. The impeller guide vanes and diffusers shall be of suitable design with special emphasis to improve the efficiency of the pump.

12.2.2 The material used in all the parts of the pump and casing shall be suitable to withstand corrosive action of the liquid to be handled by the pump and shall be designed for long service.

12.2.3 All bearings/bushes used in the pumps shall be of water lubricating, high loading capacity, synthetic thrust type. The sleeve bearings shall be of special lead bronze having a high bearing load capacity.

12.2.4 The pump shall be complete with a suitable brass strainer at the suction side to prevent any hard material from entering the pump.

12.3 Motor

12.3.1 The motor shall be squirrel cage type induction motor, suitable for operation with the pump, capable of running on 230V, single phase or 415 V, 3 phase, 4 wire, 50 Hz, Ac supply system(as specified). The motor shall be suitably rated to withstand any overload due to higher discharge at a lower head and reduction in head up to 25 % of the specified head without getting over loaded.

12.3.2 The motor shall be of “wet type” according to manufacturer’s standard design and generally conforming to IS: 325.

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12.3.3 The casing shall be of stainless steel, tube treated, so as to prevent corrosion and rust during service. The starter winding shall be provided with one-ageing, waterproof, dense synthetic molecular insulation so as to resist the environmental chemical influence and shall have extremely high percussion strength.

12.3.4 The motor shall be assembled on hardened stainless steel shaft and supported on antifriction thrust bearings of synthetic molecular insulation. The sleeve bearings shall be of special bronze make. All the end thrust bearings shall be constructed from such material as to ensured trouble free service and be water lubricated.

12.3.5 The motor shaft shall be fitted with synthetic rubber sealing rings and sand guard to prevent sand and impurities from entering the motor. The motor shall be directly coupled to the pump and shall be provided with a suitable device to prevent uncoupling when the motor is started occasionally in the wrong direction.

12.3.6 The motor shall be equipped with suitable compensative device in order to protect the water inside the motor from getting mixed up with well water which may contain some quantity of sand etc. In the event of slight expansion of water inside the motor, the device shall give a spongy action, to accommodate it and return to normal when the motor is not working.

12.3.7 The electrical cable shall be connected to the motor by means of perfectly watertight sealing gland, to prevent water from entering the motor. The cable shall be protected by a strong cable guard plate. Waterproof cable of suitable size and length shall be supplied.

12.4 Control Panel

The control panel shall be wall mounted, cubicle type suitable for outdoor weather proof application with proper gasketing, complete with incomer TPN MCB 10 KA of suitable capacity, starter, single phase preventer, accessories, internal connections with copper conductor cable etc. and fabricated from 16 SWG CRCA sheet steel duly powder coated. Base plate shall be detachable with cable gland/s. Panel shall be earthed with separate earth suitably.

12.4.1 Starter

The starter for the motor shall be push button operated type with under voltage and over load release for direct on line starting and conforming to IS: 8544.

12.4.2 Indicator lamps for input supply for each phase, output supply

12.4.3 Suitable ammeter and voltmeter for each phase shall be provided.

12.4.4 Suitable electronic/microcontroller based motor protection relay with over/under voltage protection, phase sequence, locked rotor, earth fault, over current protection, dry run protection, single phase preventor, suitable timer control and measurement for running time of pump.

12.5 Accessories

12.5.1 The submersible pump shall be supplied with the following accessories:

- (a)** Non-return valve streamlined for minimum friction and integral in each pump set. The cone of the valve shall be fully quoted on the periphery valve seating shall be renewable rubber ring type.
- (b)** Pressure gauge of suitable size and graduated in kg/sq.cm on the delivery side.
- (c)** The pump shall be supplied along with the test certificates and catalogue etc. issued by manufacturer.

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12.6 Pump and control panel should be suitably provided with two independent earthing system.

12.7 Foundation/Plinth for Centrifugal pumps

Centrifugal pumps set with motor shall be fixed on the proper designed plinth as specified by OEM or as per approved drawing.

POWER DISTRIBUTION TRANSFORMER

POWER DISTRIBUTION TRANSFORMER

13.0 General

The transformer shall be suitable for operation in tropical climate and for mixed load and for continuous operation. It shall be natural cooled, outdoor/indoor type (as specified in the relevant BOQ item) and star rated. The PF at full load shall not be less than 0.8 lagging. ‡ Distribution transformers shall conform to IS: 2026 (Pt. I to Pt. IV)/1997 for more than 100 KVA rating and IS:1180 upto 100 KVA rating. The efficiency of the transformer shall not be less than 98% at full load. It shall be supplied with first filling of inhibited mineral oil conforming to IS: 12463-1988 capable of withstanding 50 kV (rms) voltage as per IS: 6792/1972.

13.1 Vector Group

The vector group shall be DYN 11.

13.2 Tapping

An externally operated, off load tap changer with suitable tap indicator and mechanical locking device shall be provided for giving +/- 5% in steps of 2.5 % each on HT side or as specified in the BOQ. The rated KVA of the transformer shall not be less than the rated capacity of the transformer on extreme tapping positions.

13.3 Parallel Operation

The transformers shall be capable of operating in parallel.

13.4 TRANSFORMER CORE:

The transformer core shall be built up of cold rolled grain oriented plain strip laminations fully processed and stress relieved and annealed having low loss and good ageing characteristics. The laminations may be bolted together and the whole core fixed through bolts to the steel frame adequate dimensions or also the construction may be tie rod type but in either case, the design should be such that it prevents undue vibrations and noise in service. Wooden frame for core fixing is not acceptable and contractor offer shall be specific about this.

The transformer shall be suitable for ever fluxing due to the combined effect of voltage and frequency upto 12.5% on any tap without injurious heating. The maximum working flux density at point shall not exceed 19000 lines per square centimeter on the basis M4 and M6 grade.

13.5 WINDINGS:

The winding shall be with double copper wound delta connected on primary, star with neutral brought out for earthing purpose on secondary. The copper wires conforming to IS 7404 (Part 1 and 2)/1974 or the latest version for paper covered conductors shall be used for HV and LV coils. The insulation of the conductors of the HV as well as LV coil shall be double paper coverage (DPC).The vector group unless other wise stated in the appendix 'A', shall be DY 11.

Class of insulation for winding shall be 'A' class.

The LV wiring shall be circular and concentric with HV winding on the outside. Vertical duct shall be provided for both HV and LV windings. The arrangements of the windings must be such that there is no electrical and magnetic balance under conditions of operation. The design shall permit free circulation of oil to ensure absence of hot posts. All similar coils shall be interchangeable. It is essential that the windings are subjected to a thorough shrinking and seasoning process during manufacture so that no further shrinkage of windings occur during early years of service. Adjustable screws shall be provided for taking up possible shrinkage of

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windings after a number of years of service. The general design and construction of transformer and bracings of the windings shall be such that no mechanical movements of the coils will be possible a dead shot on either sides of the transformer.

The short circuit ratings of the transformer shall be as per relevant clause of IS 2026/1977 or latest.

The clearance between windings/live parts and nearest earthed parts shall be adequate for sustained voltage of 110% of the rated operating voltage. The clearance between LT bushing internal terminal windings and cord shall be adequate so as to facilitate interposing of protective element if required.

13.6 TERMINAL ARRANGEMENTS:

- a) For out door type transformers: Bushing terminals shall be on HV side and cable end box on LV side.
- b) For in door type transformers following arrangement shall be provided.
HV side: A trifurcating box for three core XLPE Cable suitable size and voltage. LV side: A Cable box of suitable size and voltage to take a four core LT Cable.

13.7 TANK:

The transformer tank shall be rectangular and shall be fabricated with tested MS plates of not less than 5mm thickness at sides top and bottom suitably reinforced and stiffened with ribs etc. All joints of the transformer tank shall be welded both inside and outside in such a way that they are fully hot oil type and such that no bulging occurs during service. The tank plates shall be of such strength that the complete transformer filled with oil can be lifted bodily by means of lifting lugs provided on the tank and the lifting lugs should be of adequate strength to cater for this. This tank design shall be such that core and the windings can be lifted together freely out of the tank with minimum dismantling.

The tank cover shall also be provided with suitable lifting lugs. The tank cover and bushing joints shall be provided with superior quality oil resistant gaskets to render the tank full watertight. In case of outdoor transformers, the cover design shall be such that rain water drains out automatically. The cooling arrangement whether with circular or electrical tubes or with radiators offered for the transformer shall be indicated in Appendix 'B'.

13.8 CONSERVATOR:

Conservator with its oil gauge filling and drain plugs breather shall be fixed to the transformer tank cover. Air release device on the tank cover is necessary unless the conservator is so located has to eliminate the possibility of air being trapped within the main time. Necessary quantity of transformer oil sufficient for the transformers shall be filled along with the transformer.

13.9 FINISH

The exterior of transformer tank and outer ferrous fitting shall be thoroughly cleaned, scrapped and given a primary coat and two finishing coats of durable oil and weather resistance enamel paint. The colour coats shall be dark admiral gray conforming to No.63 of IS 5/1961 for colours for ready mixed paints or its latest version.

13.10 Provision of Additional Fittings

The transformers shall be provided with following additional fittings in addition to those specified in IS-2026:

- (a) Rollers
- (b) Explosion vent.
- (c) Thermometer –dial Type.
- (d) Inspection covers

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13.11 Tests

13.11.1 Routine Test

Tests as per Clause 16.1.2 of IS: 2026 (Pt.1)/1977 shall be witnessed at manufacturer's works by the nominated Inspecting Officer.

13.11.2 Type Test

Type Test certificates for similar transformer (same voltage class and same rating) as per IS: 2026 (Pt.I)/1997 shall be furnished. A copy of the short circuit test as per Clause 16.11 of IS: 2026 (Pt.I) /1977, successfully carried out on similar transformers (same voltage class and same rating, shall be supplied to the Inspecting Officer.

13.12 Earthing

The star point on the low voltage side shall be brought out for solid earthing with copper plate using copper strip of suitable length as per earthing specifications enclosed.

Transformer body shall also be provided with independent earthing system other than star point as specified in earthing specification enclosed.

13.13 Installation

Installation of transformers shall be done as per IS 10028 (Pt. II/1981). Suitable concrete work for foundation or mounting arrangements on pole shall be done as directed by engineer for erection of transformer.

13.14 Parameters for acceptance/rejection of transformers shall be as under:

ACCEPTANCE/ REJECTION PARAMETERS

SN	IS Clause No.	Acceptance Limits	Rejection Limits
1	4.3.1/2026 (Pt. I) (Operation at other than rated voltage)	Limits within +/- 10 % of rated voltage of particular tapping.	Limits exceeding +/- 10 % of rated voltage of particular tapping
2	3.2/2026(Pt.II)(Temperature rise)	Limits as specified in Clause 3.2/IS2026 (Pt II)	Exceeding Limits as specified in Clause 3.2 of IS2026(Pt. II)
3	Table 3.2026 (Pt. I) (Impedance voltage)	i) 4.5% up to 630 kVA ii) 5% above 630 kVA upto and including 1000 kVA	Exceeding limits i) 4.5% up to 630 kVA ii) 5% above 630 kVA up to and including 1000 kVA
4	8.1.6/2026(Pt.I) (Tap changing equipment)	Limits as specified in Clause 3.2/IS:2026 (Pt. II)	Less than Limits as specified in Clause 3.2/IS:2026 (Pt. II)
5	9.1.3/2026 (Pt. I) (duration of symmetrical short circuit current)	2 seconds	Period less than 2 seconds.
6.	Table 7/2026(Pt. I) (Tolerances)	As specified in Table-7	Limits exceeding as specified in Table- 7

13.15 Technical Specifications of Transformer Summary:

a	Particulars of a specification to Which the transformer should confirm	IS 2026 (Part 'A' to IV 1977 or its latest version if any
b	No. of transformers required	As per BOQ
C	Type of transformer	Double wound, core type
d	Single or polyphase unit	Polyphase unit

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e	No. of phases in system	Three
f	Frequency	50 Hz +/- 3%
g	Type of insulating and cooling medium	Inhibited Mineral oil to IS 12463:1988 with latest amndts.
h	Service	Outdoor
i	Type of cooling	Natural, oil cooled (ON) or as specified by purchase/Supply order
j	Rated KVA on normal tapping (the figures given are preferred ratings)	As per BOQ
k	Normal HV supply voltage	11000 volts phase to phase +/- 10%
l	No load voltage ratio at normal tap	11000/433 volts
m	Tappings required	+/- 2 1/2 , 5, 7 1/2 , 10% tapping on HV side
n	Type of tapping switch	OFF 3/4 load type with locking arrangements
o	Method of system earthing	Solid earthing of neutral
p	Material of winding conductors	Copper wire IS 7404 (Part I & II) / 1974
q	Insulation of winding conductors	Double paper covering (DPC)
r	Winding connection	HV delta LV: Star
s	Vector reference	DY.11
t	Terminal arrangements i) For indoor type transformers	Suitably marked cable boxes with 3 terminals on HV side and 4 on LV side with neutral brought out for earthing
	ii) For outdoor type transformers	3 bushings on HV side and 4 bushings on LV side suitably marked

Note: a) Rods, nuts, washers etc. of all HV and LV bushing must be of brass only.
b) All bushings shall conform to IS 2099/1973 or its latest version.

13.16 Foundation and Fencing

Suitable foundation, fencing for the transformer shall be provided as specified in the BOQ. The typical details for foundation and fencing (wherever required) shall be as under:

(i) Foundation

M10 type foundation shall be constructed with 20mm coarse aggregate. The size of foundation shall be as per the approved drawing based on Transformer dimensions but shall not be less than 2 x 1.5m Length x breadth X 600mm (height above ground level) duly plastered and finished surface. Curing shall be done as per code applicable. Excavation shall be done complying with Code of Safety as per IS 3764/1992(Latest Version).

(ii) Fencing

Fabrication of enclosure for housing transformer shall be made in rectangular formation as required with M.S. angle iron 50x50x8mm spaced at about 2 meters and 12 SWG GI wire. The design of the fencing panel shall be as approved by RVNL. MS strip not less than 15x3mm size shall be provided and welded above the GI wire along the angle frame to hold the GI wire mesh. Height of enclosure shall be 2 meter above ground level. The portion of MS angle to be grouted in foundation shall be 500mm.

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The fencing panels shall be erected on foundation constructed of size 200mmx200mmx500mm deep with cement concrete M10 grade.

- (iii) **Iron gate:** Iron gate shall be fabricated with M.S. angle 50x50x8mm iron frame with iron grill etc as approved. The size of the gate shall be 2.0 m height X 3.5 m width and fabricated in two parts of aprox size 1.75m each. Gate shall be provided with suitable sliding lock with padlock. Gate shall be fixed on channels of size not less than 100 X 50 mm (weight 7.90 kg/m). Channels shall be erected on foundation constructed of size 300mm X 500mm deep with M10 grade cement concrete.
- (iv) **Painting:** MS portions of enclosure (fencing and gate etc) shall be painted with two coats of red oxide primer and two coats of enamel paint of approved shade.
- (vi) **Approval of Drawing of Enclosure:**
Drawing of the enclosure with gate etc shall be got approved from the Engineer prior to start of the work.

**AUTO POWER FACTOR
CORRECTION (APFC)
PANEL**

AUTO POWER FACTOR CORRECTION (APFC) PANEL

16.0 General

The APFC panel shall be totally enclosed, made of mild steel sheet 14 SWG, free standing, floor mounting, indoor type, with degree of protection not less than IP42. The panel shall be compartmentalized, fixed type, manufactured as per IS 8623 Pt. I & II/1993 & powder coated with specified colour. The panel shall be suitable for operation on 3-phase, 4-wire, 415V, 50 Hz, AC supply system, with automatic or manual switching arrangement for 10 step power factor correction, to achieve power factor near unity. The capacitor bank shall be complete with inter-connections. A continuous GI earth bus bar shall run at the bottom. It shall comprise of the following items: (However, any other item, not specifically listed below, but required for meeting the site requirement, shall also be deemed to be included.)

(1) Incomer shall be double the rating of panel i.e. 250A for 125 kVAR, 50 kA, MCCB 4 pole ($I_{cs} = 100\% I_{cu}$) conforming to IS 13947/ Part II.

(2) Microprocessor based Automatic Power Factor Control Relay of not less than 12 steps with display of electrical parameters- i.e. power factor, current, voltage, etc. with following specifications:

- a. 415 V 50 Hz
- b. Capacity 5 Amps
- c. Intelligent type
- d. Built in Automatic and manual control
- e. Low current cut out relay,
- f. Relay shall function even at low loads
- g. It shall have data logging facility and sufficient memory back-up to log the data for 30 days or above.

(3) Indicating Lamp for incoming power supply with suitable back up protection.

(4) ON/ OFF indication lights for each set of capacitor

(5) Configuration of capacitor output – 10 steps x 12.5 kVAR each with switching ratio 1:2:3:4

(6) Knife type HRC fuses with base of suitable capacity for back up protection of capacitor duty contactor for each capacitor bank.

(7) 3- Pole contactor of suitable rating (capacitor duty).

(8) Capacitor shall be low loss, self-healing type for Ac power system having rated voltage 650 V & conforming to IS13340/1993 & IEC 60831.

(9) TPN copper bus bars of 400 amp rating for phase and 200 amp rating for neutral, fitted on insulators and PVC sleeves and duly colour coded.

(10) Suitable size cooling fan.

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- (11) Inter connection of capacitor duty contactors to bus bars with suitable size PVC copper conductor cable of 1.1 kV grade, with suitable lugs. Lugs, wherever required, for control wiring of relays, meters, equipments and indicating light etc. Inter connection from MCCB with suitable size copper bus bars, as required.
- (12) LT XLPE armoured cable conforming to IS7098/Pt.1/1988 for connection of control panel to main bus bar of LT switchboard. The cable shall be connected with suitable size of lugs and glands.
- (13) LT Current Transformer (CT) conforming to IS2705/Part I to IV, of suitable CTR, for incoming feeder/s complete with four terminal at input side and two terminal at output side including connection from incoming CTs to summation CT and APFC relay with suitable size copper conductor cable with proper wiring arrangement.
- (14) Suitable metering, indication and other accessories, as per site requirement.

CONTROL SWITCH BOARD FOR A.T.

CONTROL SWITCH BOARD FOR A.T.

22.0 GENERAL

- (a) Control switch board shall be cubicle type, mast mounted, dust and vermin proof, totally enclosed & compartmentalized design of uniform height for **outdoor** utilization and suitable for 1-phase, 2 wire, 415V, 50Hz AC, solidly earthed neutral, electric supply system complete with accessories, inter connections, bus bar chamber with copper bus bar, ON/OFF & trip indication, duly wired up with copper conductor cable with colour coding etc.
- (b) Switch board shall conform to IS:8623/Pt.1/1993 (LATEST).
- (c) The switch board manufacturer shall have ISO: 9001 certification with testing arrangement as per IS: 8623 and powder coating facilities in the works.
- (d) Drawing shall be got approved from RVNL's Engineer.

22.1 CONSTRUCTION

- a) The panels shall be fabricated from 1.6 mm thick CRCA sheet steel. The shroud & partitions shall be of minimum 1.6 mm thick CRCA sheet steel. The panels shall be powder coated in approved shade. The degree of protection shall not be less than IP: 65 as per IS: 13942/Pt.1 (LATEST). The bus bar chamber/s and MCCB chamber shall have double doors. It shall be possible to operate the MCCB only after opening of the outer door. The Switch board shall be in vertical formation. Switch board shall be compartmentalized for accommodating bus bars on top & on bottom and MCCB in centre with individual compartment. Each compartment shall have its own door with insulated thumb screw. Each compartment/s shall have provision of concealed lock.
- b) Upper side (on top) bus bar compartment shall be for incoming cable from AT to bus bar. Termination from bus bars to incoming terminals of MCCB shall be with 35 sq.mm copper conductor single core FRLS PVC insulated cable.
- c) Lower side (on bottom) bus bar compartment shall be for outgoing cable for feeding supply to load. Termination from outgoing terminals of MCCB to bus bars shall be with 35/70 sq.mm (for 10 KVA) & 70 sq.mm (for 25 KVA) copper conductor single core FRLS PVC insulated cable.
- d) Cable glands with detachable gland plates shall be provided on Lower side (on bottom) bus bar compartment for incoming and outgoing cable entry.
- e) Earthing terminal as required shall be provided.

22.3 BUS BAR

The bus bars shall be made of high conductivity copper conforming to the requirement of IS: 1897/1983(LATEST) for copper. The bus bars shall have uniform cross section (basis of bus bar cross section will be 1000 A/sq. inch for copper). The cross-section of the neutral bus bar shall be same as phase bus bar. Bus bars shall be supported on suitable non-hygroscopic, non-combustible, material such as DMC/SMC. Bus bars shall be insulated with PVC tapes/tubes (heat shrink type) with colour coding (Red/Yellow/Blue/Black) to withstand the test voltage of 2.5 kV for one minute

22.4 MCCB

- a) MCCBs ($I_{cs}=100\%I_{cu}$) shall conform to IS: 13947/Pt -2/1993(LATEST). Tripping unit shall be of thermal-magnetic type provided in each pole and connected by a common trip bar such that tripping of any one pole operates all the poles to open simultaneously.

Specifications-

22.5 INDICATION LIGHTS

- a) Clustered LED type Indication light shall be provided for ON/OFF indication on incoming and outgoing side.
- b) Cable entries shall be provided with metallic glands to prevent damage to the insulation of the cable and terminals shall be provided in the switchboard to suit the number, type and size of power cables.

22.6 TESTING AND COMMISSIONING

Following tests shall be carried out prior to commissioning of the panel:

- a) **Insulation test:** When measured with 500V meager, the insulation resistance shall not be less than 100 mega ohms.
- b) Trip test & protection test.

22.7 ERECTION

Control switch board shall be fixed with the mast at suitable height /location and arrangement shall be as approved by the Engineer. Base shall be of Galvanized Mild steel angle of size 50x50x6mm and holding clamps shall be of Galvanized Mild steel flat of size 50x6mm. Nut & bolt shall not be less than 12 mm dia.

**APPROVED MAKES
OF
EQUIPMENTS & MATERIALS**

CHAPTER: A-28

APPROVED MAKES OF EQUIPMENTS & MATERIALS

1. All Equipments & Materials should conform to latest version of BIS or other indicated specification as per given Policy guidelines. All energy consuming equipments should have minimum 3 star rating given by BEE, wherever applicable.

SN	Equipment/ Material	BIS Specification No.	Name of Manufacturer/Brand Name
1.	PVC Conduit	9537/Pt.3/1983	AKG
			Poly cab
			Precision
			Finolex , CROWN
			Presto Plast, AKU, SUDHAKAR , NANDI
2.	1.1 kV PVC Insulated, multi strand Copper conductor Cable for wiring (ISI Marked)	694/1990	The National Insulated Cable Co.
			Grandlay Electricals (India)Delhi
			Cable Corporation of India Ltd.
			Fort Gloster Industries Ltd.,
			Universal Cable Co.
			Asian Cables
			Vijay Cables Industrials New Delhi
			Sunhome Cables Industries New Delhi
			ICL Cable, Rajpura
			Incab
			Torrent
			Skytone
			Poly Cab
			Arun Manufacturing Delhi
			Vishal Brandh of Desmesh Cables
			Finolex
			Uniflex , PRIMECAB
			RPG
			Unistar
			Indian Cable Co. Kolkata
			Havell's
			Frexton Cables(I)
			Ajanta cables
			Indrani Cables
			Fixolite Wires & Cables

Specifications-

			Cab com
			Galaxy power cables
			Victor cables
			Tara Cables
			Deco Industries
			Maxwell New Delhi
			Oriental Power cable
			Pee Kay Industries
			Cab cond, New Delhi
			Ajanta Electric Industries.
			Insucon cables & cond.
			KEI industries Ltd.,
			Mid Light Electrical Pvt. Ltd.
			Bharat Cab brand of Vardman cables
			Anchor, PLAZA, RR CABLES, LEADER, UNI STAR
3.	Metal Box (enclosure for accessories)	14772/2000	Anchor , HAVELLS
			Cona , GM , C&S ,MDS ,
			Legrand , INDOASIAN ,TOYOMA
4(i)	Electrical Accessories for wiring (ISI Marked)	Relevant	Anchor , GM
			Cona
			SSK(top Line)
			Precision (Prime)
			Vinay (Clair 30)
			Leader
			Legrand, Havell's, HPL, C&S, Ryder, ABB, Hensel.
4(ii)	Electrical Accessories for wiring (Modular switches& Sockets) (ISI Marked) (NEW ITEM)	Relevant	Anchor- Roma Woods
			Indo Asian- Hussman
			Havell's- Crab Tree , GM , MARU , LEADER , LEGRAND ,TOYOMA
5	Phenolic Laminated Sheets(ISI Marked)	2036/1995	Bakelite Hylum Ltd. Calcutta
			Formica India Ltd. Motia Khan New Delhi, Super Hylan, Pvt Ltd.New Delhi, Surendra composites Pvt.Ltd. Bhopal
6	Industrial Type Iron Clad Socket	13947	Havell's
			Crompton
			Control & Switchgear
			BCH
			Standard Electricals
			HPL India Ltd.
			GE

Specifications-

			Siemens
			L&T
			Indo Asian
7	i) MCB ii) RCBO iii) RCCB	i) 8828/1996 ii) IEC: 61009 iii) IEC: 61008	Havell's
			Crompton
			Control & Switchgear
			Legrand
			GEC
			Jyoti
			L&T
			MDS
			Siemens
			GEC
			Andrew Yule
			Indo Asian
			Schneider
			Standard Electricals
			Merlin Gerin
			ABB
			Moeller
			HPL India
			BCH
8	Call Bell (NEW ITEM)	Relevant	Anchor
			Cona , GM
			MAX.
			Leader
			SSK
9	MCB Distribution Boards	8623/1993, 13032/1991	Havell's
			Crompton
			Control & Switchgears
			GE , GM
			Standard
			HPL India
			L&T , LEGRAND
			Siemens
			Indo Asian , C&S
			BCH
10	Electronic Regulator (ISI Marked)	Relevant	Anchor
			Usha
			ERIK
			RIDER
			CGL , GM
			Jay Engg.
			Matchwell Elect

Specifications

			Roma
			Cona
			Plaza
11	Ceiling Fan/Air Circulating Fan (ISI Marked)	374/1979	Khaitan
			Crompton
			Usha
			Orient
			Bajaj
			Havell's
			Kedia
			Polar
			GEC
			Almonard
			Phillips
			Anchor
12(i)	Exhaust Fan (ISI Marked)	2312/1967	Crompton
			GEC, Almonard
			Usha
			Bajaj
			Khaitan
			Polar
			Orient
			Phillips
12(ii)	Exhaust Fan/ Fresh Air fan with fibre body	Relevant	Usha
			Bajaj
			Khaitan
			Polar , HAVELLS
13	AC Units (Window & Split type)* , Cassette AC, Tower AC , Packaged AC , Battery Operated AC	Relevant 1391/Pt.1/1992	VOLTAS
			Carrier Air con
			Blue Star
			Amtrex Appliances
			Sidwal Refrigeration
			Frick India Ltd.
			LG , TROPYCOOL
			Samsung , O General
			Godrej , PANASONIC
			Fedders Lloyd
			Hitachi
			Shri Ram
			Onida
			Videocon
			Daikan
14	Water Cooler SS Body	1475/Pt.1/2001	Voltas

Specifications-

			Blue Star
			Sidwal Refrigeration
			USHA
			Fedders Lloyd
			Kelvinator
			Shriram, Eureka Forbes
15	Auto Voltage Corrector	Relevant	As recommended by the OEM of Ac Unit/Water Cooler
16	Geyser	2082/1993	Racold
			Bajaj Electricals
			Crompton
			Venus
			Johnson
			Superhot
			USHA
			SPHEREHOT, Havells.
17	Power Distribution Transformer	2026	Crompton Greaves
			NGEF
			AREVA T&D India Ltd., New Delhi
			Kirloskar Electric Co. Ltd., New Delhi
			Andrew Yule and Co., New Delhi
			Bharat Bijlee Ltd., New Delhi
			Bharat Heavy Electricals Ltd.,
			Kanohar Electrical Ltd., Meerut, (UP)
			Mirzapur Electrical Industries Ltd., Mirzapur, (U.P)
			ABB
			Siemens
			Voltas
			Volt Amp. ,
			Kerala Electric and Allied Engg. Co. Ltd.,
			Rama Krishna Transformers, Hyderabad
			ECE Industries
			Radhika Electricals
			Tesla , SHAKTI
			GEC
			TELK
			Hint Transformers

Specifications

			EMCO
			Mahindra Transformers Ghaziabad
			Vijay Electricals
			Indo Tech. Transformers Ltd.,
			PN Engg.
			Power Master Electricals, Kolkata
			Automatic Electrogear, Kolkata
			Alfa Transformers, Bhubaneshwar
			Orissa Transformers, Pvt. Ltd., Bhubaneshwar
			United Machinery Corporation, Kolkata, Star Delta Transformers Pvt. Ltd. Bhopal.
18.	11 kV Vacuum Cricuit Breaker Panel	13118/1991 & 3427/1997	AREVA T&D India Ltd.,
			ABB
			Crompton
			Siemens India
			BHEL
			Jyoti
			Andrew Yule
			Kill Burn
			Voltas
			Biecco Lawrie
			ECE Industries
			Schneider electric India
			GEC
			L&T , Denson Yamuna Power
19	HT 11 kV and 33 kV XLPE (E) Cable (ISI Marked)	7098/Pt.2/1985	ISI APPROVED SUPPLIERS
20(i)	HT Protection Relays (Over current, Earth Fault and other protective relays for transformers & Panels (Introduction/Static/Nu mberical type) (NEW ITEM)	3231	AREVA T&D IndiaLtd.
			L&T
			ABB
			Easun Rey Rolle
			Alind
			BHEL
			Jyoti
			GE
			BCH
			Minilac
			Enercon

Specifications-

20(ii)	LT Protection Relays (NEW ITEM)	3231	AREVA T&D IndiaLtd.
			L&T
			ABB
			Easun Rey Rolle
			Alind
			BHEL
			Jyoti
			GE
			BCH
			Minilac
			Enercon
21	D.G. Set (NEW ITEM)	Engine 10000/1980, Alternator: 4722/2001	VXL
			Engine:
			Kirlosker
			Cummins
			Ashok Leyland
			Greaves Ltd.
			Caterpillar
			PentaVolvo
			Alternator
			Kirlosker Electric Co. Hubli
			Jyoti
			Crompton
			Stamford
22	Cable Jointing/ Terminating Kit for 11 kV to 33 kV HT cables	13573/1992	Kerala
			Leroy Somer
			Kirlosker Green
			Yamuna Gases and Chemicals Ltd., New Delhi
			Mohindra Engg.& Chemical Product, New Delhi
			Raychem RPG Ltd.,New Delhi
			Hari Consolidated Pvt. Ltd.,New Delhi
			XICON
			Safe Systems
			Shrink Fit
			REPL
			DENSON Yamuna
			Super Seal Birla 3M

Specifications

23(i)	Measuring & recording Instruments (Electrical)	Relevant	Auto Electric
			Havell's
			Meco Instruments
			Motwani
			L&T
			National Instruments
			Shanti
			Toshniwal
			Siemens
			Sivananda Electronics
			JMP
			CIE
			Electric & Electronic devices.
			IMP
			Industrial Meters
			Rishab
23(ii)	Electric Energy Meter	13779/1999 Cl.1.0	Moeller (HPL)
			Havell's
			L&T
			HPL
			Baroda Electric Meters
			VXL India Ltd.
			Jaipur Metal Works
			Capital Power System
			ECE
			Meters & Instruments
			Industrial Meters
			Anchor
			Indo Asian
			Max Well
			IMP
			Swecure Meters
			ABB
			Enercon, BENLO

Specifications-

24	L.T. XLPE armoured Aluminium Conductor Cable (ISI Marked)	7098/Pt. 1/1985	ISI APPROVED SUPPLIERS
25(i)	APFC Panel (NEW ITEM)	Relevant	L&T
			Siemens
			ABB, Neptune
25(ii)	Capacitor	13340/93	Siemens
			ABB
			L&T
			BHEL
			Indian Capacitors
			Khatau Junker
			Shreem
			Unistar
			Junkar
			W.S. Insulators
			Hind Rectifier
			Voltas
			Schneider
			Indian Condensers
			EPCOS
			Universal Cables, Neptune
26	CLS control Panel for AT supply (NEW ITEM)	RDSO Tech. Spec. No. TI/SPC/PSI/CLS/0020 (12/02) with A&C slip No. 1 to 4 or latest	JAPS
			S&S
			Suntron & Matrix &
			Other RDSO's approved makes
27	ACB & ACB Bus coupler	13947/Pt.1&3/1993	Siemens
			Control & Switch Gear
			ALSTOM
			L&T
			Crompton
			Jyoti
			Mysore Electric Industries
			GEC(AREVA)
			Schneider Electric India
			JSL Industries Ltd., New Delhi
			BCH

Specifications-

			MEI
			ABB
			English Electric
			Havell's , Enercon
			NGEF
			Legrand
			Standard
			BHEL
			Power Boss
			N.N. Planner
			Minilac
			Andrew Yule ,
			Indo Asian
28	MCCB	13947/Pt.1&3/1993	Siemens
			Control & Switch Gear
			ALSTOM
			L&T
			Crompton
			Jyoti
			Mysore Electric Industries
			GEC(AREVA)
			Schneider Electric India
			JSL Industries Ltd.,New Delhi
			BCH
			ABB
			HAVELLS
			Legrand
			Standard,Electricals
			BHEL
			Merlin Gerin
			Indo Asian
29	Time switch (timer) Solid State	Relevant	General Industrial Control Pvt. Ltd.,
			MDS Legrand
			Havell's
			Jyoti
			BHEL
			BCH
			GE
			ABB,
			Indo Asian
			L&T
			Siemens
			Minilac
			Legrand

Specifications

30	Fuse Switch Unit/ Switch Fuse Unit, COS & HRC fuses	13947/Pt.1&3/1993	L&T
			Siemens
			Control & Switchgears
			Hevell's
			GE
			Indo Asian
			Crompton
			NGEF
			ABB
			Jyoti
			Mysore Electric
			HPL
			Standard
			BCH
			Indo Asian
			Kenbar
			GEC (Areva)
			SHNEIDER Electric
			Legrand
			Andrewyule
			Moeller
			Merlin Gerin
31	Cable Jointing/ Terminating Kit for LT cables	Relevant	DENSON Yamuna
			Mohindra Engg. & Chemicals Products, New Delhi
			Raychem RPG Ltd.,New Delhi
			Hari Consolidated Pvt. Ltd.,New Delhi
			Yaswant Industrial Works (P) Ltd Make: Super Seal
32	Current Transformers	2705/1992	Havell's
			AE
			CGL, Risabh
			C&S
			MECO
			Kappa
			Siemens
			L&T
			Schneider
			JSL Ind.

Specifications-

33	Ferrules, Thimbles/ Lugs	Relevant	Dowells
			G.J.Metal Works
			Usha Martin
			Universal Machines
			Kamlesh Industries
			KSE Electrical
			UML Engg
			ASCON
34	Flood Light and street light Luminaries	10322/Pt.5/sec.3/1987 & 10322/Pt.5/sec.5/1987	Philips
			Bajaj
			Crompton
			GE
			Wipro
			Osram
			Genlec
			Surya
			Sylvania , Asian
			Illumination enterprises
			New light industries
			ECE Industries Ltd.
			Keselec Schreder
35.	Energy Efficient Luminary & Lamps	10322/pt.5/1987	Havell's
			Asian
			Bajaj
			Philips
			Crompton
			Wipro
			GE
			Osram
36	CFL Luminaries	10322	AREVA
			Havells
			Keselec
			Crompton
			Philips
			Bajaj
			GE
			Wipro , Asian
			Mysore lamps
			Shinkolite Pvt. Ltd.
			Twinkle Industries
			Tilok Chand & Sons
			Surya Roshini
			Havell's
			Osram

Specifications

37	Metal Halide lamps	Relevant IEC	Philips
			Bajaj
			Crompton
			GE
			Osram
			Arklite
			Surya
			Sylvania
			Wipro
			Venture
38	CFL	IEC 901	Phillips
			General Electric
			Bajaj
			Crompton
			Osram
			Surya
			Wipro
			Havell's
39	High Mast Lighting Tower	Relevant	Sylvania
			Bajaj
			Phillips
			Crompton
			General electric
			BPP
40	Tubular Pole		UTKARSH
			Reputed make with the approval of the Employer
41	GI Pipe (ISI Marked)	2713/Pt.1 to 3/1980 1239/Pt.1/2004	TATA
			Jindal
			Utkarkash
			PRAKASH-SURYA-Surya
			TT Swastik
42	Porcelain Insulators	LT-1445/1977 HT-731/1971 & fitting IS 486/Pt.2/1989	Bengal Potteries Ltd.
			BHEL
			W.S. Insulators
			Seshasayee Industries Ltd.,
			Venkateshwara Ceramics
			Jaya Shree Insulators
			Insulators and Electricals Company.
			Mahalaxmi, RASTRIYA,
43	ACSR Conductor (ISI Marked)	398/Pt.II/1996	Reputed make ISI mark with the approval of the Engineer.

Specifications-

44	RCC Hume /HDPE pipe/DWC Pipe	Relevant	Reputed make ISI mark with the approval of the Engineer
45	Battery Charger for Train Lighting	2026 & 3895	Hind Rectifier
			Usha Rectifier
			Suresh Electricals
			Pyramid
			Automatic Electric
			Delta Electric
			Universal Industrial products
			Trinity Electric
			Venus Engg.
			R.S. Power
			Engineering Services Equipment control
46	i) H.S. Pump	1520/1980	Maxflow Pumps India Ltd., Gurgaon
			Geeta Flow Pumps India Pvt. Ltd.
			Kirloskar
			Worthington Pumps India Pvt. Ltd., Ghaziabad
			Beacon Weir Ltd., Chennai
			Mather & Platt Ltd., Pune
			Jyoti Ltd., New Delhi
			Luxmi Pumps
			KSB
			Suguna
	ii) Control Panel for Pump	Relevant	Original as supplied with pump by OEM
47.	i) Submersible Pump	8034/2002	KSB Pumps Ltd. Calama
			Mody Industries (FC) Pvt. Ltd., New Delhi
			India Electrical & Engg. Co. Ahemdabad
			Jyoti Ltd., New Delhi

Specifications

			Crompton
			Kirloskar
			KK Pumps
			Lix,o Hydraulics
			Shroff Engg.
			Waterman
			SB Pumps
			Flow Tech
			Suguna
			TEXMO
			SABER
	ii) Control Panel	Relevant	Original as supplied with pump by OEM
48	11 kV Air break Gang operating Switch with Drop Out fuse 200 A & 400 A (NEW ITEM)	IS:9921/1993	ABB
			ALIND
			Crompton Greaves
			Jyoti
			Mysore Electric
			NGEF
			Siemens
			Trans Electricals
			IE Power Gears Pvt. Ltd.,Hyderabad
			S&S Power Switch Gears LTd.,
			Kiron
			Alliance Engg. Pvt. Ltd.
			ECE Industries
49	33 kV Air break Gang Operating Switch with Drop Out Fuse 200 A to 1750 A	IS: 9921/1982	ECE Industries
			ABB
			IE Power Gears Pvt. Ltd., Hyderabad
			S&S Power Switch Gears Ltd.
			Alliance Engg. Pvt. Ltd.
			HLM
50	Rotary Switch & Selector Switch	Relevant	Kay Cee
			L&T ,
			Slazer
			GE
			ABB
			C&S
			Siemens
			HPL
			Moeller

Specifications

51	Contactors	13947	L&T
			Jyoti
			GEC
			C&S
			Siemens
			Crompton
			MEI ,
			Indo Asian
			NGEF
			Legrand
			BCH
			Standard
			BHEL
			Minilac
			Enercon
52	L.T. Panel	8623	Andrew Yule
			NN Planner
53	Solar lighting system for Crossing Gate	IS – 12834, 12763, 12761 Part - 1	Power Boss
			Scheinder
			Mysore Electric
52	L.T. Panel	8623	Firm s having ISO:9001 certification & testing facilities in works as per IS: 8623
53	Solar lighting system for Crossing Gate	IS – 12834, 12763, 12761 Part - 1	TATA BP, BEL, TITAN, SSPL, ANDROMEDA, SUNWATT, JAIN SOLAR SYSTEM, CIRA, Nano Bright
54	Induction Lamp	Relevant	Bajaj, Philips, LVD Raes, Halonix, Fortune Art.
55	Remote Energy Monitoring, Control and Data Aquisition System of Power, AMRs (New Item)	Relevant	AMI, Analogic , J&J, Vision Tech
56	Elevator, Escalator, Travelator and lifts(New Item)	Relevant	Thyssen Krupp , Jhonson , Schindler , OTIS , Kone ,
57	LED Lamps	Relevant	Phillips-Lumileds, Osram, Nichia, Cree/Seoul Semiconductor
58	Solar Water Heater	Relevant	Tata-BP Solar, Racold thermo ltd, Kotak Urja, Anu solar, Jain Irrigation OR other MNRE approved sources with prior approval of RVNL
59	GI Octogonal Poles	Relevant	PHILIPS, BAJAJ, SURYA AND OTHER REPUTED MAKES WITH PRIOR APPROVAL OF RVNL

SECTION – VII
TECHNICAL CONSULTANCY
&
PROVISION OF ROAD VEHICLE

TECHNICAL CONSULTANCY

1. The Contractor shall appoint qualified and experienced person(s)/firm(s) as Technical consultants. The consultant's team will comprise of Resident Engineer (Elect/Mech.) for OHE/PSI/SCADA, Expert (Elect/Mech.) for OHE/PSI/SCADA, Supervisor (Elect/Mech.) for OHE/PSI/SCADA and Tower Wagon Driver, having requisite experience of similar works. The objective of obtaining consulting services is to assist the employer in execution and timely and successful completion of the contract.
2. The technical team shall work directly under Project Head/Project coordinator of IRCON for the execution of work in Katni Grade Separator & Katni-Singrauli section of West Central Railway from the present stage to the stage of successful completion of all the contemplated works as per Contract. The technical consultant's team will assist employer to ensure implementation of all RDSO/Railway drawings, specifications & standards for project execution. The team will also assist employer to ensure highest quality, safety, health and environmental standards in project execution.
3. The Consultant will certify Project Procedure Manual, Quality Manual, Safety Manual and Environment Manual. The Consultant will guarantee supervision & timely completion of work. The Consultant's team will also prepare all documentations for EIG/CRS approval. They will ensure that, the works are executed in accordance with the provisions of the contract. They will be responsible for keeping proper account of the material supplied by the contractor and also the old released materials from site, if any.
4. The consultant shall also ensure safety of work sites, running trains, people working at site & properties adjacent to work sites by proper verification/ deployment/ suggestion of methods and means in tune with contract conditions, agreement, policies, procedures, Railway rules & regulations. They will also arrange power/ traffic block in coordination with Railway authority if required.
5. The Contractor shall furnish the details of the key personnel of the Consultant who shall have adequate experience and qualifications with respect to the main elements of the Railway Electrification Project as mentioned below. For the avoidance of doubt, no firm or person having any conflict of interest shall be engaged hereunder. Any assignments completed at least three years prior to the appointment hereunder shall not be reckoned for the purposes of conflict of interest. The consultant shall assist the Employer to implement the Project in conformity with Railways' rules and regulations; and codes Local laws, by laws, regulations, etc.

The requirement, minimum qualification and experience of the Consultant's key personnel shall be as under.

Sr. No.	Position	Total Minimum Work Experience (years)	Minimum Experience in similar work (years)	Minimum Qualifications
1	Resident Engineer (Electrical/ Mechanical/ Civil) for OHE/ PSI/ GS/ TSS/ SCADA works	10	5	BE/ B. Tech in Elect/ Mech./ Civil Engineering. Or

		20	10	Diploma in Elect/ Mech. /Civil Engineering
2	Electrical Expert (OHE/ PSI/ GS/ TSS/ SCADA)	5	3	BE/ B. Tech in Electrical Engineering Or
		7	5	Diploma in Electrical Engineering
3	Supervisor electrical (OHE/ PSI/ GS/ TSS/ SCADA)	5	3	Diploma in Electrical Engineering
		10	5	ITI (Electrician/ Fitter)
4	Traffic Inspector	10	5	Graduate in Any Discipline
5	Tower Wagon Driver	10	5	ITI/ Intermediate

6. The technical consultant having management capabilities shall be relevantly experienced persons. Before appointment of above professional, the Contractor shall submit Bio-Data of the professional and obtain prior approval of IRCON and if required interview of the candidates shall be conducted by IRCON. The Bidder shall also provide details of the proposed personnel, their experience in Form PER-1 and PER-2 attached here under.
7. In the interest of the project, IRCON reserves the right to remove any Consultant from the project site duly giving one month's notice. In that case the Contractor may propose name of another technical Consultant with duly approved bio data and/or conducting interview by the employer.
8. Only the office space for accommodating of technical consultant's team shall be provided at Ircon's site office/project office. All other facilities for daily execution of work by Technical Consultants viz., vehicles, stationary and consumables, computers and peripherals, office equipment, accommodation etc. shall be provided by the Contractor. Consultants shall be entitled to avail 12 nos. of casual leave and all national/ gazetted holidays or any other kind of leave as per instruction of IRCON engineer. The Consultant shall visit site as per instruction of IRCON's Engineer at contractor's own cost.
9. Furnished accommodation with kitchen/ mess along with cook and other required water & electricity supply connection is to be provided at 02 (Two) locations in Katni-Singrauli section by the contractor. Guest house/ accommodation to be furnished for double sharing occupancy in a single room. Vehicle for conveyance of consultants for day to day site visits & inspection is to be provided by the contractor. Cost of above mentioned items mentioned in sr. no. 8 & 9 are deemed to be included in the BOQ rates.
10. The scope of work of the Technical Consultant includes but not limited to the following:
 - 10.1 Technical Consultant's Responsibility:** The Consultant shall be responsible for the following:
 - 10.1.1 The Technical consultant shall evolve a system approach with the Head Designer of the working Contractor's design unit and shall be responsible for survey, soil investigation and collection of data from site and preparation of preliminary and detailed Design so as to minimize the time required for final designs and construction drawings.

- 10.1.2 Developing systems and procedures to administer the construction contracts and ensure that the contractual requirements, with respect to both quality and quantity of work, are respected and the works are constructed in accordance with the provisions of the construction contract. The consultant shall finalize these within 45 days of commencement of work. This includes job related to proper accountal of the material both supplied by the contractor and the old released one.
- 10.1.3 The Resident Engineer shall be responsible for checking of various drawings, plans, designs, documents prepared by the contractor before execution of the work. The proof checker shall responsible for Checking of all drawings viz. Pegging plan, LOP, CSD, SED, Profile, AED, SWR etc. and corrections thereto, if any.
- 10.1.4 Maintaining copies of all reference documents, specifications, and drawings in a systematic manner in the office of the Project Manager and provide relevant documents forms and stationery to site supervisory personnel.
- 10.1.5 Nominating a Project in Charge/Representative who will be full time resident on the Project. The consultant shall provide competent staff in full complement.
- 10.1.6 Making all engineering decisions required for the successful and timely implementation and completion of the construction contract.
- 10.1.7 The consultant shall arrange to train its Personnel who are deployed for the Management of the Project, from time to time, as may be required, for efficient Management.
- 10.1.8 Project Planning, Project coordination, Project interfacing or linkages using Project Management Software as specified in the works contract.
- 10.1.9 Preparation, submission and approval all plans and documents which are required for the execution of the work but which are not covered in the construction contract.
- 10.1.10 Expeditious completion of work to ensure the required time schedule.
- 10.1.11 Supervision of all construction work.
- 10.1.12 Conflict management and Change Management.
- 10.1.13 The Technical consultants shall be responsible for supervision and monitoring of construction work as per provision of the contract, approved drawings and RDSO specification.
- 10.1.14 Making all necessary measurements and certify contractor's bill before submission for payment. Consultant is required to certify interim payment after detailed check within 14 days after receiving statement & supporting documents from the contractor. Keeping records of all relied documents. The Consultant shall keep measurement records in daily progress report and in measurement books issued by the Employer. They will issue interim certificates for progress payments. Certify completion of part or whole work.
- 10.1.15 Ensure compliance of quality control and safety requirements during currency of the

contract.

- 10.1.16 Project monitoring with implementation of RDSO specifications till commissioning of the project.
- 10.1.17 Testing of installations as per the various provisions of codes, manuals and Railway instructions and recording of complete testing data and submission same to the client.
- 10.1.18 Preparation and submission of monthly and quarterly progress reports as per formats specified by the Employer.
- 10.1.19 As desired by the client, all such activities are to be taken up by Consultants before commencement of work by the works contractor:
- 10.1.20 The consultants shall assist the client and contractor for coordination with Railway administration and any other agencies, till the installations are handed over to the Railways for operation. They also execute the works as per detailed programme given by the works Contractor for execution of various activities of the project including stage working for achieving the mile stone set up by the Employer.
- 10.1.21 They will ensure that, the works to be carried out on running lines are coordinated, planned meticulously and executed without exceeding the limit of sanctioned traffic and power block. Ensuring that Railway operations are not disturbed by duly coordination with Railway authorities. Arranging of power and traffic blocks through Railway authority will also be the responsibility of consultant. They will also ensure safety of workers, Railway assets, Rolling stock and Railway users.
- 10.1.22 They shall ensure required materials/ equipments are procured from the approved sources as per approved drawings and specification and are duly inspected by the nominated agencies.
- 10.1.23 The consultant shall assist the client in preparing relevant documentation for EIG sanction and CRS inspection.
- 10.1.24 The consultant shall witness any quality tests carried out by the contractor in the laboratory or in the site. They will maintain records of all testing, including cross referencing to items of work to which each test refers and the location from which any samples were obtained for testing.
- 10.1.25 They will ensure replacement/rectification of any defective material/equipment or workmanship and which are not as per the RDSO/Railway specification and approved drawings.
- 10.1.26 One level of checking of various drawings, plans, designs, documents prepared by construction contractor before submission to Ircon/Railway for their approval. This will include carrying out required alterations in the drawings in the process of approval. This also includes arranging various drawings (prints or tracings, as a case may be) from railway for reference or for alterations/modification required for execution of the work. Approval of Ircon/Railways to various plans, design, documents etc. shall be arranged by the Consultant.

- 10.1.27 Preparation of CRS applications and the related follow-up work in railways and CRS office.
- 10.1.28 Ensuring consignee inspection, receipt of materials at site, accountal, issue of materials to works Contractors, (including materials procured through Supply contractors) and proper storage by Works Contractor.
- 10.1.29 Project monitoring for the implementation of the Project up to commissioning of the project or the end of the defect liability period or handing over the assets thus created to the Zonal Railway, whichever is later.
11. Activities to be taken up by Consultant before commencement of work by the works contractor:
- 11.1 Consultant shall study the information provided by the Employer such as drawings, designs, reference points etc. He shall also study various rules, regulations, codes, practices etc., applicable to Railway working and rules, regulations and by laws of state and central government as applicable to project under implementation including the agreement entered in to with the agency/agencies entrusted by the Employer for execution of works for project completion. He shall also study the special conditions of contract and detailed specifications to identify and decide:
- a) The Methods and the Means to be employed for execution of works.
 - b) The detailed programme given by the works Contractor for implementing the various activities of the project including stage working, if any, for achieving the Employer defined mile stone progress during the execution of project leading to successful completion of all works under the project including putting the created assets to use.
 - c)
 - d) The requirement of men, machinery and material for the desired progress at different stages of project execution in advance, so that the project gets implemented without any hindrances as per the above mentioned programme.
 - e) Planning the requirement of machinery and materials which shall be issued by Employer, scheduling and ensuring the availability of machinery and materials at site in consultation with the Employer and their proper utilization and accountal.
 - f) Checking along with the works Contractor, the correctness or otherwise of the Employer provided reference points, data, drawings and take corrective action by way of modifying/rectifying/supplementing the available reference points/data/drawings and to remove any inconsistencies/redundancies/voids (gaps) in the execution plan/schemes for safe and economical execution of works.
 - g) Planning for the various checks and supervisory/managerial functions to be performed in-house for the Consultancy, and providing competent, qualified and experienced staff including support staff to ensure implementation of various obligations of the works contract.
 - h) Planning for maintenance of Records to be kept e.g. checks to be carried for passing of materials/works at various stages, measurement of works/materials used, Accountal of materials etc.

- i) Planning for submitting various documents required for works requiring EIG/CRS's sanction, checking of Completion drawings, plans, work closed statements etc.

12. Review: The Consultant shall:

- (i) Review the Detailed Project Reports, including the detailed construction drawings, and the contract for the project work. The review shall identify any defects or omissions that compromise the completeness or consistency of the design including checking of design or affect the viability, accuracy or implementation of the construction contract.
- (ii) Review the adequacy of the contractor's quality management system and contractor's proposed personnel specified in the construction contract.
- (iii) Checking of designs/drawings as to functionality, general layout, adherence to specifications and provisions of relevant codes, constructability and construction impacts, maintainability and aesthetics.
- (iv) The approved Design and Drawings made available by Employer will be required to be checked by the Consultant for correlating the data shown in drawings with actual available at site, minor changes (e.g. change in foundation design because of actual type of soil strata found during excavation resulting in variation from design soil bearing capacity, change in diameter of reinforcement due to non-availability of the reinforcement shown in the drawing etc.). Review drawings and specifications for construction including suggestions on design changes during progress of work. Drawings not included in the construction contractor's scope including those required for phase working shall be prepared by the consultant. Further if any plan/drawings/Design (Tracing & prints) maintained by railway are required for execution of the work same shall be arranged by the consultant for reference, alteration, modification etc. He shall arrange approval of various drawings from concerned railway. The drawings and design work has to be followed till the submission of as made (i.e. completion) drawings to railways. Checking of Design and Drawings for all temporary works (except that of the launching scheme for triangulated steel girders), proof checking of Design and drawings for civil works and checking of Design and Drawings for Electrical will also be done by Consultant.
- (v) Liaison between various contractors, designers, such that the designs for these sub-systems, that in particular their civil works, such as ducting, pedestals, cabins, poles and supports will be integrated properly into the overall project works.
- (vi) Review proposal for acceptance by West Central Railways/RDSO under the guidelines of cross acceptance for any equipment or system proposed by the contractor for execution of the work.

13. Quality Assurance: The Consultant shall:

- a) Prepare a Quality Assurance Manual, detailing the consultant's quality assurance/control procedures, to be submitted within 30 days of commencement of services.
- b) Assist the contractor to evolve a system of Quality Assurance for the works, including but not limited to, establishing testing frequencies and acceptance criteria for all materials and construction activities in accordance with the specifications. The system should specify the prescribed quality checks and their frequency to be performed, acceptable limits for each quality check and do's and don'ts for all important activities, in appropriate format acceptable

to the Employer, so that the same can be provided to the concerned field officers responsible for supervision of respective items for ready reference.

- c) Ensure that the procurement of materials and equipment are from the authorised sources and are duly inspected by the nominated agencies.
- d) Inspect and approve all materials received at site proposed to be incorporated in works.
- e) Check concrete mix designs proposed by the contractors and approve/suggest modifications to the mix designs, laying methods, sampling, testing procedures and quality control measures to ensure the required standards and consistency in quality at the commencement of activities.
- f) Inspect the quality of the works with regard to workmanship, compliance with the specifications and all necessary testing required for acceptance of any item of work.
- g) Assess and check the laboratory and field tests carried out by the contractor, and carry out independent tests in the site laboratory, wherever necessary.
- h) Maintain records of all testing, including cross referencing to items of work to which each test refers and the location from which any samples were obtained for testing.
- i) Issue orders to the contractor to remove or make good any work which is found to be:
 - a) Not in accordance with the drawings.
 - b) Not in accordance with the specifications in terms of either work methods or materials specifications.
 - c) Covered prior to inspection for acceptance or after rejection as unacceptable.

14. Project Control:

- a) The consultant shall monitor the project covering all aspects of the project but not limited to:
 - Progress in accordance with schedules with the objective of taking remedial measures to ensure project completion date and costs.
 - Critical Interface requirements particularly when different agencies are involved whether under different contracts or within the same contract for works.
 - Cost Control
 - Environmental matters
 - Quality Control
- b) The Consultant shall develop systems to professionally manage the project implementation. The system to include the physical and Financial Progress vis-à-vis program and forecast cash flow. Project Management Software, as mutually agreed with the Contractor and the Employer. The Program must identify the milestones, interface requirements and program reporting elements. The consultant shall supply a soft copy of program (macro) developed. The output shall be updated every month.
- c) Project Management control to include cost, schedule, quality control, technical performance and reporting for the entire project, up to the end of the defect liability period of the contract.



- d) The consultant shall take actions as may be necessary for expeditious completion within the contract period.

15. Construction Supervision:

The Consultant shall:

- (i) Ensure adequacy, stability and safety of all personnel and construction works being executed by the contractor during the construction and operation, including ensuring the safety of the running trains in the vicinity of the project site.
- (ii) Ensure that the works to be carried out on running lines are coordinated, planned meticulously and executed without exceeding the traffic and power block, ensuring that Railway operations are not disturbed by duly coordination with Railway authorities, arrangement of power and traffic blocks from Railway will also be the responsibility of consultant. He shall also ensure safety of workers, Railway assets, Rolling stock and Railway users.
- (iii) Conduct site visits to review progress in implementation, including physical progress, environmental mitigation, contractor performance, and adequacy of contractor's supervision.
- (iv) Assist/ advise the Employer timely regarding handing over the site by Railway which they will hand over in stages, in the advance actions required to be taken for the handing over of the site and to achieve the milestones for completion of the construction packages.
- (v) Assist the Employer in co-ordination with different agencies and hold meetings for proper and timely implementation of the Project.
- (vi) Assist the Employer for liaison and co-ordination with the relevant authorities to remove all obstacles and encumbrances from the project site, including utility relocation and tree cutting, as required.
- (vii) Assist the Employer in coordination with different agencies and hold meetings for proper and timely implementation of the project.
- (viii) Assist the Employer in the proper monitoring of progress of the works through computer aided project management techniques.
- (ix) Check contractor setting out for conformance with the drawings.
- (x) Maintain close liaison with North Eastern Railways and if required with local State Electricity Board and other government bodies to ensure progress of all works.
- (xi) Prepare/issue modified drawings required for variation orders, or any other change, agreed by the Employer.
- (xii) Approve contractor's proposed designs/drawings for all temporary works except that of the launching scheme for triangulated steel girders.
- (xiii) Inspect at regular intervals the contractor's plant and facilities, including the workers' accommodation at site, to ensure conformity with the construction contract and all government/state regulations.



- (xiv) Inspect the contractor's safety measures, including labour welfare, and immediately notify both the Employer and the contractor of any infringement or violation.
- (xv) Maintain records, working/as-built/completion drawings, test data, details of variations, correspondence, and diaries in the formats approved/specified by the Employer.
- (xvi) Verify lines and levels to ensure works are being executed as per the approved drawings/layouts, alignments and levels.
- (xvii) Check all hidden measurements through Project Manager/Project In Charge which shall be recorded by Experts/PM/RE before covering the works. And test check to be carried out.
- (xviii) Ensure that the materials used, meet the specifications.
- (xix) Ensure that the quality of workmanship and the temporary arrangements/structures made for carrying out the works meet the requirement of specifications and safety standards.
- (xx) Ensure that the reinforcement provided is as per the approved drawings tied properly with cover blocks and chairs as required.
- (xxi) Inspect the works or any part of the works, at substantial completion and advise the Employer and the contractor of any outstanding work, including defect, to be completed/remedied during the defect liability period.
- (xxii) Inspect the works at appropriate intervals during the Defect Liability Period.
- (xxiii) Ensure "as-built/completion" drawings, as true record of the works as constructed, are documented and kept in a systematic manner by the contractor.
- (xxiv) Prepare an inventory of the completed works, in a format agreed with the Employer, for use by the maintaining authority.
- (xxv) Maintain account of various materials and machinery as stated below.
- (xxvi) Maintaining material at site account for
 - (a) all materials to be issued by the Employer free of cost,
 - (b) all released materials till they are handed over to the Railway/re-used.
- (xxvii) Maintaining accounts of (a) material brought to the site by the Contractor for which secured advance has been paid and the use of such material; (b) other materials brought to the site by the Contractor for which part payments are arranged and the use of such material; (c) other materials brought to the site by the Contractor for which, no payment will be made till they are laid and use of such material for execution of works.
- (xxviii) Maintenance of accounts of machinery made available by the Employer to the Contractor, either free of cost or otherwise, and their effective utilization.
- (xxix) Submission of monthly statement of material consumed and material balance available to employer and review the consumption.

16. Measurement and Payment:

- a) The Consultant shall take measurements and keep measurement records in daily progress report, in measurement books issued to him by the Employer.
- i) Issue interim certificates for progress payments.
- ii) Certify completion of part or all of the works.
- iii) Review and ensure continuity of the contractor's sureties in approved formats.
- iv) Assist in preparation of quarterly cash flow projections for the Employer in a format acceptable to the Employer. Cash flows should identify budget estimates for all outstanding work.
- v) Update cost estimates on completion of 50 percent, 75 percent and 100 percent of the Project.
- vi) Maintain records of all plant, labour and materials used in the construction of the works.
- vii) Check and agree the contractor materials ordering schedule.
- viii) Analyze claims submitted by the contractor and prepare a report for the Employer addressing the contractual basis, in terms of both technical and financial issues, for the claims and recommendations for a response to the contractor.
- ix) Assist the Employer in providing clarifications/explanations to the observations made from time to time by auditors.
- x) Co-operate and assist the Central Vigilance Commission, Quality cell of Ircon and other organizations as instructed by the Employer in the event that the construction of the Project is subject to review.

17. Project Completion Report:

- (a) The Technical Consultant's team shall issue the relevant certificates as may be required in the construction contract documents.

Consultant shall be responsible to obtain all records of completion drawings and completion documents from the contractor and prepare completion estimates in accordance with provisions of Indian Railways Engineering Code. This shall be submitted within six months of issue of taking over certificate.

- b) The Consultant shall prepare and issue to the Employer six (6) copies of the following reports, the format and content of which are to be acceptable to the Employer:
 - (i) An Inception Report to be submitted within 21 days of commencement of services.
 - (ii) Project Management Plan: Within 30 days of the Effective Date.
 - (iii) Systems and Procedures duly covering quality and safety plan: Within 45 days of Effective Date of services along with necessary proformas, stationery for smooth functioning.

In addition to the above the Consultant shall provide the following reports in a format approved by the Employer.

- i) A daily report including significant events, if any, on the previous day. The report shall be sent by e-mail or fax to the Employer's head office and the Employer's representative at site. This report will also include any event/happening which is likely to affect the progress, quality of work and safety.



- ii) A brief monthly progress report to be submitted within 7 days of the end of each month. This report should include details on progress of checking of designs/drawings/approval of drawings and specifications for construction, deployment of technical and supervisory staff by the Contractor and progress of construction work with reference to the targets.

The report should also include: -

- (a) List of approval sought and given.
- (b) Measures aimed at course corrections – their requirement and their implications.
- (c) Unresolved claims their genesis, justifications and recommendations on the same.
- iii) A detailed Quarterly Report, to be submitted within 14 days of the end of each quarter. Quarterly reports should include a description of project activities illustrated by progress/completion photographs, status of any delays and detailed plan to make up any shortfall or deficiency, status of contractual claims, and details of all latest financial projections;
- iv) A detailed Contract Completion Report with completion documents within 6 (six) months of completion and date of commissioning.
- v) Any other report as sought to be the Employer from time to time.

TOWER WAGON DRIVER

The contractor shall appoint qualified and experience Tower wagon driver. The Tower wagon Driver shall preferably be retired Railway Passenger Driver/ Goods Train Driver or Tower wagon driver. They will work directly under nominated official of IRCON in Katni-Singrauli section for execution of OHE works as assigned by IRCON Engineer.

The Tower wagon drivers shall follow the traffic rules while working on Railway Track, safety of running trains, people working at site.

Before appointment of above professionals, the Contractor shall take prior approval of bio data and/or interview of the candidates. The Bidder shall provide details of the proposed personnel, their roles and experience records in Forms PER-1 & PER-2 attached to this chapter.

In the interest of the project, IRCON reserves the right to remove any Traffic Inspector/Tower Wagon Driver from the project site duly giving 7 days' notice. Contractor has to replace the personnel duly approval of bio data and/or interview by Project Head of IRCON or his representative



ANNEXURE-A

Proposal for Technical consultant

Form PER -1

Bidders should provide the names of suitably qualified personnel to meet the specified requirements stated above. The data on their experience should be supplied using the Form below for each candidate.

1.	Title of position*
	Name
2.	Title of position*
	Name
3.	Title of position*
	Name
4.	Title of position*
	Name



Form PER-2

Resume of Proposed Personnel

Name of Bidder

Position		
Personnel information	Name	Date of birth
	Professional qualifications	
Present employment	Name of employer	
	Address of employer	
	Telephone	Contact (manager / personnel officer)
	Fax	E-mail
	Job title	Years with present employer

ROAD VEHICLE

1. The contractor shall provide Road vehicles (Tata Sumo, Bolero, Scorpio, Safari, Inova or similar SUV) for Employer's/ Engineer's use for execution of the contract as per the following terms and condition:
 - a) The vehicles shall be new delivered and maintained by the contractor in good road worthy condition. The vehicle shall be replaced with a new vehicle after a maximum run of 75000 Km or three years whichever is earlier.
 - b) The Contractor shall employ and make available competent drivers fully licensed to operate the vehicles. The Contractor shall replace drivers at the advice of the Engineer/ Employer.
 - c) The vehicles shall be licensed and insured for use on the public highway and shall have comprehensive insurance cover. Operational FASTAG is to be issued & installed on vehicle.
 - d) The Contractor shall provide fuel, oil for running of each vehicle up to 3000 KM per month and ensure maintenance in conformity with the vehicle manufacturer's recommendations and all relevant toll and parking charges incurred in connection with the works. The vehicle shall be provided day and night as required by the Engineer/Employer. If any vehicle is allowed, (with the prior approval of Project In-charge), to run beyond 3000 KM in a month the charges for running of the additional kilometres shall be paid extra as per the BOQ rate.
 - e) A suitable replacement shall be made by the contractor for any vehicle out of service for more than 24 hours. If the contractor at any time fails to provide Vehicle (s) or substitute vehicle (s) as specified, an amount of Rs.1500/- per day for each vehicle (that the contractor failed to provide) shall be recovered from the contractor.
2. Number of Vehicles
 - a) The Contractor shall provide the following type of vehicles as per requirement indicated below within one month of the date of commencement.

Sr. No.	Type of Vehicle	Qty
1	Tata Sumo, Bolero, Scorpio or similar SUV	4
2	Tata Safari, Toyota Innova or similar SUV	1

- b) The Vehicle requirement given in Para above is tentative. However, requirement in a particular period will be intimated to the contractor at least 7 days before the actual date of requirement after approval of the distribution. The contractor shall withdraw particular vehicle (s) if the same is not further required by the Engineer/Employer. In Such cases the instructions shall be given in writing 7 days in advance to the contractor. The requirement during the defect Liability Period will be quite less than the maximum requirement mentioned above.
- c) Duration of vehicle Requirements

The Vehicles for the Engineers/ Employer shall be provided so as to cover the entire completion period (s). The transport so provided shall continue to be the property of the contractor.