HOOGHLY COCHIN SHIPYARD LIMITED

NATIONAL TECHNOLOGY CENTRE FOR PORTS WATERWAYS AND COASTS
NTCPWC

ELECTRIFICATION WORKS FOR SHIP REPAIR FACILITY AT PANDU, GUWAHATI

Hooghly Cochin Shipyard Ltd (HCSL),
Satyen Bose Road
P.O-Danesh Shaikh Lane,
Nazirgunge, Howrah,
West Bengal-711109, India

SRF Pandu, Guwahati

HOOGHLY COCHIN SHIPYARD LIMITED

(A WHOLLY-OWNED SUBSIDIARY OF COCHIN SHIPYARD LTD.)

HOOGHLY COCHIN SHIPYARD LIMITED

TENDER DOCUMENT
of
ELECTRIFICATION WORKS
for
SHIP REPAIRING FACILITY AT PANDU, GUWAHATI

Tender No.: HCSL/PANDU/TEN/2026/238 Dtd. 06/11/2026

Due Date of Submission: 15.00 Hrs. on 27.11.2026
Date & Time of Opening: 15.30 Hrs. on 27.11.2026

ELECTRIFICATION WORKS FOR SHIP REPAIRING FACILITY AT PANDU, GUWAHATI

Tender Document No.:

INDEX

Tender Notice					
Invitation to Tender				p)	Format of Performance Bank Guarantee for Release of Secured Advance against Materials brought to Site
1.		**General**			
	1.1	One Tender per Tenderer			
	1.2	Cost of Tendering		q)	Format for performance of Bank Guarantee for Release off Retention Money
	1.3	Site Visit			
2.		**Tendering Documents**		r)	Self-Declaration to be given by the bidder in Letter head.
	2.1	Content of Tender Documents		s)	COMPLIANCE STATEMENT- List of Deviations
	2.3	Clarification of Tender Documents		t)	Details of legal cases pending against the firm for the last five years
	2.4	Amendment of Tender Documents		u)	Tender Declaration
3.		**Preparation of Tenders**		v)	VENDOR DETAILS (to be submitted along with TECHNICAL BID)
	3.1	Language of the Tender:		w)	SITE VISIT SLIP
	3.2	Documents comprising the Tender:		x)	Pre-contract integrity pact Hooghly cochin shipyard limited
4.		**Tender Prices**			
5.		**Currencies of Tender and Payment**			**General Conditions of Contract**
6.		**Tender Validity**			(As per Index therein)
7.		**Tender Security**			**Special Conditions of Contract**
8.		**Alternative Proposals by Tenderers**			**(As per Index therein)**
9.		**Format and Signing of Tender**			**(Including the following)**
10.		**Submission of Tenders**			*Contract Data*
	10.1	Sealing and marking of Tenders			**Technical Specifications**
11.		**Deadline for Submission of the Tenders**			
	11.2	Late Tenders			Preamble to Bill of Quantities
12.		**Modification and withdrawal of Tenders**			
13.		**Tender Opening and Evaluation**			Bill of Quantities
	13.1	Tender Opening			
	13.2	Process to be confidential			Tender Drawings: (**Download Link has been provided in the contract data**)

14.		**Clarification of Tenders**			
15.		**Employer's Right to Accept any Tender and to reject any or all Tenders**			
	15.2	Notification of Award and Signing of Agreement			
16.		**Performance Security**			
17.		**Corrupt or Fraudulent Practices**			
18.		**Forms of tender, qualification information and letter of acceptance**			
	a)	Form-A : Qualification Information			
	b)	Format-D: Similar works during last five years			
	c)	Format-G: Ongoing works			
	d)	Format-J: Proposed subcontracts			
	e)	Format-L: Bank certificate			
	f)	Format-N: Litigation history			
	g)	Format-P: Key personnel			
	h)	Format-Q: Equipment & plant			
	i)	Format for Tender			
	j)	Form of Articles of Agreement			
	k)	Format for Letter of Acceptance			
	l)	Format for Notice to proceed with the work			
	m)	Form of Tender Security (Bank Guarantee)			
	n)	Format of Performance Bank Guarantee			

हुगली कोचीन शिपयार्ड लिमिटेड
हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

NOTICE INVITING TENDER

TENDER NOTICE NO: **HCSL/PANDU/TEN/2026/238 Dtd. 06/11/2026**		
Sealed tenders in the prescribed form are invited for the following work:		
1	Name of the work:	**ELECTRIFICATION WORKS FOR SHIP REPAIRING FACILITY AT PANDU, GUWAHATI**
2	Owner:	**HOOGHLY COCHIN SHIPYARD LIMITED**
3	Design Consultants:	National Technology Centre for Ports, Waterways and Coasts, IIT Madras (NTCPWC - IITM).
4	Completion time:	➢ **04(Four) Months** from the Start Date of issue of Letter of Acceptance, or any other date specified in Letter of Acceptance ➢ The Contractor shall supply the DG SET within 1.5 months from the date of award of work. ➢ The Contractor shall complete the shore power panels and deck cabling within 2 months from the date of award of work.
5	Tender Security Earnest Money Deposit (EMD)	INR 2,60,000/- (Two Lakh Sixty Thousand)
6	Cost of Tender Document:	NIL.
7	Tender Books will be available from:	06.11.2026
8	Last date for written queries	On 27.11.2026
9	Pre-bid meeting	18.11.2026 at 15:30 Hrs.
10	Last date and time for submission of Tender Document	27.11.2026, upto 15.00 Hrs.
11	Time and venue for opening of tenders:	27.11.2026 AT 15.30 Hrs., Hooghly Cochin Shipyard Ltd., Nazirgunge, Satyen Bose Road, PO: Danesh Seikh Lane, Howrah, West Bengal-711109.
12	Delays in submission of tenders:	The Owner will not be responsible for any delay, loss or non-receipt of Tender Documents or tenders during transit by courier.

13	Owner's rights:	The Owner reserve the right to issue / refuse Tender Documents and to accept / reject any or all tenders either in part or full or to split and award the work to more than one agency without assigning any reasons thereof and without any liability to the Owner / Design Consultants.
14	Address for requisition and submission of tender document.	Hooghly Cochin Shipyard Ltd., Nazirgunge, Satyen Bose Road, PO: Danesh Seikh Lane, Howrah, West Bengal-711109.

Tender reference should be clearly indicated on top of the respective envelopes.

Sealed tenders addressed to the Chief Executive Officer, Hooghly Cochin Shipyard Ltd, shall be dropped in the "Hooghly CSL Tender box" located at Hooghly CSL-Nazirgunge Unit at Danesh Sk. Lane, Nazirgunge, Howrah -711109 or courier to Hooghly CSL, Nazirgunge at Danesh Sk. Lane, Nazirgunge, Howrah -711109, West Bengal by the due date and time and the bids should be submitted in **HARDCOPY (Original & One Softcopy in USB-Pen-drive)**

Tenders should be submitted in a two separate sealed covers/files as PART – I "TECHNO-COMMERCIAL" & PART – II "PRICE BID" indicating the tender number, due date of the tender and subject as in-line with the scope of work.

Tender documents received after the due date & time will not be considered.

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

Signature and Seal of the Contractor(s)

For Hooghly Cochin Shipyard Ltd.

INVITATION TO TENDER

The present tender is for Electrification works for Ship Repairing Facility at Pandu, Guwahati. The components of work are listed in the Preamble to Bill of Quantities.

The attached Tender Notice gives details of certain salient points in regard to this tender. Additional details in the form of Instructions to Tenderers are given below.

1. General

1.1 One Tender per Tenderer

Each tenderer shall submit only one tender for one package. A tenderer who submits or participates in more than one Tender (other than as a subcontractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the Tenderer's participation to be disqualified.

1.2 Cost of Tendering

The tenderer shall bear all costs associated with the preparation and submission of his Tender, and the Employer will in no case be responsible and liable for those costs.

1.3 Site Visit

The Tenderer, at the Tenderer's own responsibility and risk, is encouraged to visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Tender and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Tenderer's own expense.

2. Tendering Documents

2.1 Content of Tender Document:

The set of tender documents comprises the documents listed in the table below and addenda issued in accordance with Clause-2.4:

- Tender Notice
- Invitation to Tender, including Instructions to Tenderers
- Forms of Tender and Qualification Information
- Forms of Securities
- General Conditions of Contract
- Special Conditions of Contract
- Contract Data
- Technical Specifications
- Preamble to Bill of Quantities

- Bill of Quantities
- Drawings, termed as Tender Drawings, where enclosed to the Tender Document, or otherwise available with the Employer for perusal by the tenderers.

2.2 The tender document shall be filled in and returned with the Tender (Clause-3.2).

2.3 **Clarification of Tender Documents**

a) A prospective tenderer requiring any clarification of the tender documents may notify the employer in writing at the Employer's address indicated in the Invitation to Tender.

b) The Employer will respond to any request for clarification that he receives earlier than five days prior to the deadline for submission of tenders.

c) Copies of the employer's response will be forwarded to all purchasers of the tender documents, including a description of the enquiry but without identifying its source.

2.4 **Amendment of Tender Documents**

a) Before the deadline for submission of tenders, the Employer may modify the tender documents by issuing addenda.

b) Any addendum thus issued shall be part of the tender document and shall be communicated in writing to all the purchasers of the tender documents. Prospective tenderers shall acknowledge, in writing, the receipt of each addendum.

c) To give prospective tenderers reasonable time in which to take an addendum into account in preparing their tenders, the Employer shall extend as necessary the deadline for submission of tenders.

3. Preparation of Tenders

3.1 **Language of the Tender:**

All documents relating to the tender shall be in the English language.

3.2 **Documents comprising the Tender:** The tender submitted by the tenderer shall comprise the following:

a) The Tender Document (as described in Clause-2.1), alongwith the covering letter of the tenderer, as per Format for Tender, on tenderer's letterhead.

b) Tender Security

c) Priced Bill of Quantities

d) Qualification Information Forms and Documents;

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

e) And any other material required be completing and submitting by tenderers in accordance with these instructions.

The documents listed under Forms of Tender and Qualification Information, Forms of Securities and the Bill of Quantities shall be filled in without exception.

4. Tender Prices

4.1 The contract shall be for the whole works, based on the priced Bill of Quantities submitted by the Tenderer.

4.2 The tenderer shall fill in rates and prices and line-item total (both in figures and words) for all items of the Works described in the Bill of Quantities along with total tender price (both in figures and words).

4.3 Items for which no rate or price is entered by the tenderer will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities. Corrections, if any shall be made by crossing out, initialing, dating and rewriting.

4.4 All duties, taxes, and other levies payable by the contractor under the contract, or for any other cause, shall be included in the rates, prices and total Tender Price submitted by the Tenderer.

4.5 The rates and prices quoted by the tenderer shall be fixed for the duration of Contract and shall not be subject to adjustment on any account.

5. Currencies of Tender and Payment

5.1 The unit rates and the prices shall be quoted by the tenderer entirely in Indian Rupees.

6. Tender Validity

6.1 Tenders shall remain valid for a period not less than 120 days after the deadline date for tender submission specified in Clause-11. A tender valid for a shorter period may be rejected by the Employer as non-responsive.

6.2 In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the tenderers may extend the period of validity for a specified additional period. The request and the tenderers' responses shall be made in writing. A tenderer may refuse the request without forfeiting his tender security.

6.3 A tenderer agreeing to the request will not be required or permitted to modify his tender except that he will be required to extend the validity of his tender security for the period of the extension, and in compliance with Clause-7 in all respects.

7. Tender Security

7.1 The Tenderer shall furnish, as part of his Tender, a Tender security, termed as Earnest Money Deposit (EMD), in the amount as indicated in the Tender Notice. This tender security shall be in the form of Bank Guarantee(as per attached format), NEFT/RTGs and shall be valid for a period of 6 (Six) months from the due date of opening of Techno-commercial Bids, Bank details provided below.

STATE BANK OF INDIA
ERNAKULAM BROADWAY BRANCH
ACCOUNT NO: 00000045548156100
IFSC CODE: SBIN0008614

7.2 Any tender not accompanied by an acceptable Tender Security and not secured as indicated at Clause-7.1 and 7.2 above shall be rejected by the Employer as non-responsive.

7.3 The Tender Security of unsuccessful tenderers will be returned within 28 days of the end of tender validity period specified at Clause-6.1.

7.4 The Tender Security of the successful tenderer will be discharged when the tenderer has signed the agreement and furnished the required Performance Security.

7.5 The Tender Security may be forfeited.

a) If the Tenderer withdraws the Tender after Tender opening during the period of Tender validity;

b) In the case of a successful Tenderer, if the Tenderer fails within the specified time limit to sign the Agreement or furnish the required Performance Security.

8. Alternative Proposals by Tenderers

8.1 Tenderers shall submit offers that comply with the requirements of the tender documents, including the basic technical design as indicated in the drawing and specifications. Alternatives will not be considered.

9. Format and Signing of Tender

9.1 The Tenderer shall prepare the set of documents comprising the tender as described in Clause-3 of these Instructions to Tenderers, bound with the volume containing the Form of Tender.

9.2 The Tender shall be typed or written in indelible ink and shall be signed by a person or persons duly authorised to sign on behalf of the Tenderer.

9.3 All pages of the tender where entries or amendments have been made shall be initialed by the person or persons signing the tender.

9.4 The Tender shall contain no alterations or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the tenderer, in which case such corrections shall be initialed by the person or persons signing the tender.

10. Submission of Tenders

10.1 **Sealing and Marking of Tenders**

a) The Tenderer shall seal the Tender (Clause-3.2) in an envelope, which shall:

• be addressed to the Employer at the following address:	Hooghly Cochin Shipyard Ltd., Nazirgunge, Satyen Bose Road, PO: Danesh Seikh Lane, Howrah, West Bengal-711109.
• bear the following identification:	Tender Notice no. **HCSL/PANDU/TEN/2026/238 Dtd. 06.11.2026. DO NOT OPEN BEFORE 27.11.2026, at 15:30HRS.**
• bear the identity of the tenderer:	**Full name and mailing address of the tenderer.**

b) Where the tender is declared late, pursuant to Clause-11.4, it may be returned unopened to the tenderer, using the identity cited above.

c) If the envelope is not sealed and marked as above, the employer will assume no responsibility for the misplacement or premature opening of the tender.

11. Deadline for Submission of the Tenders

11.1 Tenders must be received by the Employer at the address specified above not later than the date and time indicated in the Tender Notice.

11.2 In the event of the specified date for the submission of tenders being declared a holiday for the Employer, the Tenders will be received upto the appointed time on the next working day.

11.3 The Employer may extend the deadline for submission of tenders by issuing an amendment in accordance with Clause-2.4, in which case all rights and obligations of the Employer and the tenderers previously subject to the original deadline will then be subject to the new deadline.

11.4 **Late Tenders**

a) Any Tender received by the Employer after the deadline prescribed in Clause-11 will be returned unopened to the tenderer.

12. Modification and withdrawal of Tenders

12.1 Tenderers may modify or withdraw their tenders by giving notice in writing before the deadline prescribed in Clause-11.

12.2 Each Tenderer's modification or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance with Clause-9 and 10, with the outer and inner envelopes additionally marked "MODIFICATION' or 'WITHDRAWAL" as appropriate.

12.3 No tender may be modified after the deadline for submission of Tenders.

12.4 Withdrawal or modification of a Tender between the deadline for submission of tenders and the expiration of the original period of tender validity specified in Clause-6.1 above or as extended pursuant to Clause-6.2 may result in the forfeiture of the Tender security pursuant to Clause-7.

12.5 Tenderers may only offer discounts to, or otherwise modify the prices of their Tenders, by submitting Tender modifications in accordance with this Clause, or included in the original Tender submission.

13. Tender Opening and Evaluation

13.1 **Tender Opening**

a) The Employer may or may not opt to open all the Tenders received (except those received late), including modifications made pursuant to Clause-12,

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

in the presence of the Tenderers or their representatives who choose to attend at the time and on the date and at the place specified in Clause-10. In the event of the specified date of Tender opening being declared a holiday for the Employer, the Tenders will be opened at the appointed time and location on the next working day.

b) Envelopes marked "WITHDRAWAL" shall be opened and read out first. Tenders for which an acceptable notice of withdrawal has been submitted pursuant to Clause-12 shall not be opened.

c) The Tenderers' names, the total amount of each Tender and of any alternative Tender (if alternatives have been requested or permitted), any discounts, Tender modifications and withdrawals, the presence or absence of Tender security, and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening. Any Tender price, discount, or alternative Tender price which is not read out and recorded at Tender opening will not be taken into account in Tender evaluation.

d) The Employer may prepare minutes of the Tender opening, including the information disclosed to those present in accordance with Clause-13.1.

13.2 **Process to be Confidential:**

Information relating to the examination, clarification, evaluation, and comparison of Tenders and recommendations for the award of a contract shall not be disclosed to Tenderers or any other persons not officially concerned with such process until the award to the successful Tenderer has been announced. Any effort by a Tenderer to influence the Employer's processing of Tenders or award decisions may result in the rejection of his Tender.

14. Clarification of Tenders

14.1 To assist in the examination, evaluation, and comparison of Tenders, the employer may, at his discretion, ask any Tenderer for clarification of his Tender, including breakdowns of unit rates. The request for clarification and the response shall be in writing.

14.2 Subject to Clause-14.1, no Tenderer shall contact the Employer on any matter relating to his tender from the time of the tender opening to the time the contract is awarded. If the Tenderer wishes to bring additional information to the notice of the Employer, he should do so in writing.

14.3 Any effort by the Tenderer to influence the Employer in the Employer's tender evaluation, tender comparison or contract award decisions may result in the rejection of the Tenderers' tender.

15. Employer's Right to Accept any Tender and to reject any or all Tenders

15.1 Notwithstanding anything else stated in these documents, the Employer reserves the right to accept or reject any Tender, and to cancel the Tendering process and reject all Tenders, at any time prior to the award of Contract, without thereby incurring any liability to the affected Tenderer or Tenderers or any obligation to inform the affected tenderer or Tenderers of the grounds for the employer's action.

15.2 **Notification of Award and Signing of Agreement**

a) The Tenderer whose Tender has been accepted, in whole or part, will be notified of the award by the Employer prior to expiration of the Tender validity period by cable, telex or facsimile confirmed by registered letter. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") will state the sum that the Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract called the "Contract Price".

b) The notification of award will constitute the formation of the contract, subject only to the furnishing of a performance security in accordance with the provisions of Clause-16.

c) The Agreement will incorporate all agreements between the Employer and the successful Tenderer. It will signed by the Employer and sent to the successful Tenderer, within 28 days following the notification of award along with the Letter of Acceptance. Within 21 days of receipt, the successful Tenderer will sign the Agreement and deliver it to the Employer.

d) Upon the furnishing by the successful Tenderer of the Performance Security, the Employer will promptly notify the other Tenderers that their Tenders have been unsuccessful.

16. Performance Security

16.1 Within seven days of receipt of the Letter of Acceptance, the successful Tenderer shall deliver to the Employer a Performance Security in any of the forms given below for an amount equivalent to 5% (five percent) of the Contract price:

a) A bank guarantee in the form given in this Tender Document.

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

16.2 If the performance security is provided by the successful Tenderer in the form of a Bank Guarantee, it shall be issued either (a) at the Tenderer's option, by a Nationalized / Scheduled Indian Bank or (b) by a foreign bank located in India and acceptable to the Employer.

16.3 Failure of the successful Tenderer to comply with the requirements of Clause-16.1 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Tender Security.

17. Corrupt or Fraudulent Practices

17.1 The Employer, without assigning any reason thereof, reject the tender of a tenderer, who, in the opinion of the Employer has resorted to corrupt or fraudulent practices in presenting his tender.

18. Forms of tender, qualification information and letter of acceptance

18.1 Formats for the following are provided in the pages hereunder:

a) Contractor's tender
b) Qualification information
c) Letter of acceptance
d) Notice to proceed with the work
e) Agreement form
f) Form of Tender Security (Bank Guarantee)
g) Performance Bank Guarantee*
h) Bank Guarantee for Release of Mobilisation Advance*
i) Bank Guarantee for Release of Secured Advance against Materials brought to Site*
j) Performance Bank Guarantee for Release of Retention Money

18.2 * **Tenderers should not complete the Performance, Mobilisation and Secured Advance forms at the time of submitting the tender.**

18.3 Only the successful Tenderer will be required to provide Performance, Mobilisation and Secured Advance Securities in accordance with the respective forms, or in a similar form acceptable to the Employer.

18.4 **PREQUALIFICATION, TECHNICAL AND FINANCIAL CRITERIA**

18.4.1. PRE-QUALIFICATION CRITERIA:

Only competent agencies with sound technical and financial capability meeting the respective pre-qualification requirement stated hereunder shall be prequalified for the work. The bidder shall have a valid Grade A License or equivalent categorised for high-tension/unlimited voltage capacity, issued by Government State Electricity Licensing Board and shall take single point responsibility for execution of the complete work as specified in the tender document. In case the bidder does not possess a valid 'A' Grade license or equivalent in his own name, he shall identify an agency (Sub-Contractor) possessing the valid license for carrying out electrical installation work on behalf of the bidder and submit a commitment letter from that agency. Notary attested photocopy of the valid 'A' Grade license of the bidder or his identified sub-contractor shall be furnished along with Techno-Commercial Bid for verification. No JV/consortium firm will be allowed for bidding.

18.4.2. TECHNICAL CRITERIA

EXPERIENCE CRITERIA

Experience of bidder having successfully completed similar works during last 7 years ending 31st of October, 2026 should be as follows:

I) One similar completed work costing not less than Rs. 7.5 Crores OR
II) Two similar completed works, each costing not less than Rs.4.7 Crores OR
III) Three similar completed works, each costing not less than Rs. 3.7 Crores

Similar work means installation and commissioning of electrical works involving minimum 11KV class transformer of capacity not less than 1600KVA. Work completion certificate shall be submitted in this regard. The Client reserves the right to inspect the installation, if required, during the prequalification evaluation process.

Following enhancement factors will be used for the costs of works executed for bringing the financial figures to a common base value in respect of the works completed in the past years.

Year Before	Multiplying Factor
One year	1.07
Two years	1.14
Three years	1.21
Four years	1.28
Five years	1.35

हल्दिया कोचीन शिपयार्ड लिमिटेड
हावड़ा-०९
HOWRAH-09
Haldia Cochin Shipyard Limited

Six years	1.42
Seven years	1.49

18.4.3. **FINANCIAL CRIERIA**

TURNOVER REQUIREMENT

The average annual turnover during the last three financial years i.e. 2023-24, 2024-25, 2025-26 of the BIDDER shall be at least Rs.3.99 Crores ii) All BIDDERs shall submit Audited Balance Sheet and Profit & Loss statement for last three financial years i.e. 2023-24, 2024-25, 2025-26. In case the audited financial statements for the financial year 2025–2026 have not been finalised, a Provisional Certificate shall be submitted instead.

Note for Micro & Small Enterprises and Startups: Prequalification, Technical and Financial criteria specified above shall also be applicable for Micro & Small Enterprises and Startups without any relaxation.

TECHNO-COMMERCIAL EVALUATION

Only offers from Bidders meeting the specified Prequalification Requirements as mentioned at para 1.0, 2.0 and 3.0 shall be considered for further Technical and Commercial Evaluation.

GENERAL

1. The cut-off date mentioned in above clauses shall be reckoned from the date of publishing of this tender. Any experience acquired subsequently will not be considered.
2. BIDDER shall submit all supporting documents, certificates and credentials etc. in ENGLISH language only

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

18.5 **The bidder must visit the HCSL Pandu SRF project site before submission of the bid. The site visit slip must be submitted along with the tender document containing HCSL Officer signature is mandatory else offer will be rejected.**

SRF project location:
Opposite Assam Railway Police Station,
Pandu Port Road,
Maligaon, Guwahati 781 012,
Assam, India

Any request for clarification in writing must be addressed to,

Name : Biswajit Ch Das
Designation : Project Officer (Electrical)
Email : biswajitch.das@hooghlycsl.com
Mob : 9804338498

Name : Sreerag G.
Designation : Manager (Materials)
Email : sreerag.g@hooghlycsl.com
Mob : 9482608957

Form-B **Qualification Information**

The information to be filled in by the Tenderer in the following pages and their annexures will be used for purposes of post qualification. This information will **not** be incorporated in the Contract.

Sl.no	Parameter	Details	Mark of format / encl.	Instructions
1	This Form-B, duly filled up		A	
2	Constitution or legal status of Tenderer		B	(Attach copy)
3	Place of registration			
4	Principal place of business			
5	Power of attorney of signatory of Tender		C	(Attach copy)
6	Works, similar in nature to that under this Tender, executed in the last five years, in Rs. Lakhs.	2019-20:_____ 2020-21: _____ 2021-22: _____ 2022-23: _____ 2023-24: _____	D E	1. Attach details in format below. 2. Attach certificates from employer's engineer.
7	Payments received in the last five years	2019-20:_____ 2020-21: _____ 2021-22: _____ 2022-23: _____ 2023-24: _____	F	Attach certificates from Chartered Accountant.

8	Existing commitments and on-going works		G H	1. Attach details in format below. 2. Attach certificates from employer's engineer.
9	Works for which tenders already submitted			
10	Proposed subcontracts and firms involved.	Number: _____	J	Attach list
11	Financial reports, balance sheets, profit & loss statements, auditors' reports, etc. for the last five years	---	K	List them and attach copies.
12	Evidence of access to financial resources to meet the qualification requirement (cash in hand, lines of credit, etc.)	1. . 2. .	L	1. List them below and attach copies of support documents. 2. Letter from bankers.
13	Persons having business relationship with Tenderer, who may provide reference to the Employer.	List (names, addresses, tel & fax numbers)	M	Attach list.
14	Information on litigation history in which the Tenderer is involved.	List:	N	Attach details.
15	List of key manpower		P	Attach details in format below.
16	List of plant & equipment		Q	Attach details in format below.

Format-D Similar works during the last five years: ***Attach certificates from the employer / his engineer.***

Description of work	Price & State	Contract no. & Date	Name and Address of	Value of Contract (Rs. Lakhs)	Stipulated period of completion	Value of works* remaining to be	Anticipated date of completion

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

			Employer			completed (Rs. Lakhs)	
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*

Format-G Ongoing works: *Attach certificates from the employer / his engineer.*

Description of work	Price & State	Contract no. & Date	Name and Address of Employer	Value of Contract (Rs. Lakhs)	Stipulated period of completion	Value of works* remaining to be completed (Rs. Lakhs)	Anticipated date of completion
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*

Format-J Proposed subcontracts:

Sections of the works	Value of Subcontract	Subcontractor (name and address)	Experience in similar works

Format-L Bank certificate:

This is to certify that M/s. _____ is a reputed company with a good financial standing. If the contract for the work, namely _____ is awarded to the above firm, we shall be able to provide overdraft / credit facilities to the extent of Rs. _____ to meet their working capital requirements for executing the above contract.

Sd. _____ *Senior Bank Manager*

Name of Bank *Address of the Bank*

Format-N Litigation history, involving the Tenderer:

Other party(ies)	Employer	Cause of dispute	Amount involved	Remarks showing present status

Format-P Key personnel: Qualifications and experience of key personnel proposed for administration and execution of the Contract.

Attach biographical data.

Position	Name	Qualifications	Years of experience (general)	Years of experience in the proposed position
Project Manager				
*				
etc.				

Format-Q Equipment & plant:

Required			Availability proposal			Remarks
Item of equipment	Required no.	Required capacity	Owned / leased / to be procured	Nos. / Capacity	Age / Condition	From whom to be purchased

Hooghly Cochin Shipyard Limited
हावड़ा-०९
HOWRAH-09

Annexure-1

Format for Tender
(on tenderer's letterhead)

Dated:

To:
.....
.....
.....
.....

GENTLEMEN,

Subject: Electrification Works for Ship Repairing Facility at Pandu, Guwahati, vide Tender Notice no..

1. We offer to execute the Works described above in accordance with the Conditions of Contract accompanying the Tender for the Contract Price of ----------[in figures](----------[in letters], as arrived at based on the Bill of Quantities.
2. We understand that the Contract Price stated above is subject to revision in terms of variations in the actual quantities to be executed in respect of the various items in the Bill of Quantities.
3. This Tender and your written acceptance of it shall constitute a binding contract between us, until the signing of the Contract Agreement.
4. We understand that you are not bound to accept the lowest of any Tender you receive.
5. We have examined, understood and hereby undertake to comply with all the requirements of the Contract, as detailed in your Tender Document, including, but not limited to, General Conditions of Contract, Special Conditions of Contract, Specifications, Bill of Quantities and it's Preamble, tender drawings, Tender Notice and Invitation to Tender, as well as all clarifications received by us.
6. We have visited the site and satisfied ourselves of all the present and expected situations.

7. We undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will abide by the laws of the Republic of India, in so far as they relate to our actions and activities in connection with this tender.

8. We hereby confirm that this Tender complies with the Tender Validity and Tender Security required by the Tendering documents.

9. We attach herewith our current income-tax clearance certificate.

10. The Tender Document, duly filled up and signed by us, is enclosed herewith in a sealed envelope.

Authorized Signature, with date :----------

Name & Title of Signatory :----------

Name of Tenderer :----------

Address :----------

Annexure-2

Format for Letter of Acceptance
(on Employer / Engineer's letterhead)

Ref. no.:
Dated:

To:
---------- [Name and Address of the Contractor]

Dear Sirs,

1. This is to notify you that your Tender dated ---------- ----- for execution of the -----[name of the contract and identification number, as given in the Instructions to Tenderers] for the Contract Price of Rupees----------[amount in words and in figures], as corrected and modified in accordance with the Instructions to Tenderers is hereby accepted by us.

2. You are hereby requested to furnish Performance Security, in the form detailed at para-16 of Invitation to Tender, for an amount of Rs.----------, within seven days of the receipt of this letter of acceptance, valid upto 28 days from the date of expiry of Defects Liability Period i.e., upto---------- and sign the Contract, failing which action as stated at para-16 of Invitation to Tender will be taken.

Yours sincerely,

Authorised Signature
Name and Title of Signatory

Annexure-3

Form of Articles of Agreement
(on non-judicial Stamp Paper)

This Agreement, made the ---------- day of ---------- 20----,

Between ---------- [name and address of Employer] (hereinafter called "the Employer") and ---------- [name and address of contractor] (hereinafter called "the contractor") of the other part,

Whereas the Employer is desirous that the Contractor execute----------
----------[name and identification number of Contract] (hereinafter called "the Works") and the Employer has accepted the Tender by the contractor for the execution and completion of such Works and the remedying of any defects therein at a contract price of Rupees----------.

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.

2. 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 aspects with the provisions of the Contract.

3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying the defects wherein 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.

4. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.
   a) Letter of Acceptance
   b) Notice to proceed with the works
   c) Contractor's Tender
   d) Contract Data
   e) Conditions of contract (including Special Conditions of Contract)
   f) Specifications
   g) Drawings
   h) Bill of Quantities and

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

i) Any other document listed in the Contract Data as forming part of the contract.

5. No amendment to this Agreement shall be valid or be of any affect unless the same is agreed to in writing by both the parties hereto and specifically stated to be an amendment to this Agreement.

In witness whereof the parties hereto have caused this Agreement to be executed the day and year first before written :

The Common Seal of ---------- was hereunto affixed

in the presence of : ----------Signed, Sealed and Delivered by the said ---------- in the presence of : ---------- ----------Binding signature of Employer: ---------- ---------- Binding Signature of Contractor : ----------

Annexure-4

Format for Notice to proceed with the work
(on Employer's / Engineer's letterhead)

Ref. no.:
Dated:

To:
---------- [Name and Address of the Contractor]

Dear Sirs,

Pursuant to your furnishing the requisite security as stipulated at para-16 of Invitation to Tender and signing of the Contract for ---------- at a Contract Price of Rs.----------, you are hereby instructed to proceed with the execution of the said works in accordance with the contract documents. The Contract Price stated above is subject to revision in terms of variations in the actual quantities to be executed in respect of the various items in the Bill of Quantities.

Yours sincerely,

Authorised Signature
Name and Title of Signatory

Annexure-5

Form of Tender Security (Bank Guarantee)

To
HOOGHLY COCHIN SHIPYARD LTD
(Govt. of India Enterprise,)
Administrative Building, HCSL Premises,
Satyen Bose Road, Danesh SK Lane (PO),
Nazirgunge, Howrah, West Bengal - 711109.

WHEREAS, _____ *[name of Tenderer]* (hereinafter called "the Tenderer") has submitted / is submitting his Tender for _____ *[name of Contract]* (hereinafter called "the Tender"),

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 _____ *[name of Employer]* (hereinafter called "the Employer") in the sum of _____ * for which payment well and truly to be made to the said Employer, the Bank binds itself, his successors and assigns by these presents.

SEALED with the common seal of the said bank this _____ day of _____ of 20----.

THE CONDITIONS of this obligation are:

1) If after tender opening the Tenderer withdraws his tender during the period of Tender validity specified in the Form of Tender;
2) If the Tenderer having been notified of the acceptance of his tender by the Employer during the period of Tender validity:
    a) fails or refuses to execute the Form of Agreement in accordance with the Instructions to Tenderers, if required; or
    b) fails or refuses to furnish the Performance Security, in accordance with the Instruction to tenderer,

    then, we undertake to pay, without cavil or argument, to the Employer upto the above amount upon receipt of Employer's first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that

the amount claimed by him is due to him owing to the occurrence of one or any of the two conditions, specifying the occurred condition or conditions.

3) This guarantee will remain in force upto and including the date _____ , which is 145 days, being the sum of 120 days of Tender Validity after the deadline date for tender submission and 25 days thereafter, as such deadline and stipulations are stated in the Instructions to Tenderers or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not later than the above date.

4) This guarantee shall not be vitiated by any change in the constitution of the Bank or the Tenderer or the Employer.

DATE _____ SIGNATURE OF THE BANK _____

WITNESS _____ SEAL _____

---

* *The Tenderer should insert the amount of the guarantee in words and figures denominated in Indian Rupees. This Figure should be the same as stipulated in the Tender Notice.*

Hooghly Cochin Shipyard Limited
हावड़ा-०९
HOWRAH-09

Annexure-6

Format for Performance Bank Guarantee/Warranty Guarantee

To
HOOGHLY COCHIN SHIPYARD LTD
(Govt. of India Enterprise,)
Administrative Building, HCSL Premises,
Satyen Bose Road, Danesh SK Lane (PO),
Nazirgunge, Howrah, West Bengal - 711109.

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

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognised bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract.

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, upto a total of _____ *[amount of guarantee]** _____ *[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 thereunder 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 until 28 days from the date of expiry of the Defects Liability Period.

This guarantee shall not be vitiated by any change in the constitution of the Bank or the Tenderer or the Employer.

Signature and seal of the guarantor _____

Name of Bank _____

Address _____

Date _____

---

* An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract as Performance Security and denominated in Indian Rupees.

Annexure-7

Format for Bank Guarantee for Release of Secured Advance against Materials brought to Site (Not Applicable)

To
HOOGHLY COCHIN SHIPYARD LTD
(Govt. of India Enterprise,)
Administrative Building, HCSL Premises,
Satyen Bose Road, Danesh SK Lane (PO),
Nazirgunge, Howrah, West Bengal - 711109.

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

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor may opt to furnish you with a Bank Guarantee by a recognised bank for the sum specified therein as security for his being eligible for receiving advance against materials brought by him to Site, in accordance with the Contract.

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, upto a total of _____ *[amount of guarantee]** _____ *[in words]*, such sum being arrived at as the maximum amount of unadjusted advance that may remain with the Contractor at any time during the pendency of the Contract, payable in the types and proportions of currencies in which the Contract Price as per terms of the Contract 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 thereunder 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 until 28 days from the date of expiry of the Defects Liability Period.This guarantee shall not be vitiated by any change in the constitution of the Bank or the Tenderer or the Employer.

Signature and seal of the guarantor _____

Name of Bank _____

Address _____

Date _____

---

* An amount shall be inserted by the Guarantor, representing the amount of unadjusted / unrecovered advance that can be maintained against this Guarantee and denominated in Indian Rupees.

~~Annexure-8~~

~~Format for Performance Bank Guarantee for Release of Retention Money~~ (Not Applicable)

~~To~~
~~HOOGHLY COCHIN SHIPYARD LTD~~
~~(Govt. of India Enterprise,)~~
~~Administrative Building, HCSL Premises,~~
~~Satyen Bose Road, Danesh SK Lane (PO),~~
~~Nazirgunge, Howrah, West Bengal - 711109.~~

~~WHEREAS _____ *[name and address of Contractor]* (hereinafter called "the Contractor" has undertaken, in pursuance of Contract no. _____ dated _____ to execute _____ *[name of Contractor and brief description of works] (* hereinafter called "the Contractor").~~

~~AND WHEREAS it has been stipulated by you in the said Contract that the Contractor may opt to furnish you with a Bank Guarantee by a recognised bank for the sum specified therein as security for compliance with his obligations during the Defect Liability Period, in accordance with the Contract.~~

~~NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, upto a total of _____ *[amount of guarantee]** _____ *[in words],* such sum being payable in the types and proportions of currencies in which the Retention Money as per terms of the Contract 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 thereunder 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 until 28 days from the date of expiry of the Defects Liability Period.~~

~~This guarantee shall not be vitiated by any change in the constitution of the Bank or the Tenderer or the Employer.~~

~~Signature and seal of the guarantor _____~~

Name of Bank _____

Address _____

Date _____

---

* An amount shall be inserted by the Guarantor, representing the amount of Retention Money sought to be released against this Guarantee and denominated in Indian Rupees.

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

Annexure – 9

Self-Declaration to be given by the bidder in Letter head

Bid's Reference No. & Date:

Bidder's Name & Address:

Person to be contacted:

Designation:

Telephone No.: Fax No.: Email:

1. We do hereby declare that we have not been debarred/black listed by Hooghly CSL or by any of the Public Sector Undertaking or Government department etc.

2. If Hooghly CSL finds that, we have been blacklisted/ debarred by any of the Public Sector Undertaking or Government department, and then Hooghly CSL can reject the offer or terminate the contract at any point of time. In such case, we are aware that, EMD, security deposit, performance guarantee etc will be forfeited by Hooghly CSL. Further we are confirming herewith that, any loss that has happened to Hooghly CSL due to this will be compensated by us.

For and on behalf of the firm

(Firms Name & Address)

(Signature of Authorized Signatory)

Name:

Designation

Phone No.:

Seal:

Date: .....

Place:.....

Annexure - 10

COMPLIANCE STATEMENT- List of Deviations	PAGE 1 OF 1
Tender Name: ELECTRIFICATION FOR SHIP REPAIRING FACILITY AT PANDU, GUWAHATI	
TENDER NO: HCSL/PANDU/TEN/2026/238 Dated: 06.11.2026	

We hereby confirm and truly declare that our Offer / Bid No. .....dated .....is in full compliance with the documents issued against the Tender No. ----------dated -------, except for the deviations listed below:

LIST OF DEVIATIONS (HOOGHLY CSL reserves the right to reject offers with deviations)

Sl. No.	Description / Tender Reference	Reasons for Deviation

Name of tenderer:
Date: Name & Designation Seal & Signature

(Company Seal)

हावड़ा-०९
HOWRAH-09

Annexure - 11

(Sample Format)

Details of legal cases pending against the firm for the last five years

SL. NO.	ORGANISATION AGAINST WHOM THE LITIGATION IS INVOLVED	BRIEF DETAILS OF DISPUTE	AMOUNTS INVOLVED (Rs. .....)	PRESENT STATUS	Remarks

SIGNATURE OF BIDDER

हावड़ा-०९
HOWRAH-09

Annexure - 12

TENDER DECLARATION

This is to certify that I have completely read and understood the tender enquiry / number .....and we/I, M/s....., hereby declare that will abide by all the tender conditions. Deviations, if any in the techno-commercial offer from that of the tender enquiry and subsequent corrigendum in any form will be clearly furnished by us in a separate document which will be titled as "List of Deviations".

If we are not providing any separate document titled as "List of Deviations" then it is to be considered that all the terms and conditions are acceptable to us.

Signature of Supplier/Authorized signature of firm/agency:

Name of Supplier or authorized signatory of firm/agency:

Designation:

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

Annexure-13

VENDOR DETAILS (to be submitted along with TECHNICAL BID)

1	Name of Bidder/Firm	
2	Registered office Address of Company/firm in Kolkata/Howrah: Local office address at Kolkata/Howrah (if held):	
3	Telephone No./Fax No./Mobile No:	
4	E-mail address:	
5	Names of the contact person & Designation:	1) 2) 3)
6	Type of Entity-Pro praetorship/Partnership firm/company/NSIC/MSME Category etc. (Please attach registration certificate of Firm/Partnership agreement/proprietorship documents)	
7	Cost of Tender Details (DD No. Name of Bank)	N/A
8	EMD Details (DD No. Name of Bank)	N/A
9	PAN Card Number (Self-attested copy of PAN card has to be Submitted)	
	GST Registration No. (Self-attested copy has to be Submitted)	
10	Whether the agency has been blacklisted/de barred or given tender holiday or contract terminated before expiry of the contract period by any govt. autonomous bodies/organizations where bidder has provided services earlier due to deficiencies in service or misconduct etc.	Yes/No (Please tick as applicable) If yes, please furnish details on a separate sheet

- **Certified that the above information is true to the best of our belief and information.**

Place:
Date:

Signature of Supplier/Authorized signature of firm/agency:
Name of Supplier or authorized signatory of firm/agency:
Designation:

Annexure - 14

HOOGHLY COCHIN SHIPYARD LIMITED

A wholly owned Subsidiary of Cochin Shipyard Limited,

A Government of India Enterprise under Ministry of Ports, Shipping and Waterways

SITE VISIT SLIP

I ....., authorized representative of .... address: .... Visited the site on .....and understood the work completely related to the work of procurement of **ELECTRIFICATION WORKS FOR SHIP REPAIRING FACILITY AT PANDU, GUWAHATI.**

....

Stamp and Signature of the representative of the firm Signature of HCSL officer

Annexure-15

PRE-CONTRACT INTEGRITY PACT

HOOGHLY COCHIN SHIPYARD LIMITED

General

This pre-bid pre-contract Agreement (hereinafter called the Integrity Pact) is made on.... day of the month of..... , between, on one hand, the President of India acting through Deputy
General Manager, Hooghly Cochin Shipyard Ltd (HOOGHLY CSL) having its registered office at Howrah, West Bengal, India (hereinafter called the "PRINCIPAL", which expression shall mean and include, unless the context otherwise requires, his successors in office and assigns) of the First part and M/s.....represented by Shri.....,Chief Executive Officer (hereinafter called the "BIDDER/Seller" which expression shall mean and include, unless the context otherwise requires, his successors and permitted assigns) of the second part.
WHEREAS the PRINCIPAL proposes to procure and the BIDDER/Seller is willing to offer / has offered the stores and
WHEREAS the BIDDER is a private company / public company / Government undertaking /partnership/registered export agency, constituted in accordance with the relevant law in the matter and the PRINCIPAL is a Government of India PSU performing its functions on behalf of The President of India.

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 with a view to:-
Enabling the PRINCIPAL to obtain the desired said stores/equipment/item at a competition price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement, and
Enabling BIDDERs to abstain from bribing or indulging in any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the PRINCIPAL 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. Commitments of the PRINCIPAL

The PRINCIPAL undertakes that no official of the PRINCIPAL, connected directly or indirectly with the contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial 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 on implementation process related to the contract.

The PRINCIPAL will, during the pre-contract stage, treat all BIDDERs a like and 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.

The officials of the PRINCIPAL will report to the appropriate Government office any attempted or completed breaches of the above commitments as well as any substantial suspicion of such a breach.

3. In case any such preceding misconduct on the part of such official(s) is reported by the BIDDER to the PRINCIPAL with full and verifiable facts and the same is prima facie found to be correct by the PRINCIPAL, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the PRINCIPAL and such a person shall be debarred from further dealings related to the contract process. In such a case while an enquiry is being conducted by the PRINCIPAL the proceedings under the contract would not be stalled.

4. Commitments of BIDDERs

The BIDDER commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of its bid or during any pre-contract

Or post-contract stage in order to secure the contract or in further anceto secure it and in particular commit itself to the following:-

The BIDDER will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the PRINCIPAL, 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.

The BIDDER further undertakes that it has not given, offered or promised to give, directly or indirectly any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the PRINCIPAL or otherwise in procuring the Contract or for bearing to do or having done any act in relation to the obtaining or execution of the contract of any other contract with the government for showing or forbearing to show favour or disfavor to any person in relation to the contract of any other contract with the Government.

BIDDERs of foreign origin shall disclose the name and address of their Indian agents and representatives, if any and Indian BIDDERs shall disclose their foreign principals or associates, if any.

BIDDERs shall disclose the payments to be made by them to their Indian agents/brokers or any other intermediary, in connection with this bid/contract and the payments have to be in Indian Rupees only.

The BIDDER further confirms and declares to the PRINCIPAL that the BIDDER is the original manufacturer/integrator/authorized agent of the stores/equipment/items and has not engaged any individual or firm or company whether Indian or foreign to intercede, facilitate or in any way to recommend to the PRINCIPAL or any of its functionaries, whether officially or unofficially to the 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.

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

The BIDDER, either while presenting the bid or during pre-contract negotiations or before signing the contract, shall disclose any payments he has made, is committed to or intends to make to officials of the PRINCIPAL or their family members, agents, brokers or any other intermediaries in connection with the contract and the details of services agreed upon for such payments.

The BIDDER will not collude with other parties interested in the contract to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract.

The BIDDER will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.

The BIDDER shall not use improperly, for purposes of competition or personal gain, pass on to others, any information provided by the PRINCIPAL 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 careless any such information is divulged.

The BIDDER commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts.

The BIDDER shall not instigate or cause to instigate any third person to commit any of the actions mentioned above.

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 the PRINCIPAL, or alternatively, if any relative of an officer of the PRINCIPAL has financial interest/stake in the BIDDER's firm, the same shall 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.

The BIDDER shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee or the PRINCIPAL.

5. Previous Transgression

The BIDDER declares that no previous transgression 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.

The BIDDER agrees that if it makes incorrect statement on this subject, BIDDER can be disqualified from the tender processor the contract, if already awarded, can be terminated for such reason.

6. Earnest Money (Security Deposit)

While submitting commercial bid, the BIDDER shall deposit an amount NIL (to be specified in RFP) as Earnest Money as applicable / Security Deposit, with the PRINCIPAL through any of the

following instruments:

(i) Bank Draft of Pay Order in favour of HOOGHLY CSL.

(ii) A confirmed guarantee by an Indian Nationalized Bank, promising payment of the guaranteed sum to the PRINCIPAL on demand within three working days without any demur whatsoever and without seeking any reasons whatsoever. The demand for payment by the PRINCIPAL shall be treated as conclusive proof of payment.

(iii) Any other mode or through any other instrument (to be specified in the RFP).

The Earnest Money if applicable/Security Deposit shall be valid upto the complete conclusion of the contractual obligations to the complete satisfaction of both the BIDDER and the PRINCIPAL, including warranty period.

In case of the successful BIDDER a clause would also be incorporated in the Article pertaining to Performance Bond in the Purchase Contract that the provisions of sanctions for Violation shall be applicable for forfeiture of Performance Bond in case of a decision by the PRINCIPAL to forfeit the same without assigning any reason for imposing sanction for violation of this Pact.

No interest shall be payable by the PRINCIPAL to the BIDDER on Earnest Money/ Security Deposit for the period of its currency.

7. Sanctions for Violations

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

To immediately call off the pre contract negotiations without assigning any reason or giving any; compensation to the BIDDER. However, the proceedings with the other BIDDER(s) would continue.

The Earnest Money Deposit (in pre-contract stage) and/or Security Deposit/ Performance Bond (after the contract is signed) shall stand forfeited either fully or partially, as decided by the PRINCIPAL and the PRINCIPAL shall not be required to assign any reason therefore.

To immediately cancel the contract, if already signed, without giving any compensation to the BIDDER.

To recover all sums already paid by the PRINCIPAL, and in the case of an Indian BIDDER with interest there on at 2% above the prevail2ing Prime Lending Rate of State Bank of India, while in case of a BIDDER from a country other than India with interest thereon at 2% above the LIBOR (London Inter Bank Offer Rate). If any outstanding payment is due to the BIDDER from the PRINCIPAL in connection with any other contract for any other stores, such outstanding payment could also be utilized to recover the aforesaid sum and interest.

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

To encash the advance bank guarantee and performance bond/warranty bond, if furnished by the BIDDER, in order to recover the payments, already made by the PRINCIPAL, along with interest.

To cancel all or any other contracts with the BIDDER. The BIDDER shall be liable to pay compensation for any loss or damage to the PRINCIPAL resulting from such cancellation /recession and the PRINCIPAL shall be entitled to deduct the amounts o payable from the money (s) due to the BIDDER.

To debar the BIDDER from participating in the future bidding processes of HOOGHLY CSL for a minimum period as deemed appropriate, which any be further extended at the discretion of the PRINCIPAL.

To recover all sums paid in violation of this Pact by BIDDER(s) to any middle man or agent or broker with a view to securing the contract.

In cases where irrevocable Letters of Credit have been received in respect of any contract signed by the PRINCIPAL with the BIDDER, the same shall not be opened.

Forfeiture of Performance Bond in case of a decision by the PRINCIPAL to forfeit the same without assigning any reason for imposing sanction for violation of this pact.

The PRINCIPAL will be entitled to take all or any of the actions mentioned at para 6.1(i) to(x) of this pact also on the Commission by the BIDDER or any one 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.

The decision of the PRINCIPAL to the effect that a breach of the provisions of this pact has been committed by the BIDDER shall be binding on the BIDDER. However, the BIDDER can approach the Independent Monitor(s) appointed for the purposes this Pact.

8. Independent Monitor

The PRINCIPAL has appointed Independent Monitors (hereinafter referred to as Monitors) for this Pact in consultation with the Central Vigilance Commission.

1. Dr. Rajan S Katoch, IAS (Retd) A-91, Alkapuri, Bhopal (MP) - 462022. Mobile: 8800919222; Email: rkatoch@nic.in.

2. Dr. Vinod Bihari Mathur, IFoS (Retd.) D302, Arborea Luxury Homes, Tarla Nagal, Near Doon Helidrome, Dehradun, Uttarakhand – 248001. Mobile: 9412054648; Email: vbm.ddn@gmail.com

The task of the Monitors shall be to review independently and objectively, whether and to what

extend the parties comply with the obligations under this Pact.

The Monitors shall not be subject to instructions by the representatives of the parties and perform their functions neutrally and independently.

Both the parties accept that the Monitors have the right to access all the documents relating to the project/procurement, including minutes of meetings.

As soon as the Monitors notices, or has reason to believe, a violation of this pact, he will so inform the Authority designated by the PRINCIPAL.

The PRINCIPAL accepts that the Monitors have the right to access without restriction to all Project documentation of the BUYER including that provided by the BIDDER. The BIDDER will also grant the Monitors, upon his request and demonstration of a valid interest, unlimited access to his project documentation. The same is applicable to Subcontractors. The Monitors shall be under contractual obligation to treat the information and documents of the BIDDER/ Subcontractor(s) with confidentiality.

The PRINCIPAL will provide to the Monitors sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the parties. The parties will offer to the Monitors the option to participate in such meetings.

The Monitors will submit a written report to the designated Authority of PRINCIPAL/ Secretary in the Department/within 8 to10 weeks from the date of reference or intimation to him by the PRINCIPAL /BIDDER and, should the occasion arise, submit proposals for correcting problematic situations.

9. Facilitation of Investigation

In case of any allegation of violation of any provisions of this pact or payment of commission, the PRINCIPAL or its agencies shall be entitled to examine all the documents including the Books of Accounts of the BIDDER. The BIDDER shall provide necessary information and documents in English and shall extend all possible help of the purpose of such examination/ inspection.

10. Law and Place of Jurisdiction

This Pact is subject to Indian Law. The place of performance and jurisdiction is the seat of the PRINCIPAL.
A person signing Integrity Pact shall not approach the Courts while representing the matters to Independent External Monitors and shall await await their decision in the matter.

11. 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 extent law in force relating to any civil or criminal proceedings.

12. Validity

The validity of this Integrity Pact shall be from date of its signing and extend up to 5 years or the complete execution of the contract to the satisfaction of both the PRINCIPAL and the BIDDER/Seller, including warranty period, whichever is later. In case BIDDER is unsuccessful, this Integrity Pact shall expire after six months from the date of the signing of the contract.

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

13. The parties hereby sign this Integrity Pact at.....on.....

----------	----------
PRINCIPAL	**BIDDER**
Name of the Officer Designation Dept./ MINISTRY/ PSU	CHIEF EXECUTIVE OFFICER
Witness	Witness
1.....	1.....
2.....	2.....

*Provisions of these clauses would need to be amended/ deleted in line with the policy of the BUYER in regard to involvement of Indian agents of foreign suppliers.

DEVELOPMENT OF SHIP REPAIRING FACILITY WORK AT PANDU, GUWAHATI.

PACKAGE II: TENDER FOR ELECTRIFICATION WORKS

GENERAL CONDITIONS OF CONTRACT

HOWRAH-09 Cochin Shipyard Limited

INDEX for GCC

1.0 Definition, interpretations, etc
1.3 Definitions
1.4 Communications
1.5 Queries about the Contract Data
1.6 Notices
2.0 Extent and scope of Contract
2.2 Contractor's obligations
2.3 Coverage of costs
2.4 Employer's obligations
2.5 Contract Agreement
2.6 Language of the Contract and applicable law
2.7 Documents forming part of the Contract
2.8 Documents mutually explanatory
2.9 Interpretation of Contract documents
2.10 Sufficiency of Tender
2.11 Sufficiency of Contract
2.12 Securities
2.13 Change in Employer / Engineer
2.14 Subcontracting
2.15 Assignment and transfer of Contract
2.16 Employer's and Contractor's Risks
3.0 Engineer
3.1 Identity
3.2 Delegation
3.3 Works to the satisfaction of Engineer
3.4 Duties and powers of Engineer
3.5 Instructions
3.6 Form of instructions
3.7 Site Order Book
3.8 Compliance by Contractor
4.0 Drawings
4.1 Supply of Drawings
4.2 Return of Drawings
4.3 As-built drawings
4.4 Drawings to be available at Site
4.5 Ownership of drawings and documents
4.6 Confidentiality of drawings & documents
4.7 Tender Drawings
5.0 Measurements
6.0 Alterations, additions and
7.0 Site
7.1 Possession of the site
7.2 Awareness of Site
7.3 Access to Site and Works
7.4 Land for Contractor
7.5 Clearing the Site
7.6 Discoveries
7.7 Unauthorized use
8.0 Temporary Works and utilities
8.5 Approval by the Engineer
8.6 Water
8.7 Electricity
8.8 Lighting
8.9 Rectification of utilities
8.10 Construction yards and premises
8.11 Site Office, stores and work places
9.0 Cooperation and coordination
9.2 Interference
9.3 Facilities for others
9.4 Coordinating work
9.5 Engineer's decision
10.0 Safety and Security
10.3 Explosives
11.0 Protection of Environment
12.0 Care of Works
12.5 Damages to persons and property
12.6 Insurance
13.0 Plant, Materials & Labour
13.3 Adequacy
13.4 Liability against loss or injury to plant
13.5 Irremovability
13.6 Plant, Equipment, Tools and Tackles
13.7 Plant and machinery by Employer
13.8 Engineers discretion
13.9 Obligations of the Contractor
13.10 Charges
13.11 Materials
13.12 Substitution
13.13 Materials obtained from dismantling, etc.
13.14 Patent Rights & Royalties

omissions

6.1 Variations
6.2 Orders for variations to be in writing
6.3 Valuation of variations and Power of Engineer
6.4 Day work

13.15 Materials by Employer
13.16 Requisition
13.17 Emergency procurement
13.18 Intertransfer
13.19 Bonafide use
13.20 Accounting

Contd....

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

INDEX for GCC *contd*

14.0	**Manpower**	18.8	Documents alongwith Bills
14.4	Compliance with Labour Regulations	18.9	Periodicity of Bills
14.5	Indemnity	18.10	Minimum amount for certification
14.6	Returns of Labour	18.11	Period of certification
14.7	Authorised Agent	18.12	Amending previous certifications
14.8	Competent personnel	18.13	Payments
14.9	Removal of Workmen	18.14	Mode of payment
14.10	Accident or injury to Workmen	18.15	Interest on late payment
14.11	Salient features of some major labour laws	18.16	Tax
15.0	**Time**	**19.0**	**Closing the Contract**
15.2	Dates	19.2	Completion Certificate
15.3	Programme	19.3	Multiple Completion Certificates
15.4	Extension of the Intended Completion Date	19.4	Taking over ahead of Completion Certificate
15.5	Early Warning	19.5	Guarantee Period
15.6	Delays and suspensions ordered by Engineer	19.6	Guarantee period Certificate
15.7	Suspension lasting more than three months	19.7	Approval onlyby guaranteeperiod certificate
15.8	Possession of site and instructions for work	19.8	Cessation of Employer's Liability
15.9	Management Meetings	19.9	Multiple guarantee period certificates
15.10	Liquidated damages for delay	~~19.10~~	~~Retention Money~~
15.11	Reduction & adjustment of LD	~~19.11~~	~~Release of Retention~~
15.12	Certificate of completion of works	19.12	Completion
15.13	Milestones	19.13	Taking over
16.0	**Quality**	19.14	Final Account
16.1	Responsibility	19.15	Components of Final Bill
16.2	Quality Assurance Plan	19.16	Documents to accompany Final Bill
16.3	Defects	19.17	Action on Final Bill
16.4	Covered-up works	**20.0**	**Termination of Contract**
16.5	Tests	20.2	Fundamental breach of Contract
16.6	Laboratory	20.3	Termination of Contract by the Employer:
16.7	Samples	20.4	Valuation at date of termination of Contract
16.8	Guarantees and warranties	20.5	Termination of Contract by Contractor:
16.9	Documents	20.6	Payment after termination of Contract
16.10	Preliminary and final acceptance tests	20.7	Urgent Repairs
17.0	**Defect Liability Period**	20.8	Frustration of Contract
17.3	Commencement	20.9	Works to be continued on outbreak of war
17.4	Duration	20.10	Effect of completion within days
17.5	Execution of Work or repair, etc	20.11	Right of Employer

17.6	Cost of execution of repair, etc.	20.12	Removal of Plant on Determination
17.7	Remedy on Contractor's failure	20.13	Payment on Determination
			Provisions to apply as from
18.0	**Cost and payment**	20.14	outbreak of war
18.1	Contract Price	20.15	Payment upon Termination
18.2	Bill of Quantities	20.16	Property, upon termination
18.3	Changes in the Quantities	20.17	
			Disputes and stages of dispute
18.4	Variations in cost	**21.0**	**settlement**
18.5	Payments for Variations	21.1	Amicable dispute settlement
18.6	~~Retention~~	21.2	Arbitration
18.7	Bills	21.3	Court of law
		22	Force MAJEURE
		23	Independent monitor

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

GENERAL CONDITIONS OF CONTRACT

1.0 Definition, interpretations, etc.

1.1 Terms, which are defined in the Conditions of Contract, are not also defined in the Contract Data and vice versa, but keep their defined meanings. Capital initials are used to identify defined terms. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined.

1.2 Where the context so requires, words importing the singular only also include the plural and vice versa, words importing persons include firms and corporates and vice versa and words importing masculine gender include the feminine gender and neuter and vice versa.

1.3 **Definitions:** In the Contract (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them except where the context otherwise requires. The terms Employer and Engineer are interchangeable in their meaning as the context requires and are purported to mean the same to the extent that such meaning is not at conflict with the rights, duties, responsibilities and functions attributable to the Employer or the Engineer.

- Approved means approved in writing including the subsequent written confirmation of previous verbal approval and Approval means approval in writing including as aforesaid.
- Bill of Quantities means the priced and completed Bill of Quantities forming part of the Bid.
- Completion Date is the date of completion of the Works as certified by the Engineer.
- Constructional Plant means all appliances or things of whatsoever nature required in or about the execution, completion or guarantee period of the works or temporary works (as hereinafter defined) but does not include materials or other things intended to form or forming part of the permanent work.
- Consultant means National Technology Centre for Ports Waterways and Coasts, IIT Madras, Room no. 606, 6th Floor, NAC, IIT Madras, Adayar, Chennai – 600036 and their personal representatives or successors or assignees.
- Contract Data defines the documents and other information that comprise the Contract and may be forming part of either the General Conditions of Contract or the Special Conditions of Contract, irrespective of which it is applicable to the whole of the Contract.
- Contract is the contract between the Employer and the Contractor, whereby the Contractor agrees to execute, complete and maintain the works and comprises invitation to tender, instructions to tenderers, tender with all the enclosures thereto, articles of agreement, general conditions of contract, special conditions of contract, technical specifications, preamble to bill of quantities, bill of quantities, schedule of rates and prices (if any), tender drawings together with the letter of intent or letter of acceptance, notice to proceed with the works, and other documents that may be specified in any of the above.
- Contract Price is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.
- Contractor is a person or body corporate whose tender to carry out the works has been accepted by the Employer and includes the Contractor's heirs,

executors, administrators, legal representatives, personal representatives, successors and permitted assignees, where the context requires.

- Contractor's Account means any moneys in the Employer's hands due or which may become due to the Contractor under this Contract. As the context and circumstances require, this also means any moneys in the Employer's hands due or which may become due to the Contractor under any other contract or business between the Contractor and the Employer or Employer's subsidiary unit / companies / associates. Further, all moneys of the Employer lying with the Contractor, for whatever reason or cause, are directly relatable to the Contractor's Account.
- Contractor's Bid is the completed tender document submitted by the Contractor to the Employer.
- Corrupt practice means the offering, giving, receiving or soliciting of any thing of value to influence the action of an official or individual or body in the tendering process or in contract execution.
- Fraudulent practice means a misrepresentation of facts in order to influence a tendering process or the execution or the execution to the detriment of the Employer, and includes collusive practice among tenderers, prior to or after bid submission, designed to establish tender prices at artificial non-competitive levels and to deprive the Employer of the benefits of free and open competition.
- Days are calendar days; months are calendar months.
- Defect is any part of the works not completed or became nonfunctional in accordance with the Contract.
- Defects Liability Period is the period named in the Contract Data and calculated from the Completion Date.
- Drawings means the drawings and tracings or prints there-of, annexed to the Contract or referred to in the specification and any modification of such drawings approved in writing by the Engineer and such other drawings as may from time to time be furnished or approved in writing by the Engineer.
- Employer is the party who will employ the Contractor to carry out the Works.
- Engineer is the person named in the Contract Data (or any other competent person appointed and notified to the contractor to act in replacement of the Engineer) who is responsible for supervising the Contractor, administering the Contract, certifying payments due to the Contractor, issuing and valuing variations to the Contract, awarding extensions of time
- Engineers Representative means any assistant of the Engineer or any clerk of works / employee or agent appointed from time to time by the Employer / Consultant or the Engineer.
- Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.
- Initial Contract Price is the Contract price listed in the Employer's Letter of Acceptance.
- Intended Completion Date is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Engineer by issuing an extension of time.



- Letter of Intent / Letter of Acceptance mean an intimation, by a letter, to a tenderer that his tender has been accepted in accordance with the provisions contained in that letter.
- Materials are all supplies, including consumables, used by the contractor for incorporation in the works.
- Notice in Writing or Written Notice means a notice in written, typed or printed characters sent (unless delivered personally or otherwise proved to have been received) by registered post to the last known private or business address or registered office of the addressee and shall be deemed to have been received when in the ordinary course of post it would have been delivered.
- Owner / Employer means and includes Owner's / Employer's personal representatives or successors, permitted assignees, heirs, executors, administrators, legal representatives, personal representatives, where the context requires.
- Site is the area meant for executing the Works.
- Site means the lands and other places envisaged by the employer on, under, in or through which the works are to be executed or carried out and any other lands or places provided by the employer for the purpose of the contract.
- Specification means the Technical specification of the works included in the Contract and any modification or addition thereof made or approved by the Engineer.
- Start Date is the date when the Contractor shall commence execution of the works and does not necessarily coincide with any of the Site Possession Dates.
- Subcontractor is a person or partnership or body corporate who has a contract or understanding with the Contractor to carry out a part of the work in the Contract which includes work on the Site or outside the Site.
- Temporary Works means all temporary works of every kind required in or about the execution, completion or guarantee period of the works.
- Variation is an instruction given by the Engineer that varies the Works in terms of quantity and new items which are not covered in the contract.
- Virtual completion means that the work is, in the opinion of the Engineer, substantially completed and has satisfactorily passed any final test that may be prescribed in the Contract.
- Works shall mean and include all works specified or set forth and required in and by the specifications, drawings and other documents hereto annexed or to be implied therefrom or incidental thereto or to be hereafter specified or required in such explanatory instructions and drawings and also such additional instructions and drawings as shall from time to time be supplied by the Engineer during the progress of the work hereby contracted for.

1.4 Communications

1.4.1 Communications between parties, which are referred to in the Contract, are effective only when in writing in the form of letter or email. A notice shall be effective only when delivered (in terms of Indian Contract Act).

1.5 Queries about the Contract Data

1.5.1 The Engineer will clarify queries on the Contract Data.

1.6 Notices

1.6.1 Service of Notices on Contractor: Any notice to be given to the Contractor under the terms of the Contract shall be considered duly served if the same shall have been delivered to, left for or posted by registered post to the Contractor's principal place of business (or in the event of the Contractor being a company to or at its Registered Office) or at the site.

1.6.2 Service of Notices on Owner: Any notice to be given to the Employer under the terms of the Contract shall be considered as duly served, if the same shall have been delivered to, left for, or posted by registered post to the Employer's last known address.

2.0 Extent and scope of Contract

2.1 The Contract comprises the electrification and guarantee period of the Works by the Contractor, in accordance with the various provisions in the Contract, complete in all respects as per drawings, specifications and instructions of the Engineer and any other details to be furnished from time to time and as broadly indicated in the bill of quantities, in consideration of which the Employer pays the Contractor for the aforesaid.

2.2 Contractor's obligations

2.2.1 The Contractor's obligations and responsibilities include providing everything whether of a temporary or permanent nature required for due carrying out of the Contract, including but not limited to arranging for water, power, consumables, materials, transport and facilities for storage, shifting, handling and installation, tools and tackles, testing, documentation, labour, supervision and Temporary Works, insurance coverages, taxes, duties, royalties and overheads in that connection

2.3 Coverage of costs

2.3.1 Except where it is expressly provided that the cost will be borne by the Employer, the various obligations of the Contractor under the Contract shall be at the cost of the Contractor and are deemed to be fully covered under the Contracted rates or amounts.

2.3.2 All costs in respect of approvals / inspection of electrical inspectorate and approvals / inspection of all Temporary Works shall also be borne by the Contractor.

2.4 Employer's obligations

2.4.1 The Employer's obligations and responsibilities are making available the Site and necessary instructions and drawings as required and to make payments to the Contractor in time and at times as specified in the Contract.

2.4.2 The Employer shall bear the cost statutory fees paid to Government Authorities. The same shall be supported by invoice from the Government Authoroties.

2.5 Contract Agreement

The Contractor shall enter into and execute a Contract agreement in the prescribed form within the time specified in the Contract Data and / or the Letter of Acceptance of the Employer.

2.6 Language of the Contract and applicable law

2.6.1 The language of the Contract shall be English and the Contract shall be governed by the Law for the time being in force in the Republic of India.

2.7 Documents forming part of the Contract

Hooghly Cochin Shipyard Limited HOWRAH-09

2.7.1 The documents forming part of the Contract are listed under the format for Articles of Agreement.

2.8 Documents mutually explanatory

2.8.1 The several documents forming the Contract are to be considered as mutually explanatory of one another and in case of ambiguities or discrepancies, the same shall be explained and adjusted by the Engineer who shall thereupon issue to the Contractor instructions directing as to in what manner the work is to be carried out and in what manner the Contract is to be operated.

2.9 Interpretation of Contract documents

2.9.1 In case any portion of the Contract documents is repugnant to or at variance with provisions of any other portion, the documents that shall prevail over the other shall be as detailed hereunder, unless the Engineer, taking into account the peculiarities of the context, directs to a different interpretation:

a) Special Conditions of Contract prevail over provisions of General Conditions of Contract.

b) Provisions in the Bill of Quantities including the preamble thereof shall prevail over the provisions of specifications, drawings and Special Conditions of Contract.

c) Between two issues of the same document, the document revised or re-issued as of the later date shall prevail.

2.9.2 All specifications, drawings and other documents shall be interpreted in conformity with the General Conditions of Contract as supplemented and / or modified by the Special Conditions of Contract.

2.9.3 In case of any conflict of meaning either in the same document or between other documents (other than the above stipulations), the Engineer's decision will be final, binding and conclusive.

2.9.4 Notwithstanding the aforesaid, the documents forming the Contract shall be interpreted in the following order of priority:

a) Contract Agreement
b) Work order
c) Any agreed deviationsbetween the Employer and the Contractor including but not limited to minutes of negotiation, amendments of specifications and/ or specifications
d) Accepted Schedule of Rates/ prices
e) Technical specifications
f) Drawings
g) Special conditions of contract (SCC)
h) General Conditions of the Contract (GCC)
i) Employers Requirements
j) Instruction to Bidders & Notice inviting tender
k) All materials, literature, drawings, data, duly filled forms and formats and information of any sort given by the Contractor and approved by Employer as well as the one given by the Employer tothe contractor.
l) Any other documents as may be required.

Decisions taken by the Employer for the successful completion of the works shall be final and binding on the parties.

2.10 Sufficiency of Tender

2.10.1 The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the Works and of the rates and prices he has stated in the Bill of Quantities and that the same cover all his obligations under the Contract and all matters and things necessary for the proper construction completion and guarantee period of the Works and compliance to all his obligations under the Contract.

2.11 Sufficiency of Contract

2.11.1 The Contract is deemed to have been entered into after both parties to it have mutually agreed as to its sufficiency in enabling both parties to fully and adequately perform their respective duties and meet their obligations under the Contract.

2.12 Securities

2.12.1 The securities and /or deposits, in terms of money and / or guarantees from banks, that are required to be maintained by the Contractor for his due fulfillment of his various responsibilities and obligations, both at the time of tendering and during the period of Contract, including during Electrification works and guarantee period, are specified elsewhere in this document under the respective heads and chapters.

2.13 Change in Employer / Engineer

2.13.1 If for any reason the Contract is transferred or the Work is transferred from the jurisdiction of the Employer to another Company or a project Authority or vice versa while the Contract is in subsistence, the Contract shall continue to be binding on the Contractor and the successor company / project authority in the same manner and take effect in all respects as if the Contractor and the successor company / project authority were parties thereto from the inception and the corresponding office or the competent authority in the successor company / project authority will exercise the same powers and enjoy the same authority as conferred to the predecessor company / project authority under the original Contract Agreement entered into.

2.14 Subcontracting

2.14.1 The Contractor may subcontract or sublet parts of the Work only with the approval of the Engineer.

2.14.2 The execution of the details of Works by petty contracts under the direct and personal supervision of the Contractor or his agent shall not be deemed to be subcontracting under this clause.

2.14.3 Subcontracting does not alter the Contractor's obligations.

2.14.4 Subcontracting or sub-letting shall not establish any contractual relationship between the Subcontractor and the Employer and shall not relieve the Contractor of any of his responsibilities, liabilities or obligations under the Contract, and the Contractor is deemed responsible for the acts and deeds of the Subcontractors or their agents, servants or workmen as fully as if they were the acts, defaults or neglects of the Contractor or his agents, servants or workmen.

2.15 Assignment and transfer of Contract

2.15.1 The Contractor shall not assign or transfer the Contract or any part thereof or any benefit or interest herein or hereunder without the written consent of the Employer. In the event of the Contractor contravening this condition, the

HOWRAH-03 Hooghly Cochin Shipyard Limited

Employer shall be entitled to place the Contract elsewhere on the Contractor's account and at his risk and the Contractor shall be liable for any loss or damage which the Employer may sustain in consequence of or arising out of such replacing of Contract.

2.16 Employer's and Contractor's Risks

2.16.1 The Employer carries the risks which this Contract states are Employer's risks and the Contractor carries the risks which this Contract states are Contractor's risks.

2.16.2 **Employer's Risks**

a) The Employer is responsible for the Excepted Risks which in so far as they directly affect the execution of the works are riot, war, invasion, act of foreign enemies, hostilities (whether war be declared or not), civil war, rebellion, revolution, insurrection or military or usurped power (in so far these are un-insurable) or disorder (unless restricted to the Contractor's employees or work force or Subcontractor's work force) or a cause solely due to use or occupation by the employer of any portion of the Works in respect of which a Certificate of Completion has been issued or contamination from any nuclear fuel or nuclear waste or radioactive / toxic / explosive material, or a cause solely due to the design of the works (all of which are herein collectively referred to as 'Excepted Risks').

2.16.3 **Contractor's Risks**

a) All risks of loss of or damage to physical property and of personal injury and death, which arise during and in consequence of the performance of the Contract, other than the Excepted Risks, are the responsibility of the Contractor.

3.0 Engineer

3.1 Identity

3.1.1 In so far as this Contract is concerned, Engineer shall denote any nominee or employee or any organisation or firm or body or team appointed by the Employer to operate this Contract.

3.1.2 All the rights and privileges held by the Employer under this Contract are deemed to be vested with the Engineer.

3.1.3 The Engineer shall act as he deems fit in safeguarding and furthering the interests of the Employer. In this Contract, the terms Employer and Engineer are used to denote either of them as the context requires and are interchangeable as to the meaning implied.

3.2 Delegation

3.2.1 The Engineer may delegate any of his duties and responsibilities to others, except to the Adjudicator, after notifying the Contractor and may cancel any delegation after notifying the Contractor.

3.3 Works to the satisfaction of Engineer

3.3.1 The Contractor shall fulfill his obligations and duties under this Contract and execute, complete and maintain the Works in strict accordance with the Contract to the satisfaction of the Engineer and shall comply with and adhere strictly to

the Engineer's instructions and directions on any matter, whether mentioned in the Contract or not. The Contractor shall take instructions and directions only from the Engineer.

3.4 Duties and powers of Engineer

3.4.1 The Engineer shall have the right of general supervision and direction of the Work, including authority to stop the Work or parts of it whenever such stoppage may be necessary, to ensure the proper execution of the Contract, to reject all work and materials which do not conform to the Contract, to direct the application of Contractor's labour and machinery forces to any portion of the work as in his judgment is required, to order the labour and machinery forces increased or diminished, to take actions consequent to the Contractor's failure to comply with statutory requirements and to decide on questions which arise in the execution of the work and operation of the Contract, unless otherwise provided for in this Contract.

3.4.2 Except where otherwise specifically stated, the Engineer will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

3.4.3 The duties of Engineer or his representative are to watch and supervise the Works and to call for or carryout tests and examine any materials to be used or workmanship employed in connection with the Works.

3.4.4 Any instruction or approval given by the Engineer's Representative to the Contractor in connection with the Works shall bind the Contractor as though it had been given by the Engineer provided always as follows:

a) The Engineer's representative shall have no authority to relieve the Contractor of any of his duties or obligations under the Contract not 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 in the works, except with concurrence by the Engineer.

b) Failure of the Engineer's Representative to disapprove any work or materials shall not prejudice the Engineer to disapprove such work or materials and to order the pulling down, removal or breaking up thereof at the cost of the Contractor.

c) The decision, opinion, certificates or valuation of the Engineer in respect of any matter under this Contract shall be final, binding and conclusive.

d) If the Contractor shall be dissatisfied by reason of any decision of the Engineer's Representative, he shall be entitled to refer the matter to the Engineer who shall thereupon confirm, reverse or vary such decision.

3.5 Instructions

3.5.1 The Engineer may, in his absolute discretion from time to time, issue further drawings and / or written instructions, details, directions and explanations which are hereafter collectively referred to as the Employer's instructions in regard to:

a) Variation or modification of the design, quality or quantity of Works or the addition or omission or substitution of any works.

b) Any discrepancy in the drawings or between the Bill of Quantities and / or Drawings and / or specifications.

c) Removal from the site of any materials brought thereon by the Contractor and the substitution of any other materials thereof.

d) Removal and / or re-execution of any work executed by the Contractor.

हावड़ा-०२ HOWRAH-02

e) Dismissal from the Works of any person employed thereupon.

f) Opening up for inspection any work covered up.

g) Amending and making good of any defects.

h) Inspection and carrying out of tests of materials and finished work on site.

i) Deducting / recovering any amounts in respect of defective plant, materials, labour and finished work for which advance payments had been made, from any amounts due to the Contractor.

3.6 Form of instructions

3.6.1 Instructions from the Engineer or his Representative shall be in the form of orders / letters, as he deems fit.

3.6.2 Further, where convenient, such orders shall be in the form of entries made by them in the Site Order Book.

3.7 Site Order Book

3.7.1 The Contractor shall maintain a site order book, with numbered pages, at the Site. This book shall always be accessible to the Engineer and his Representative and shall never be taken out of the Site. The Contractor shall sign all orders and instructions written down in this book in token of his having seen and noted the same. The site order book, comprising all its volumes, will be the property of the Employer and shall be handed over to him at the end of the Work.

3.8 Compliance by Contractor

3.8.1 The Contractor shall forthwith comply with and duly execute any work comprised in the Engineer's orders and instructions, provided always that verbal directions and explanations given to the Contractor or his representative upon the work by the Engineer shall if, involving a variation, be confirmed in writing by the Contractor within seven days and if not dissented by the Engineer in writing within a period of seven days from the date of receipt of such confirmation in writing, such instructions shall be deemed to be the Engineer's instructions within the scope of the Contract.

3.8.2 If compliance with the Engineer's instructions as aforesaid involves work and / or loss beyond that contemplated by the Contract then, unless the same were issued owing to some breach of this Contract by the Contractor, the Employer shall pay to the Contractor the price of the said work as a extra to be valued by the Engineer and as provided in this Contract.

4.0 Drawings

4.1 Supply of Drawings

4.1.1 Drawings for the Works shall be provided by the Employer / Engineer to the Contractor, free of cost, in the number of copies stated in the Contract Data, from time to time during the progress of the Works as shall be necessary for the purpose of execution and guarantee period of the Works and the Contractor shall carry out the Works accordingly and be bound by the same. Extra copies, if available, shall be supplied by the Employer, at rates to be fixed by him.

4.1.2 The Contractor shall provide, at his cost, drawings for Temporary Works, vendor drawings for manufactured, Genaral arrangement drawings, earthing and lightning layouts, cable routing details and fabricated items and support them with design calculations as directed by the Engineer. All these shall be in four

copies. These are to be revised and re-submitted by the Contractor, at his cost, where found necessary by the Engineer. The Contractor is deemed to be responsible for all matters pertaining to patents or copyrights in respect of the contents of his submissions and the actual materials, components and items represented therein and the Engineer / Employee shall stand indemnified from all claims in this regard.

4.1.3 The Engineer shall have the right and authority to supply to the Contractor from time to time during the progress of the Works such further drawings and instructions as shall be necessary for the purpose of the proper and adequate execution and guarantee period of the Works and the Contractor shall carry out the Works accordingly and be bound by the same.

4.1.4 The Engineer reserves the right to alter or modify the drawings at any time. No claim will be entertained on account of such modifications or alterations made in the drawings. However, all elements of Works as actually executed will be measured and paid for. The opinion / decision of the Engineer in all such matters shall be final, binding and conclusive.

4.2 Return of Drawings

4.2.1 The drawings and specifications and copies thereof furnished by the Employer to the Contractor, with the exception of the signed Contract set, shall be returned by the Contractor to the Employer on completion of the Works or termination of the Contract.

4.2.2 In case the Contractor does not return the drawings in full, the Engineer shall withhold the amounts stated in the Contract Data from payments due to the Contractor.

4.3 As-built drawings

4.3.1 As-built drawings, in three sets, incorporating (in red ink) all the changes, etc. along with approval references, are to be prepared by the Contractor, free of cost and furnished to the Engineer, on completion of the Works or termination of the Contract. The Engineer may instruct for submission of these pertaining to parts of the Works, at any earlier times. The Engineer shall provide to the Contractor, at appropriate times, free of cost, three sets of base drawings if available, to enable the Contractor to prepare the As-built drawings.

4.3.2 In case the Contractor does not supply the As-built drawings, or they do not receive the Engineer's approval, the Engineer shall withhold the amount stated in the Contract Data from payments due to the Contractor.

4.4 Drawings to be available at Site

4.4.1 One copy of all the drawings shall be kept by the Contractor at the site and the same shall at all reasonable times be available for perusal and use by the Engineer or his representative.

4.5 Ownership of drawings and documents

4.5.1 All the drawings and the documents and copies thereof provided by the Employer to the Contractor, or those supplied by the Contractor, including the informations therein, are deemed to be the property of the Employer.

4.6 Confidentiality of drawings and documents

4.6.1 The Contractor is under obligation to ensure that he, his representatives, his Subcontractors and suppliers maintain strict confidentiality of the drawings and their contents and are prohibited from copying them in any manner or from passing them or their contents to any other individual or party or to use them for any purpose other than for the Works of the Employer under this Contract.

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

4.7 Tender drawings

4.7.1 The Special Conditions of Contract specify whether any drawings are enclosed to the Tender Document and whether any drawing is being made available for the perusal of the tenderer at the Employer's / Engineer's premises.

5.0 Measurements

5.1 Except where any general or detailed description of the work in the Bill of Quantities expressly shows to the contrary, Bill of Quantities shall be deemed to have been prepared and measurements shall be made according to the procedure set forth in Indian Standard Method of Measurement for Building Work IS1200, wherever applicable, and any subsequent amendment or modification thereof, notwithstanding any general or local custom.

5.2 The Engineer shall, except as otherwise stated, ascertain and determine by measurement the quantities and value of work done in accordance with the Contract.

5.3 The Engineer shall when he requires that any part or parts of the Works be measured give notice to the Contractor who shall forthwith attend or send a qualified agent, with necessary measuring tools and instruments and adequate assistance in the form of necessary labour, to assist the Engineer in making such measurement and shall furnish all particulars required by him. Should the Contractor not attend or neglect or fail to comply as above on the dates fixed by the Engineer for taking measurement as per notice given to the Contractor, then the measurement made by the Engineer or approved by him shall be taken to be the correct measurement of the work.

5.4 The quantities set out in the Schedule of quantities (Price Bid) are the estimated quantities of the work, but they are not to be taken as the actual and exact quantities of the Work to be executed by the Contractor in fulfillment of his obligations under the Contract. The payment shall be made for actual measured quantity both for supply and installation. In this case the quantity shall be taken after installation, i.e. only installed portion of the work after completing the work would be measured. Scrap and balance materials would not be measured and hence no payment would be made for the same.

5.5 It may be noted that payment against the supply of items, in any case shall not exceed the final measured quantity. Additional payment, if any released during the supply of items more than the final measured quantity, corresponding payment shall be adjusted later, while processing subsequent bills after the final measurement.

6.0 Alterations, additions and omissions

6.1 Variations

a) The quantities set out in the Schedule of quantities (Price Bid) are the estimated quantities of the work, but they are not to be taken as the actual and exact quantities of the Work to be executed by the Contractor in fulfillment of his obligations under the Contract. The payment shall be made for actual measured quantity both for supply

and installation. In this case the quantity shall be taken after installation, i.e. only installed portion of the work after completing the work would be measured. Scrap and balance materials would not be measured and hence no payment would be made for the same.

b) It may be noted that payment against the supply of items, in any case shall not exceed the final measured quantity. Additional payment, if any released during the supply of items more than the final measured quantity, corresponding payment shall be adjusted

6.1.1 later, while processing subsequent bills after the final measurement

6.2 Valuation of variations and Power of the Engineer to fix rates which are not covered in the BOQ

In the case of works covered in the contract the contractor shall carryout the works as per BOQ rates irrespective of the quantity variations. In case of extra works which are not covered in BOQ, if supplied, payment shall be as follows:

i) Market rates of items from OEM and labour supplied, hire charges of equipment and machinery if used, plus 15% for overheads and profits of Contractor.

6.3 Day work

7.0 Site

7.1 Possession of the Site

7.1.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Contract Data, the Employer is deemed to have delayed the start of the relevant activities .

7.2 Awareness of Site

7.2.1 The Contractor shall visit, inspect and examine the site and its surroundings and shall satisfy himself before submitting his tender as to the form and nature of the site conditions, facilities necessary for the completion of Electrification works and guarantee period of the Works and the means of access to the site, the accommodation and other facilities that may be required, statutory requirements and in general shall himself obtain all necessary informations as to working conditions, risks and contingencies.

7.2.2 The tender is deemed to have taken all these aspects into account and all rates quoted shall be deemed to be inclusive of all costs thereof.

7.3 Access to Site and Works

7.3.1 The Contractor shall allow at all times the Engineer and any person authorised by the Engineer access to the Site and do the Works, to any place where work or any activity in connection with the Contract is being carried out or is intended to be carried out and to any place where materials are being sourced / assembled for the Works.

7.3.2 The Contractor is obliged to ensure adequate technical manpower to answer queries of the Engineer or his representative at all such venues and at all such times as the Engineer desires.

7.4 Land for Contractor

हावड़ा-०९ HOWRAH-09

7.4.1 The Employer will, at his discretion and for the duration of the Electrification / guarantee period, make available land free of charge, within the site of Work, for the Contractor to establish his site office, stores, site storage yard and the like, as required for the execution of the Contract.

7.4.2 The costs incurred by the Contractor in setting up of temporary utilities, fencing, accesses, site office, stores etc., shall be fully borne by him and no payment is due from the Employer in this regard.

7.4.3 It is obligatory on part of the Contractor to ensure hygienic conditions in regard to the Temporary Facilities set up by him. Good sanitation and cleanliness shall be ensured.

7.4.4 Land or any other facilities for lodging the supervisory staff of the Contractor and the labour shall not be made available by the Employer and the Contractor has to make his own arrangements outside project site, including conveyance.

7.5 Clearing the Site

7.5.1 On completion of Works and / or termination of Contract, utilities, fencing, accesses, etc., set up by the Contractor and all Temporary Works shall be dismantled and removed from the site by the Contractor, leaving the site and Works clear and cleaned of all obstructions, at his cost. In the event of Contractor's failure to do so, the Employer reserves the right to clear the site in the manner as he may deem necessary and the costs and expenses thereof as incurred by the Employer shall be debited to the Contractor's Account, without prejudice to any other measures the Employer is empowered to take under the Contract

7.6 Discoveries

7.6.1 All discoveries, including fossils, coins, articles of value or antiquity and structures and other remains or items of geological or archaeological and other interest encountered within the site shall be deemed to be the absolute property of the Employer and the Contractor shall take all precautions to prevent his workmen or any other persons from removing or damaging any such article or item and shall immediately upon discovery thereof, before any action or removal by him or his personnel and labour, except for ensuring proper security for the same, acquaint the Engineer of such discovery and carry out at the expense of the Employer, the Engineer's order as to the dealing with or disposal of the same.

7.7 Unauthorised use

7.7.1 The Contractor and his employees / workmen and the Contractor's Subcontractors and their employees / workmen are forbidden to unauthorisedly use or misuse the Employer's / Public property or utility and if any such misuse / unauthorised use occurs, the Employer may take severe actions against the Contractor including setting the direct and indirect damages / losses, etc., onto the payments due to the Contractor, removal of their workmen concerned and forfeiture of their entry passes, in addition to statutory and legal actions on the Contractor. Such recurrent action by the Contractor will also be considered as persistent negligence on the part of the Contractor to carryout his obligations under the Contract.

8.0 Temporary Works and utilities

हावड़ा-०९ HOWRAH-09

8.1 The Contractor shall arrange for and provide, at his own cost, all necessary temporary facilities and utilities and Temporary Works in manner and quality as approved by the Engineer.

8.2 Any facilities created by the Contractor to this end are deemed to be enabling works and are covered in the Contract Price, no extra being paid by the Employer.

~~8.3~~ On completion of the work, or at earlier times as directed by the Engineer, the Contractor at his own cost shall remove all the temporary facilities and temporary utilities set up by him, including items such as bore wells, pipelines, storage facilities, enclosures and sheds, ~~unless their retention is permitted by the Employer.~~

8.4 The Employer reserves the right to takeover any part or all of the above, at prices to be mutually agreed upon, which in any case will not be more than the actual cost incurred by the Contractor less depreciation at standard rates and also considering the condition and level of wear and tear thereof.

8.5 Approval by the Engineer

8.5.1 The Contractor shall, at his cost, be responsible for the design of Temporary Works and shall submit specifications, design back up and drawings showing the proposed Temporary Works to the Engineer for his approval. The methodology and conditions specified under the clauses in this GCC in respect of Drawings shall apply.

8.5.2 The Engineer's approval shall not alter the Contractor's responsibility for design of the Temporary Works, their durability and stability and serviceability during erection and usage.

8.5.3 The Contractor shall, at his cost, obtain approval of third parties to the design of the Temporary Works where so directed by the Engineer.

8.6 Water

8.6.1 The Contractor, at his own cost, shall make arrangements for sourcing, storage, handling and conveyance of water for Electrification and guarantee period of works, as well as for the consumption of his men and plant, from the existing wells, if any, or public utilities where available and permitted, or by setting up, with the approval of the Engineer.

8.6.2 The Employer reserves the right to draw water from the storage setup or installation / distribution lines laid by the Contractor, if he requires the same for any of his other works executed directly or through other contractors, in which case the Contractor's Account would be credited, at mutually agreed rates.

8.7 Electricity

8.7.1 No electrical power supply will be provided by the Employer and the Contractor shall make his own arrangements for the power required for the Works and Temporary Works.

8.8 Lighting

8.8.1 The Contractor shall, at his own cost, make his own arrangement for the required lighting in and around the work spots, for the purpose of Electrification works, including movement of persons and inspection by the Engineer and other authorities and general safety and security.

8.8.2 The presence of any lighting arrangements made by the other contractors or by the Engineer or public utilities shall not in any way relieve the Contractor of his responsibility to provide his own lighting arrangements.

8.9 Rectification of utilities

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

8.9.1 The Contractor shall ensure that utilities, including those for water, electricity and barriers of the Employer or public concerns or utility companies or other contractors shall be used to the extent permitted, with utmost care. All damages occurring to these due to the use or misuse by the Contractor, his Subcontractors or his men or machinery or vehicles shall be rectified by the Contractor, where he is not barred from doing so, at his own cost. This shall not relieve or indemnify the Contractor from any claims for his payment of damages or penalties or charges that the Employer or utility company or others concerned may call for.

8.10 Construction yards and premises

8.10.1 Where the Contractor is permitted by the Engineer to set up a yard or enclosure for the purposes of the former's activities in respect of this Contract, it shall be limited to demarcating appropriate extent of land or the spaces within an existing enclosure or building, for a specified period.

8.10.2 The Contractor shall provide at his own cost necessary utilities and other facilities, including barriers for safety and security, where he is not barred to do so, and watch and ward and lighting. The level of security provided by the Contractor, in terms of keeping the above premises under lock & key, etc., shall be to the extent approved by the Engineer. Where directed by the Engineer, the Contractor shall keep the accesses to and into these premises open, continuously or from time to time, to facilitate the Engineer's activities outside this Contract or for any other reason.

8.10.3 With progress of time, the Engineer may de-allot a particular location and / or re-allot at another location as he deems fit and the Contractor shall forthwith shift his establishment at his own cost.

8.11 Site Office, stores and work places

8.11.1 The Contractor shall organise his activities at Site from within the Site, by operating a Site Office therein, unless otherwise stated in the Contract Data or Special Conditions of Contract.

8.11.2 The Site Office, store and work place premises shall be at locations as approved by the Engineer and shall be allotted by the Engineer. The Engineer shall demarcate either land or spaces within an existing enclosure, all the conditions relevant to yard as herein above being applied.

8.11.3 Where called for by the Engineer, the Contractor shall, at his own cost, provide space for the Engineer's activities, within the Site Office herein above described. The Contractor shall furnish this space, provide light, ventilation and toilet facilities, as directed by the Engineer.

9.0 Cooperation and coordination

9.1 The Contractor shall plan and execute his work in a phased manner as approved / directed by the Engineer from time to time and shall fully cooperate with and share the Site with other agencies working simultaneously thereon as well as with the Employer's operations so as not to obstruct or retard the work being executed by other agencies and the Employer's operations in any way.

9.2 Interference

9.2.1 All operations necessary for the execution of the Works and any Temporary Works shall, so far as compliance with the requirements of Contract permits, be carried on so as not to interfere unnecessarily or improperly with public convenience and the access to use and occupation of public or private roads

and footpaths or of properties whether in possession of the Employer or of any other person and the Contractor shall save harmless and indemnify the Employer in respect of all claims, demands, proceedings, damages, costs, charges and expenses whatsoever arising out of or in relation to any such matters.

9.2.2 The Contractor shall use every reasonable means to prevent any of the public roads, highways, culverts or bridges communicating with or on the routes to the Site from being subjected to extraordinary traffic, within the meaning of the Road Traffic Act, by any traffic of the Contractor or any of his Subcontractors and in particular shall select routes and use vehicles and restrict and distribute loads so that any such extra-ordinary traffic as will inevitably arise from the moving of the plant and materials to and from the Site shall be limited as far as reasonably possible and so that no unnecessary damages or injury may be occasioned to such roads, highways, culverts and bridges. Where instructed by any local authority or the police in regard to traffic, the Contractor shall abide by such instructions at his own cost and risk in terms of time and any extra mobilisation thereof.

9.3 Facilities for others

9.3.1 The Contractor shall in accordance with the requirement of the Engineer afford all reasonable facilities for any other contractors or parties employed by the Employer and their workmen and for workmen of the Employer and of any other properly authorised authorities or statutory bodies who may be employed or deployed in execution or inspection on, within or near the Site of any work included or not included in the Contract or of any contract which the Employer may enter into in connection with or ancillary to the Works.

9.4 Coordinating work

9.4.1 The Contractor shall carry out at his own cost final finishing to the portions of his Works, where such portions such as surfaces and / or sections have experienced in, on or about, the work of other contractors. He shall ascertain all particulars relating to the other works with regard to the order of their execution and the position in which chases, holes, etc., will be required before any particular portion of his Work is taken in hand. He shall be particularly careful about the position of concealed work. Until and unless he is satisfied with the position and placing of all the concealed work of the Contractor or other contractors or parties, the Contractor may not be allowed by the Engineer to take up certain parts of the Works or other associated works. The Contractor's rate shall include for any losses due to any likely delay or shortfall in coordinating with the other contractors or parties. No claim will be admissible on account of lack of co-ordination and / or any loss arising thereof.

9.4.2 Where the work of other contractors and parties or the Employer's operations are effected by the Work of the Contractor, to the extent of creating undue obstruction or damage, the same shall be made good by the Contractor at his own cost and within reasonable time as decided by the Engineer.

9.5 Engineer's decision

9.5.1 The decision of the Engineer on any point of dispute between the various contractors, or parties deployed or any authorities shall be final and binding on all the parties to the dispute.

10.0 Safety and Security

10.1 The Contractor shall be responsible for the safety of all his activities on the Site and those relating to his Work of the Site and shall abide by all the safety and security regulations of the Employer in force and brought into force from time to time and other statutory requirements as per law or local Government promulgation and recommendations thereof. This applies to the safety of all labour and supervisory staff, work under progress, enabling works, Temporary Works, plant, equipment, tools, tackles, vehicles, etc. and speed restrictions for vehicles, traffic restrictions,power supply, etc.

10.2 The Contractor shall at all times ensure adherence to stipulations and recommendations laid down by the Bureau of Indian Standards in regard to safety, guarding of works, sequence of works, etc. Central Electricity Authority Regulations amended upto date shall also be complied.

10.3 The Contractor shall further ensure that his workmen observe the safety rules, regulations and precautions and ensure observance of all necessary measures to prevent accidents.

10.4 The Contractor shall, in connection with the Work, provide, maintain and use at his own cost first-aid kits, safetyware, lights, guards, cautionary boards, fencing, watch & ward when and where necessary or required for the safety and convenience of the public, safety of his or Employer's personnel engaged on the Electrification, guarantee period and protection and safety of Works against damage on account of fire and other occurrences and acts.

10.5 In case of failure on the part of the Contractor to implement the above measures to the satisfaction of the Engineer, the Employer is at liberty to get them done by others at the Contractor's cost.

10.6 The Contractor shall keep the Employer indemnified in all respects, including legal and financial, in regard to all matters pertaining to safety, loss, pilferage and accidents. This shall apply to such of those cases involving the material, plant, vehicles, equipment, labour, workmen, tradesmen or any individual either directly or indirectly deployed by the Contractor or the Engineer.

10.7 All costs towards complying with the safety and security requirements set forth herein shall be borne by the Contractor and no payment from the Employer is admissible under any circumstances.

10.8 The Contractor shall, as promptly as reasonably possible and in writing, bring to the notice of the local legal authority and the Engineer, the occurrence of accidents, thefts, sabotage or acts of vandalism and forthwith take all steps and measures required in such an exigency and implement the directions of the Engineer.

10.9 Only bonafide individuals shall be allowed access into or around the site. The Engineer may issue non-transferable admit / gate passes, with or without photograph, in favour of bonafide individuals, including the labour force, supervisory staff, etc. Nominal charges towards issue of admit / gate passes, their re-issue in case of damage, etc., shall be borne by the Contractor. The Contractor shall return such passes to the Employer from time to time when an individual's deployment has ceased and at the end of the Work.

10.10 The Employer / his security force reserve the right to prohibit entry of any individual into or near the site, at their sole discretion and without assigning any reasons, any individual being bound to forthwith leave the Site, where so demanded by them, without assigning any reasons.

10.11 Visitors shall be permitted into the Site only after necessary approval by the Engineer.

10.12 All materials, plant, tools, tackles, etc., brought into or near the site by the Contractor or his representative are liable for check by the Engineer and / or his security force. These shall be got registered with them at the time of their entry into the Site. The withdrawals from Site shall be based on permit to be issued by the Engineer. This shall also apply to any other items to be taken out of the site by the Contractor. Any material, plant etc., or individual not related to the due execution of the Contract shall not be allowed into the site.

10.13 Double earthing and earth leakage protection shall be provided for all electrics used by Contractor. Earth leakage device of 30mA shall be provided for panels/distribution boards used for construction activities

10.14 Explosives

10.14.1 Explosives shall not be used on the work by the Contractor without the permission in writing of the Engineer and then only in the manner and to the extent to which he has prescribed. Where explosives are used the same shall be stored in special magazine to be provided by and at the cost of the Contractor who shall be liable for all damages, loss or injury to any person or property and shall be responsible for complying with all statutory requirements / obligations in these respects.

11.0 Protection of Environment

11.1 The Contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his activities and methods of operation.

11.2 During continuance of the Contract, the Contractor and his Subcontractors shall abide at all times by all existing enactments on environmental protection and rules made thereunder, regulations, notifications and bye-laws of the State or Central Government or local authorities, and any other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority.

11.3 The Contractor shall bear all costs pertaining to the protection of environment, in so far as they concern or relate to his activities and shall indemnify the Employer against all actions, penalties or such other actions that are attracted by his activities.

12.0 Care of Works

12.1 From the commencement to the completion of the works, and guarantee period thereof, the Contractor shall take full responsibility of the care of the Works and of all Temporary Works.

12.2 In case any damage, loss or injury shall happen to them from any cause whatsoever, save and except the Expected Risks as defined elsewhere herein, the Contractor shall at his own cost repair and make good the same so that at completion the Works, or any other earlier instant of time as required by the Engineer, they shall be in good order and condition and in conformity in every respect with the requirements of the Contract and the Engineer's instructions.

12.3 The Contractor shall also be liable for any damage to the Works or any other works of the other contractors or the Employer or public bodies or utility companies occasioned by him in the course of any operations carried out by him for the purpose of complying with his obligations under this Contract.

12.4 Notwithstanding the aforesaid, in the event of any such damage, loss or injury happening from any of the Excepted Risks, the Contractor shall if and to the extent required by the Engineer, repair and make good at the cost of the Employer.

12.5 Damages to persons and property

12.5.1 The safety and security aspects to be taken care of by the Contractor are elaborated elsewhere in this document.

12.5.2 The Contractor shall, except in so far as the Contract otherwise provides, indemnify and keep indemnified the Employer and Engineer against all losses and claims for injuries or damages to any person or property whatsoever, including surface or other damage to land or trees or crops being on the site, suffered in consequence of the Electrification and guarantee period of the works, and against all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto, provided always that nothing herein contained shall be deemed to render the Contractor liable for or in respect of or to indemnify the Employer against any compensation of damages for or with respect to:

a) The permanent use or occupation of land by the Works or any part thereof, save in respect of damages to crops as aforesaid.

b) The right of the Employer to construct the Works or any part thereof on over, under, in or through any land.

c) Interference, whether temporary or permanent, resulting in the dilution or hindrance to or negation of any right or light, airway, way or other easement or quasi-easement which is the unavoidable result of the construction of the Works in accordance with the Contract.

d) Injuries or damages to persons or property resulting from any act or neglect done or committed during the currency of the Contract by the Employer, his agents, servants, other contractors (not being employed by the Contractor) or for or in respect of any claim demands, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto.

12.6 Insurance

12.6.1 Before commencing the execution of the works the Contractor, without limiting his obligations and responsibilities under this Contract, shall insure, in terms of third party insurance coverage, against any damage, loss or injury which may occur to any property (including that of the Employer) or to any Person (including any employee of the Employer) by or arising out of the execution of the Works or Temporary Works or in the carrying out of the Contract other than due to the matters referred to in the provisions under the clause herein above titled Damages to persons and property.

12.6.2 Minimum amount of third party insurance is stated in the Contract Data and the Contractor shall whenever required produce to the Engineer the valid policy or policies of insurance and the receipts for payment of the current premium.

12.6.3 The Contractor shall maintain and shall require his Subcontractors to maintain in full force and effect, from insurance companies in India acceptable to the Engineer, from the time of execution of his Agreement:

a) All such insurances as are required by law for the purpose of the Contract at the cost of Contractor.

b) All such insurances required in respect of equipment purchased out of advance received from Employer at the cost of Contractor.

c) Any additional insurance required specifically by the Employer / Engineer at the cost of Employer.

12.6.4 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the Contract Data for the following events which are due to the Contractor's risks:

a) Loss of or damage to the Works, Plant and Materials.

b) Loss of or damage to equipment.

c) Loss of or damage of property (except the Works, Plant, Materials and Equipment) in connection with the Contract.

d) Personal injury or death.

12.6.5 Contractor shall ensure that the insurer shall furnish to the Engineer and Employer as evidence of such insurance a copy of the issued policy and any amendments thereto and prompt notification of any cancellation or termination thereof.

12.6.6 Alterations to the terms of an insurance coverage shall not be made without the approval of the Engineer.

12.6.7 Both parties shall comply with any conditions of the insurance policies.

12.6.8 Should Contractor default in paying any premium when due, Engineer or Employer, without prejudice to other remedies set forth in this Contract shall be at liberty to pay such premium and recover the same from Contractor.

12.6.9 Any such insurance requirements are hereby established as the minimum policies and coverages, which Contractor must secure and keep in force. Contractor shall at all times be free to obtain additional or increased coverage at Contractor's sole expense.

12.6.10 The provisions contained within this Article are not intended and do not impair or in any manner limit the liabilities or obligation assumed by Contractor as may be set forth more fully elsewhere in this Agreement.

12.6.11 Policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

13.0 Plant, Materials & Labour

13.1 Except where otherwise specified, the Contractor shall at his own expense, supply and provide all the Electrification materials, both for Temporary and permanent Works and guarantee period work, necessary manpower and labour, including the supervision thereof, transport to or from site and in and about the Works and other things of every kind required for the Electrification and guarantee period of the Works. The Contractor shall promptly arrange spare parts, consumables, fuel, lubricants, etc. for the equipment, etc., as and when necessary at his own cost.

13.2 A non-exclusive list of plant, equipments, machinery, gadgets, tools and tackles is specified in the Special Conditions of Contract.

13.3 Adequacy

13.3.1 If, in the opinion of the Engineer, the tools, tackles, plant and equipment, instruments, gadgets, materials, etc., brought to site or arranged by the Contractor, are not sufficient or are inadequate, the Engineer shall have the right to direct the Contractor and the Contractor shall comply with the directions and arrange to bring such additional tools, tackles, plant and equipment, instruments, gadgets, materials, etc., to the site and employ the same for the work at his own cost.

13.4 Liability against loss or injury to plant

13.4.1 The Employer shall not at any time be liable for the loss or of injury to any of the Plant, Temporary Works or materials, irrespective of them being deemed to having been vested with him.

13.5 Irremovability

13.5.1 All materials, equipments and Temporary Works, or any part thereof, shall not be removed from the Site without the written consent of the Engineer.

13.5.2 Such consent shall not be unreasonably withheld where the aforesaid items are no longer immediately required for the purposes of completion of the Work, but the Employer will permit the Contractor the exclusive use of all such Temporary Works and materials in and for the completion of the Works until the occurrence of any event which gives the Employer the right to exclude the Contractor from the Site and proceed with the completion of the Works.

13.5.3 Similarly, all enabling or Temporary Works built or setup by the Contractor are not to be dismantled without the written approval of the Engineer.

13.6 Plant, Equipment, Tools and Tackles

13.6.1 The Contractor shall mobilise and maintain in working condition adequate numbers of plant, equipments, machinery, gadgets, tools and tackles during the period of Electrification work, some of these being required during the period of guarantee also.

13.6.2 The cost of mobilising, maintaining, manning, operating, using and withdrawing them after completion of the work is deemed to be fully covered under the Contract amount and separate payment or reimbursement is not to be made by the Employer.

13.7 Plant and Machinery by employer

13.7.1 Where, in the opinion of the Engineer, requirement exists for deployment of certain plant or machinery or gadgets and the Contractor is unable to mobilise the same, and the Engineer has at his disposal such items, either directly or as part of the mobilisation of other contractors, the Engineer may, at his discretion, offer the same on hire and / or sharing basis to the Contractor.

13.8 Engineers' discretion

13.8.1 The Engineer reserves the right to give on hire or arrange on hire or share basis particular Electrification equipment to a particular contractor without assigning any reason whatsoever.

13.9 Obligations of the Contractor

13.9.1 The Employer's inability to provide requisite Electrification equipments on hire or share to the Contractor shall not be taken as an excuse for slow progress and

non-performance of the work or for bad workmanship or for non-fulfillment of contractual obligations of the Contractor.

13.9.2 Further, this does not absolve the Contractor of his obligation to mobilise his own plant or machinery or gadgets and he shall have no right in this regard or have a claim against any decision of the Engineer to offer or not to offer the same.

13.10 Charges

13.10.1 The hire or share charges for such equipments, if made available to the Contractor, the arranging for and cost of operating manpower and consumables, upkeep and maintenance and related aspects and the debiting of account shall be as approved by the Engineer from time to time.

13.10.2 Where such hire or share is directly from or with another contractor, the Engineer shall decide on the methodology for debiting and crediting the accounts of the contractors.

13.11 Materials

13.11.1 The quality aspects of the materials to be used by the Contractor are elaborated elsewhere in this General Conditions of Contract.

13.11.2 The Contractor shall furnish the Employer with vouchers for any material on demand within seven days to prove that the materials are as specified.

13.12 Materials obtained from dismantling, excavation, etc.

13.12.1 All materials, including stone, rubble and other materials, obtained in the work of dismantling, excavation, etc., will be considered as Employer's property.

13.12.2 The Engineer may, as deemed fit by him, issue the same to the Contractor for use in the Works, at rates approved by the Engineer, or call for their disposal by the Contractor to the best advantage of the Employer.

13.12.3 Costs against disposal, handling and related activities, if covered in a separate and specific item in the Bill of Quantities, are deemed to be covered in the corresponding item rate in the Bill of Quantities, whereas in all other cases they shall be borne by the Contractor, no payment from the Employer being admissible.

13.13 Patent Rights & Royalties

13.13.1 The Contractor shall save harmless and indemnify the Employer from and against all claims and proceedings for or on account of infringement of any patent rights, design, trademark or name or other protected rights in respect of any machine, work or material used for or in connection with the Electrification works and / or Temporary Works and from and against all demands, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

13.13.2 Except where otherwise specified, the Contractor shall pay all tollages and other royalties, rent and other payments, if any, for getting materials to the site required for the Electrification works and / or Temporary Works.

14.0 Manpower

HOWRAH-09 Hooghly Cochin Shipyard Limited

14.1 The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or otherwise and for their payment, housing, feeding, welfare and transport.

14.2 The Contractor shall be deemed to be the principal Employer for the purpose of determining the responsibility under the statute and he shall get registered with the concerned statutory authority and shall be directly responsible to the authorities thereunder for compliance with the provisions thereof.

14.3 The employees of the Contractor and the Subcontractor in no case shall be treated as the employees of the Employer at any point of time.

14.4 Compliance with Labour Regulations

14.4.1 During continuance of the Contract, the Contractor and his Subcontractors shall abide at all times by all existing labour enactments and rules made thereunder, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notifications that may be issued under any labour law in future either by the State or the Central Government or the local authority.

14.4.2 Salient features of some major labour laws applicable to establishments engaged in Electrification works are listed elsewhere in this document. These include but are not limited to stipulations on the protection of health, sanitary arrangements, wages, fair wages, provident fund, welfare, amenities, safety measures, maintenance of registers, etc.

14.4.3 The Contractor shall also be fully responsible for the observance of the above provisions by his Subcontractors.

14.5 Indemnity

14.5.1 The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made thereunder, regulations or notifications including amendments thereof.

14.5.2 If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications / bye laws / acts / regulations including amendments, if any, on the part of the Contractor, the Engineer / Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer / Engineer shall also have the right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.

14.6 Returns of Labour

14.6.1 The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the several classes of labour from time to time employed by the Contractor and his Subcontractors on the Site, and / or off the Site in connection with this Work, and such other informations as the Engineer calls for.

14.6.2 Where directed by the Engineer or any statutory authority, the Contractor shall submit in the prescribed proforma periodical statements of labour and workmen employed by him, either directly or indirectly, indicating the details of persons categorised as per locally applicable statute, displaced persons, persons belonging to scheduled castes / tribes, etc. Local statute in regard to employment of persons shall be adhered to.

14.7 Authorised Agent

14.7.1 The Contractor shall have a duly authorised agent at site, to be constantly on the Works giving his whole time to the same, from the commencement to the completion of the work and as long thereafter as the Engineer may consider necessary.

14.7.2 The agent shall not be changed (unless required by the Engineer) and shall be continued till completion of the Contract unless the consent of the Engineer has been previously obtained for the change of the Agent.

14.7.3 Such agent shall be of an acceptable designation and authorised to act on behalf of the Contractor, to accept notices under the Contract and to agree to extra and varied items of works and rates for the same and to receive on behalf of the Contractor, directions and instructions from the Engineer or his representative. Such agent shall be in charge of the coordination with the Engineer and other contractors and parties at site and superintendence of the Work and shall maintain in his staff qualified Engineers and such other personnel as may be required for efficient execution of the Works and compliance with the Contract.

14.7.4 Any notice under the Contract shall be deemed to have been served on the Contractor if served upon such agent at site or sent by registered letter to the agent's address.

14.8 Competent personnel

14.8.1 The Contractor shall employ in and about the execution of the Works only such persons as are careful, skilled and experienced in their respective trades.

14.8.2 The Contractor shall deploy competent and qualified Engineers constantly on the work who will be responsible for carrying out the work to the satisfaction of the Engineer. Any directions or instructions given to them shall be deemed to have been given to the Contractor.

14.8.3 The Contractor shall send at his own cost a duly authorised competent representative to meet the Employer at his office or at any other place within the country in connection with his Works whenever called upon to do so by the Employer or Engineer and any instructions, directions or explanations given by the Employer or by the Engineer to such representatives shall be deemed to have been given to the Contractor for compliance.

14.8.4 The Electrification works or Temporary Works or their parts pertaining to certain specialised trades shall be carried out only by qualified and certified personnel. In all Electrical contractor, holding valid license issued by the Government for carrying out installation work of the voltage class involved, under the direct supervision of a person holding a certificate of competency for the same voltage class, issued or recognised by the State Government, is mandatory.

14.9 Removal of Workmen

14.9.1 The Engineer shall be at liberty to object to and require the Contractor to remove from the Works and ensure no further connection with the Work in the Contract, any person either directly or indirectly employed by the Contractor in or about the execution of the Works who in the opinion of the Engineer misconducts himself or is incompetent or negligent in the proper performance of his duties and such persons shall not be again employed upon the Works in any capacity without the prior written permission of the Engineer.

14.10 Accident or injury to Workmen

14.10.1 The Employer shall not be liable for in respect of any damages or compensation payable at Law in respect of or in consequence of any accident or injury to any workman or other person in the employment of the Contractor or any Subcontractor save and except an accident or injury resulting from any act or default of the Employer, his agents or servants and the Contractor shall indemnify and keep indemnified the Employer against all such damages and compensation (save and except as aforesaid) and against all claims, demands, proceedings, costs, charges and expenses whatsoever in respect or in relation thereto.

14.10.2 In cases where, due to the exigency of the situation, the Employer has borne any costs, expenses or compensation or paid any amounts against penalties in connection with any accident or injury, against which the Employer / Engineer stand indemnified, the Employer shall (without prejudice to any other means of recovery) be entitled to debit the same to the Contractor's Account.

14.11 Salient features of some major labour laws applicable to establishments engaged in building and other construction work

a) Workmen Compensation Act 1923: The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

b) Payment of Gratuity Act 1972: Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed five years service or more or on death the rate of 15 (fifteen) days wages for every completed year of service. The Act is applicable to all establishments employing 10 (ten) or more employees.

c) Employees PF and Miscellaneous Provisions Act 1952: The Act Provides for monthly contributions by the Employer plus workers @ 10% or 8.33%. The benefits payable under the Act are:

   i) Pension or family pension on retirement or death, as the case may be.

   ii) Deposit linked insurance on the death in harness of the worker

   iii) Payment of PF accumulation on retirement / death, etc.

d) Maternity Benefit Act 1951: The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage, etc.

e) Contract Labour (Regulation & Abolition) Act 1970: The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by Law. The Principal Employer is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ 20 (twenty) or more contract labour.

f) Minimum Wages Act 1948: The Employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, and Runways are scheduled employments.

g) Payment of Wages Act 1936: This Act lays down as to be what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.

h) Equal Remuneration Act 1979: The Act provides for payment of equal wages for work of equal nature to Male and Female workers and for not making

discrimination against Female employees in the matters of transfers, training and promotions, etc.

i) Payment of Bonus Act 1965: The Act is applicable to all establishments employing 20 (twenty) or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of wages and maximum of 20% of wages to employees drawing Rs.3,500/- per month or less. The bonus to be paid to employees getting Rs.2,500/- per month or above upto Rs.3,500/- per month shall be worked out by taking wages as Rs.2,500/- per month only. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.

j) Industrial Disputes Act 1947: The Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

k) Industrial Employment (Standing Orders) Act 1946: It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the State and Central government to 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get the same certified by the designated Authority.

l) Trade Unions Act 1926: The Act lays down the procedure for registration of trade unions of workmen and Employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.

m) Child Labour (Prohibition & Regulation) Act 1986: The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in Building and Construction Industry.

n) Inter-State Migrant Workmen's (Regulation of Employment & Conditions of Services) Act 1979: The Act is applicable to an establishment which employees 5 (five) or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home upto the establishment and back, etc.

o) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996: All the establishments who carry on any building or other construction work and employees 10 (ten) or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% (two percent) of the cost of construction as may be modified by the Government. The Employer of the establishment is required to provide safety measures at the Building or construction work and other welfare measures, such as Canteens, First-aid facilities, Ambulance, Housing accommodations for workers near the work place, etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointment by the Government.

Cochin Shipyard Limited HOWRAH-09

p) Factories Act 1948: The Act lays down the procedure for approval at plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 (ten) persons or more with aid of power or 20 or more persons without to aid of power engaged in manufacturing process.

15.0 Time

15.1.1 Time is the essence of this Contract, even if this Contract empowers the Employer to grant extension of time in certain circumstances, in which case the existing terms and conditions of this Contract shall apply, without any additional financial liability to the Employer.

15.1.2 The work covered under this Contract is to be executed in a sequential and well-coordinated manner so as to give fronts for work to other Contractors or Employer's activities. With this objective, the Contractor has to execute the work as per the Programme, as herein below defined, making all necessary arrangements including planning for executing the work in as many shifts as necessary and also on Sundays and holidays as per the requirement as well as carrying out the Works intermittently wherever called for or found necessary.

15.1.3 The Contractor is in no way entitled to any extra payment on account of implementing the Programme and following any particular sequence of work, intervals in work, work on holidays or Sundays, overtime payments and idling charges for men and machinery, establishment, overheads or any aspect thereof.

15.2 Dates

15.2.1 The Contract Data specifies the Start Date and the Intended Completion Date.

15.2.2 The Contractor shall commence execution of the Works on the Start Date and complete them by the Intended Completion Date, as specified by the Employer and / or in accordance with the Program, as valid and in force at any particular instant of time,

15.2.3 The Start Date may be revised before acceptance of the Tender, at the sole discretion of the Employer, in which case revision of the Intended Completion Date is also at the sole discretion of the Employer. The Contractor is bound to adhere to such revised dates.

15.3 Programme

15.3.1 Within the time stated in the Contract Data, the Contractor shall submit to the Engineer for approval a Programme showing the general methods, arrangements, order and timing for all the activities in the Works along with monthly / weekly cash flow forecast.

15.3.2 All time-based data and informations in the Programme shall be depicted with a week as the unit of time.

15.3.3 An update of the Programme shall be a Programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities, invariably showing all details

15.3.4 The Contractor shall submit to the Engineer, for approval, updated Programmes at intervals no longer than the period stated in the Contract Data. If the Contractor does not submit an updated Programme in time, the Engineer may

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Programme has been submitted.

15.3.5 In this Contract, at any instant of time, an updated Programme is the Programme, in so far as interpretation of any time-related matters is concerned.

15.3.6 The Engineer's approval of the Programme shall not alter any of the Contractor's obligations under this Contract.

15.4 Extension of the Intended Completion Date

15.4.1 The Engineer shall extend the Intended Completion Date if hindrance to work occurs(which is not attributable to the Contractor)which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work.

15.4.2 The Engineer shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Engineer for a decision upon the effect of hindrance

15.4.3 If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

15.4.4 Without prejudice as to the meaning and contractual implications of the Intended Completion Date, the Contract Data may specify or the Engineer may, at any time before or after the Start Date, specify or approve, completion dates for individual parts of the Work, these being termed as In-part Completion Dates and always being earlier to or co-terminus with the Intended Completion Date.

15.5 Delays and suspensions ordered by the Engineer

15.5.1 The Engineer may instruct the Contractor to delay the start or progress of any activity within the Works.

15.5.2 The Contractor shall on the written order of the Engineer suspend the progress of the Works or any part thereof for such time or times and such manner as the Engineer may consider necessary and shall during such suspension properly protect and secure the work so far as is necessary in the opinion of the Engineer.

15.6 Suspension lasting more than three months

15.6.1 If the progress of the Works or any part thereof is suspended on the written order of the Engineer for more than three months, the Contractor may serve a written notice on the Engineer requiring permission within 30 days from the receipt thereof to proceed with the Works or that part thereof in regard to which the progress is suspended.

15.6.2 If permission as aforesaid is not granted within that time as aforesaid, the Contractor by a further written notice so served may, but is not bound to, elect to treat the suspension, where it affects part only of the Works as an omission of such part under the clause pertaining to Alterations, additions and omissions, or where it affects the whole Works as an abandonment of the Contract by the Employer, without attaching any liability thereof on the Employer.

15.6.3 If at any time the Employer finds that any particular work is not progressing properly according to the Programme, the Employer will have the right, without prejudice to applying any other of his rights or invoking any other provisions of this Contract, to take over the particular work for execution by himself or through any other contractor or agency at the risk and cost of the Contractor.

15.7 Possession of site and instructions for work

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

15.7.1 Save in so far as the Contract may prescribe the extent of portions of the Site of which the Contractor is to be given possession from time to time and the order and sequence in which such portions shall be made available to him and subject to any requirement in the Contract as to the order and sequence in which the work shall be executed, the Employer will, with the Engineer's written order to commence the works, give to the Contractor possession of so much of the site and drawings and instructions as may be required to enable the Contractor to commence and / or proceed with the Works in accordance with the Programme. If there is delay in handing over the possession of the site to the Contractor, in accordance with the terms of this clause, the Engineer shall grant suitable extension of time for the completion of the works.

15.8 Management Meetings

15.8.1 Either the Engineer or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the planning for remaining work and to deal with matters raised in accordance with the early warning procedure.

15.8.2 The Engineer shall record the business of management meetings and is to provide copies of his record to those attending the meeting and to the Employer.

15.8.3 The responsibility of the parties for actions to be taken is to be decided by the Engineer either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

15.9 Liquidated damages for delay

15.9.1 Liquidated Damages shall constitute a genuine pre-estimate of damages duly agreed to by the parties to this Contract.

15.9.2 If the Contractor fails to complete the Works within the Intended Completion Date or the In-part Intended Completion Dates, then the Contractor shall pay to the Employer the sum stated as Liquidated Damages in the Contract Datafor such default, and not as a penalty, for every week or part of a week which shall elapse between the time prescribed herein above.

15.9.3 Liquidated damages pertain to a situation where completion of the Works has been delayed and in no way substitute or get substituted by any other penalties, such as for not achieving milestones, which might have been levied on the Contractor. The milestones, as described elsewhere in these documents, are therefore linked to intermediate stages of Electrification works only and not to the completion of Works.

15.9.4 The Employer may, without prejudice to any other method of recovery, debit the Contractor's Account to the extent of the Liquidated Damages.

15.9.5 The payment or deduction or debiting of Liquidated Damages shall not relieve the Contractor from his obligation to complete the Works or from any other of his obligations and liabilities under the Contract.

15.9.6 The total amount of Liquidated Damages shall not exceed the amount defined in the Contract Data.

15.10 Reduction and adjustment of Liquidated Damages

15.10.1 If before the completion of the whole of the Works, any part of the Works has been certified by the Engineer as completed pursuant to this Contract and occupied or used by the Employer, the liquidated damages for delay shall for any period of delay after such certification be reduced in the proportion which the value of the part so certified bears to the value of the whole of the works.

15.10.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Engineer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate.

15.11 Certificate of completion of works

15.11.1 As soon as in the opinion of the Engineer the Works shall have been completed and energized with statutory approvals wherever required and started using by Employer, Engineer shall on receiving a written undertaking by the Contractor issue a certificate of completion in respect of the Works and the period of guarantee of Works shall commence from the date of such certificate

15.12 Milestones

15.12.1 Various Milestones as indicated in the Contract Data if mentioned are required to be achieved during execution of work. Non-achievement of a Milestone within the specified time shall attract penalties as indicated against each activity of works.

15.12.2 In the event of non-fulfillment of Milestones during the specified period, the penalty as indicated against each shall be levied / recovered from the next Bill which shall not be refunded to the Contractor irrespective of completion of the overall work.

15.12.3 However, due to any reason attributable to the Employer, if it is not possible to achieve a particular Milestone / Milestones within the specified period, a suitable amendment in the period of affected / related Milestones shall be made as deemed fit by the Engineer whose decision shall be final, binding and conclusive. In such cases, the Levy of penalty shall be linked with the fulfillment of the amended Milestones(s). The Contractor shall not have any claim on account of such changes / postponement of Milestones.

15.12.4 Three successive failures of fulfilling Milestones by the Contractor may entail cancellation of Contract and getting the work done at his Risk and Cost.

16.0 Quality

16.1 Responsibility

The Contractor is fully and solely responsible for the quality of the Works and their components and no particular action or absence of action by the Engineer shall absolve him of this responsibility. To this end, the Contractor shall implement quality assurance and quality control measures which shall encompass the following:

16.1.1 Material, whether of manufactured, fabricated.

16.1.2 Workmanship, in incorporating the material in the Works, in ensuring intended dimensions, purpose, line and level and in ensuring that the Works or parts thereof do not get affected by subsequent or allied or other activities.

16.1.3 Achieving intended levels of operation and serviceability.

16.1.4 Systems and practices to be adhered to by the Contractor and the mechanism to implement the same as spelt out in the various parts of this Contract documents, including, but not necessarily limited to the following aspects:

a) Skilled and competent labour and supervisory manpower.

b) Careful selection of materials.

c) Good practices in putting together the Works and their components.

d) Good practices in maintaining the Works and their components, during the Electrification work as well as during the Period of guarantee.

Hooghly Cochin Shipyard Limited HOWRAH-09

e) Testing of materials and components of work, including inspection of all items comprising moving / mechanical / electrical items, including testing for their performance in their unconstructed or unassembled state as well as finished state in the Works.

f) Ensuring and enforcing guarantees and warranties against manufactured items.

g) Documentation.

16.2 Quality Assurance Plan

16.2.1 The Contractor shall, within two weeks of the receipt of the Letter of Acceptance from the Employer, submit to the Engineer, a detailed quality assurance plan (QAP) envisaged by him for ensuring due and proper adherence to quality and requiremnts as required by the Contract.

16.2.2 The QAP shall describe in detail the organisation and methodology, checks and controls, as well as the correction mechanisms built into the QAP system to be implemented at the Site and elsewhere, for ensuring quality inputs into the work and quality outputs and results.

16.2.3 The Engineer shall be entitled, from time to time and at any time, to make or cause to be made such additions, modifications or alterations in the QAP as he considers necessary to improve the QAP, the decision of the Engineer in this regard being final and binding on the Contractor, and the Contractor shall thereafter follow the QAP as added, modified or altered by the Engineer.

16.3 Defects

16.3.1 In so far as quality is concerned, any deviation of the Works, or any component and part thereof, from that intended in the Contract is termed as a Defect.

16.3.2 A Defect, when noticed or notified by the Engineer, shall be rectified by the Contractor without demur, notwithstanding any certification or measurement made or certified by the Engineer prior to such instance.

16.3.3 All materials and workmanship shall conform to the specifications and drawings issued from time to time and be free of all Defects. In case any aspect of quality is not covered by the specifications and drawings issued, it shall conform to the relevant codes of the Bureau of Indian Standards and / or as directed by the Engineer.

16.3.4 The Engineer may at any time check the Contractor's work and notify the Contractor of any Defects that are found. The Engineer may instruct the Contractor to search for a Defect and to uncover and test any work that the Engineer considers may have a Defect.

16.3.5 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the short length of time specified by the Engineer's notice.

16.3.6 The Defect Liability Period shall be extended for as long as Defects remain to be corrected.

16.3.7 If the Contractor has not corrected a Defect within the time specified in the Engineer's notice, the Engineer will assess the cost of having the Defect corrected, and the Contractor's account debited, without prejudice to any other action the Engineer may enforce.

16.3.8 The Engineer shall, during the progress of the Works have the right to order in writing from time to time the removal from the site, within such time or times as may be specified in the order, of any materials or items, which, in the opinion of the Engineer, are not in accordance with the Contract.

16.4 Covered-up works

16.4.1 No work shall be covered up or put out of view without the approval of the Engineer and the Contractor shall afford full opportunity for the Engineer to examine and measure any work which is about to be covered up or put out of view and to examine items before their concealment.

16.4.2 The Contractor shall give due notice to the Engineer whenever any such work is ready or about to be ready for examination and the Engineer shall, without unreasonable delay, unless he considers it unnecessary and advises the Contractor accordingly, attend for the purpose of examining and measuring such work or of examining such items.

16.4.3 The Contractor shall uncover any part or parts of the Works or make openings in or through the same as the Engineer may from time to time direct and shall reinstate and make good such part or parts to the satisfaction of the Engineer.

16.5 Tests

16.5.1 The specifications prescribe various tests at specified intervals for ascertaining the quality of the Work done. Mandatory tests, if indicated in the Specifications, shall be conducted, without fail.

16.5.2 If the Work is found unsatisfactory or if the tests prove unsatisfactory, the Engineer shall have the authority to order the Contractor to re-do the work done in that period and / or to order such alternations that may be necessary at the cost of the Contractor, and the Contractor shall be bound to carryout such orders, failing which the Engineer shall be at liberty to get the rectification / re-doing done through other agencies and debit the costs thereof to the Contractor's Account.

16.5.3 If the Engineer instructs the Contractor to carry out a test not specified in the Specification to check whether any work has Defect and the test shows that it does, the Contractor shall pay for the test and any samples

16.5.4 Notwithstanding anything indicated in this Contract, all materials shall be subject to inspection and approval by the Employer/Engineer from time to time and the Contractor shall provide all facilities for inspection free of cost.

16.5.5 The Engineer will reject such materials which do not conform to the specifications and no claims for compensation on this account, including any plea that order for the material has already been placed by the Contractor on the manufacturer / supplier, will be entertained. Notwithstanding the above, the Contractor is under obligation to submit samples for approval, well ahead of his actual procurement.

16.5.6 The Contractor shall, at his own cost, provide and use and make available for the use of the Engineer, all necessary instruments, appliances and labour in connection with quality control / assurance or testing therewith.

16.5.7 The Contractor is under obligation to afford the Engineer all opportunities to be physically present and certify all sampling, testing and reporting of results or the workmanship in execution.

16.6 Laboratory

16.6.1 The Contractor shall set up, at his cost, a laboratory at Site, or elsewhere if permitted by the Engineer, complete with all necessary gadgets, instruments and qualified manpower, for the purpose of testing materials, components and systems. The requirement of such site laboratory and the minimum requirement of facilities thereof are indicated in the Contract Data.

Cochin Shipyard Limited HOWRAH-09

16.6.2 Notwithstanding the site laboratory, the Engineer may call for testing at any third-party laboratory or institution, at the cost of the Contractor.

16.6.3 Cost of all samples, sampling, all testing and all costs incidental thereto are to be borne by the Contractor, no other payment being admissible and the Contract Price being deemed to cover all of them.

16.7 Samples

16.7.1 Samples of all bought-out items and such other items as may be indicated by the Engineer, shall be furnished by the Contractor, at his own cost, for approval of the Engineer, accompanied by complete details as to their source / mark / intended position in the Works, etc.

16.8 Guarantees and warranties

16.8.1 All guarantees / warranties such as those for manufactured items, water proofing etc., for the entire Works as obtained from the manufacturers or specialist agencies shall be transferred to the Employer by the Contractor prior to acceptance of such works, and the Contractor shall be responsible for such works during the guarantee period also.

16.8.2 The Contractor shall ensure that the terms and conditions and effective commencement and closing dates for the guarantees / warranties are to the best advantage of the Employer and he shall be bound by the Engineer's directions in this regard.

16.9 Documents

16.9.1 The following documents shall be furnished by the Contractor to the Engineer, from time to time and not later than the time limits that may be indicated by the Engineer, failure to do so attracting penal action and / or debiting of the Contractor's account, to the extent indicated in the Contract Data and / or omitting the related parts of the Works from the measurements thereof. These shall be furnished notwithstanding any copies or partial copies that may be already available with the Engineer:

a) Manufacturer's certificates and test certificates for materials and items.

b) Guarantees and warranties for both electrical and mechanical items, etc. and procedure-intensive works, including waterproofing, cable-jointing etc., a list and formats of these being furnished by the Contractor not later than two weeks from such an item or work being identified as being part of the Work.

c) Certificates on control, checking and test of materials.

d) Test reports.

e) Quality assurance records.

f) As built drawings

g) Operation and Maintenance manuals

h) Catalogues

i) Site test reports

16.9.2 In case of systems involving mechanical or other devices or processes, and where the Contract specifies that performance testing and / or commissioning is under the scope of the Contract, performance and acceptance tests shall be carried out by the Contractor at his own cost, subject to any stipulation as to the contrary in the Bill of Quantities, as detailed elsewhere in this Contract, more specifically in the Special Conditions of Contract.

16.10 Preliminary and final acceptance tests

HOWRAH-09 Cochin Shipyard Limited

16.10.1 Where preliminary and final acceptance tests are required for the Works, these have been described in the Special Conditions of Contract.

17.0 Defect Liability Period

17.1 This Contract is for Electrification Works as intended and spelt out in the Contract, fulfilling all the requirements, including and not limited to quality and workmanship.

17.2 The Contractor is required to maintain the Works for a specified period, herein referred to as Defect Liability Period or Period of guarantee, during which he shall rectify, free of cost to the Employer, all defects that may come to notice.

17.3 Commencement

17.3.1 On completion, the Works will be taken over by the Employer as per the handing over / commissioning sequence by listing out any defects to be attended / rectified within a time limit as brought out by the inspection committee or by the Engineer.

17.3.2 The taking over will be certified by the Engineer. The guarantee period will be counted from the date of such taking over and as elaborated below.

17.4 Duration

17.4.1 The duration of the Defect Liability Period is specified in the Contract Data, calculated from the date of completion of the Works as per Completion Certificate or in the event of more than one certificate having been issued by the Engineer, from the respective dates of the Completion Certificates for parts of the Work.

17.5 Execution of Work or repair, etc

17.5.1 The Contractor shall deploy, to the extent required and desired by the Engineer, his organisation and manpower throughout the Defect Liability Period, ensuring adequate superintendence and tradesmen with necessary tools, tackles, plant and material.

17.5.2 Where the Engineer has noticed an apparent defect, he shall direct the Contractor to attend to the same and rectify the same within a stipulated time.

17.5.3 The Engineer's action in this regard shall not absolve the Contractor's obligation to continuously and systematically search for defects and attend to the same.

17.5.4 The Contractor shall ensure that his activities during this period do not hinder, impinge upon, adversely effect or damage any of the activities of the Employer or other Contractors or agencies or parts of the structure and Works.

17.5.5 To the extent that the Works shall, at or as soon as practicable after the expiration of the Period of guarantee, be not delivered to the Employer in as good and as perfect a condition (fair wear and tear expected) to the satisfaction of the Engineer as that in which they were at the commencement of the Period of guarantee, the Contractor shall forthwith execute all such work of repair, amendment, rectification and making good of defects or other faults as may be required of the Contractor in writing by the Engineer during the period of guarantee or within fourteen days after its expiration.

17.6 Cost of execution of repair, etc.

17.6.1 All repair and rectification work pertaining to the Defect Liability Period, inclusive of any consumables thereof, shall be carried out by the Contractor at his own expense if the necessity thereof is in the opinion of the Engineer due to the use

हावड़ा-०९ HOWRAH-09

of materials or workmanship not in accordance with the Contract or to the neglect or failure on the part of the Contractor to comply with any obligation expressed or implied on the Contractor's part under the Contract.

17.7 Remedy on Contractor's failure to carry out repair

17.7.1 If the Contractor shall fail to do any such work as aforesaid required by the Engineer, the Employer shall be entitled to carry out such work by his own workmen or through other contractors and against such work which the Contractor should have carried out at the Contractor's own cost, the Employer shall be entitled to recover from the Contractor the cost thereof or may debit the same to the Contractor's Account.

17.7.2 The Contractor shall indemnify the Employer against any loss or liability that may be incurred by him on account of any failure on the part of the Contractor for timely rectification of the defects pointed out within the Defect Liability Period.

17.7.3 The release of ~~retention money~~ / security deposit against each unit / Work shall be after completion of the Defect Liability Period of such unit / parts of the Work as per discretion of the Engineer.

18.0 Cost and payment

18.1 Contract Price

18.1.1 The Bill of Quantities is used to calculate the Contract Price.

18.1.2 The initial Contract Price is the aggregate of the amounts against the individual items in the Bill of Quantities as referred to upto the stage of Letter of Acceptance and formalising the Contract agreement.

18.1.3 The Contract Price is in no way a fixed figure, being subject to revisions from time to time in respect of the actual quantities executed and / or any other changes as may be incorporated in the Contract, in the manner and to the extent provided for in the Contract, subsequent to the Letter of Acceptance issued by the Engineer.

18.1.4 The quantities set out in the Schedule of quantities (Price Bid) are the estimated quantities of the work, but they are not to be taken as the actual and exact quantities of the Work to be executed by the Contractor in fulfillment of his obligations under the Contract. The payment shall be made for actual measured quantity both for supply and installation. In this case the quantity shall be taken after installation, i.e. only installed portion of the work after completing the work would be measured. Scrap and balance materials would not be measured and hence no payment would be made for the same.

18.1.5 It may be noted that payment against the supply of items, in any case shall not exceed the final measured quantity. Additional payment, if any released during the supply of items more than the final measured quantity, corresponding payment shall be adjusted later, while processing subsequent bills after the final measurement.

18.2 Bill of Quantities

18.2.1 The Bill of Quantities contains the items, along with rates thereof, which the Contractor has to supply, install, test, commission and hand over.

18.2.2 The Contractor is to be paid for the actual item-wise quantities of the work done at the item-wise rates in the Bill of Quantities.

18.2.3 Items of work for which no rate or price has been entered in the Contract will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

18.2.4 Bill of Quantities Account denotes the account of the Contractor comprising the item-wise amounts and their aggregate, only, but not applying the amounts pertaining to securities, ~~retentions~~, ~~advances~~, recoveries, deductions, penalties and adjustments.

18.2.5 ~~The Bill of Quantities Account shall be the basis for computing the retention as hereinafter defined and the amounts of securities that the Contractor is required to provide and maintain.~~

18.3 Changes in the Quantities

18.3.1 If the final quantity of the work done differs from the quantity in the Bill of Quantities for a particular item, only unit rate mentioned in the BOQ/Schedule of Rates will be considered for payment. .

18.3.2 In case the final quantities of any items stand nil at completion of Work, adjustment of any kind in the rates of other items is not permitted.

18.3.3 In the case of works covered in this contract, the contractor shall carryout the works as per BOQ rates irrespective of the quantity variations

18.4 Payments for Variations

18.4.1 In case of extra works, if supplied, payment shall be as follows:

i) Market rates of items from OEM and labour supplied, hire charges of equipment and machinery if used, plus 15% for overheads and profits of Contractor.

18.4.2

~~18.5 Retention~~

18.5.1 ~~The Employer shall retain from each payment due to the Contractor, the proportion stated in the Contract Data until Completion of the whole of the Works.~~

18.5.2 ~~The methodology for release of retention money and the conditions thereof are described elsewhere in this document under the clauses pertaining to closure of contract.~~

18.6 Bills

18.6.1 The Contractor shall submit to the Engineer periodical statements of the value of the work completed less the cumulative amount certified previously.

18.6.2 .

18.6.3 The measurements of all the items of work shall be taken regularly and submitted every running by the Contractor for checking and certification by the Engineer; which the Engineer will normally check and return with corrections, if any, within a period of seven days, subject to the measurements being submitted in proper order and in approved format. All the bills prepared by the Contractor shall be based on these measurements certified by the Engineer. If the Contractor fails to submit proper measurement sheets in time, the Engineer has the option of not certifying the bills.

18.6.4 Payments against Bills, except in the case of Final Bill, shall be considered as progress payments and shall be regarded as payment by way of advance

HOWRAH-09 Hooghly Cochin Shipyard Limited

against final payments only and not as payment for the work completed till the date of progress payment.

18.6.5 The progress payments made shall not preclude the liability of the Contractor to finally complete the work strictly in accordance with the specifications and drawings, if required, by reconstructing or re-erecting and ensuring that all Defects, even where discovered subsequent to the payment, are eliminated.

18.6.6 The quantities set out in the Schedule of quantities (Price Bid) are the estimated quantities of the work, but they are not to be taken as the actual and exact quantities of the Work to be executed by the Contractor in fulfillment of his obligations under the Contract. The payment shall be made for actual measured quantity both for supply and installation. In this case the quantity shall be taken after installation, i.e. only installed portion of the work after completing the work would be measured. Scrap and balance materials would not be measured and hence no payment would be made for the same.

18.6.7 It may be noted that payment against the supply of items, in any case shall not exceed the final measured quantity. Additional payment, if any released during the supply of items more than the final measured quantity, corresponding payment shall be adjusted later, while processing subsequent bills after the final measurement

18.7 Documents along with Bills

18.7.1 All Bills shall be accompanied by statements and records to establish the Contractor's adherence to all aspects pertaining to quality of Work and all applicable laws, rules and regulations, in such detail and in such formats as may be insisted upon by the Engineer and shall include but not be limited to test records and certificates, remittances in respect of all taxes, duties, cess, royalties and seignorages, proof of payments made to subcontractors, labour and workmen and insurance coverages.

18.7.2 Bills are liable to be treated as incomplete and not fit for certification in the event of any shortfall in respect of the above statements and records.

18.8 Periodicity of Bills

18.8.1 The Contractor shall submit his Bills at intervals not less than the period specified in the Contract Data.

18.8.2 The Engineer may require of the Contractor to submit Bills on specified dates, in the interests of discipline in checking and reconciling measurements and ease of coordination between the Contractor and the Engineer in sorting out points that may need clarifications from either side.

18.9 Minimum amount for certification

18.9.1 Bills, except Final Bills, which, before or after checking by the Engineer, fall short of the amount specified in the Contract Data may not be certified for payment by the Engineer and will have to be treated as cancelled and their contents incorporated into subsequent Bills.

18.10 Period of certification

18.10.1 The Engineer shall check the Contractor's Bills and within 14 days of the Contractor's submission of the Bills, complete with all corrections called for and clarification of all their contents, certify the amount to be paid to the Contractor.

18.10.2 The final measurements, valuations and certification thereof in respect of the Contract are described in the clause hereof titled Final Bill.

18.11 Amending previous certifications

18.11.1 The Engineer may, in any of the Bills, make necessary entries to exclude any item certified in a previous Bill or reduce the proportion of any item previously certified in any Bill or carryout amendments and corrections in the light of later information.

18.12 Payments

18.12.1 Payments shall be adjusted for deductions pertaining to ~~advance payments~~, ~~retention~~, other recoveries in terms of the Contract and taxes, at source, as applicable under the law. In case of any ambiguity in the rates at which such deductions at source are to be made, the benefit of doubt shall be exercised to deduct at the higher of such rates.

18.12.2 The Employer shall pay the Contractor the amounts certified by the Engineer within the number of days from the date of each certificate, as indicated in the Contract Data.

18.12.3 Notwithstanding the above, where specified in the Contract Data, the Employer shall pay to the Contractor a fixed percentage of the amount billed by the Contractor, within the time also specified in the Contract Data, reckoned from the date of submission of the Bill, subject to the Engineer not having notified the Employer to desist from the same for any reason whatsoever. In such cases, the payment subsequent to the Engineer's certification of the Bill shall be adjusted for the amount already paid as above.

18.13 Mode of payment

18.13.1 All payments by the Employer to the Contractor shall, unless otherwise specified in the Contract Data, be in Indian Rupees, in the form of account payee cheques or demand drafts or bank pay orders, NEFT as the Employer opts from time to time, all bank charges thereof being to the Contractor's Account.

18.14 Interest on late payment

18.14.1 No interest is payable on late payments.

18.15 Tax

18.15.1 The rates quoted by the Contractor shall be deemed to be inclusive of the sales and other taxes, duties, seignorages that the Contractor will have to pay for the performance of this Contract.

18.15.2 The Employer will perform such duties in regard to the deduction of such taxes at source as per applicable law.

19.0 Closing the Contract

19.1.1 The Contract shall, except where otherwise provided for under the other clauses in this Contract, be deemed to be completed and fit for closure when the Engineer has satisfied himself as to the due completion by the Contractor of all the requirements of the Contract, including the due guarantee period of the Works and all other activities as provided for in the Contract.

19.1.2 The actions to be taken by the Contractor and the Engineer as a pre-requisite for closure of the Contract are specified in the other clauses of this document.

19.2 Completion Certificate

19.2.1 Save for the requirements as to the Defect Liability Period, the Contractor shall fulfill all other requirements of the Contract, whereupon the Engineer shall issue a Completion Certificate.

19.2.2 The Engineer shall decide whether any uncorrected Defect can reasonably be classified as one that can be expected to be taken care of during the Defect

Cochin Shipyard Limited HOWRAH-09

Liability Period or to the contrary whether its correction shall be a prerequisite for issue of Completion Certificate.

19.2.3 Issue of Completion Certificate shall denote the readiness of the Works for their taking over by the Employer, the commencement of the Defect Liability Period and shall be deemed as authorising the Contractor to raise his Final Bill, while in no way absolving the Contractor of obligations and duties in respect of Defect Liability.

19.3 Multiple Completion Certificates

19.3.1 Where completion of Works in parts is specified in the Contract Data or specifically provided for in the Contract, the Engineer shall issue completion certificates for each of such parts.

19.3.2 In such cases, the Defect Liability Period for each of the parts shall commence at the issue of each such completion certificate

19.3.3 The last completion certificate shall be deemed as authorisation to the Contractor to raise his Final Bill.

19.3.4 Notwithstanding the aforesaid, the Programme for the work may indicate further multiple completion dates, consistent with the order and sequence and efficiency of Electrification work or specific requirement of the Employer during the course of Electrification works.

19.3.5 The matter of further multiple completions calling for corresponding further multiple Completion Certificates shall be mutually agreed, well ahead of such dates.

19.3.6 In such cases, all other conditions as to a single completion certificate as specified hereinabove shall apply.

19.4 Taking over ahead of issue of Completion Certificate

19.4.1 Any part of the work may be put to his own use by the Employer, even in the absence of the corresponding completion certificate, based on his urgency and requirement, in which case the Contractor is bound to fulfill his obligations as if this does not in any way denote Completion or taking over.

19.5 Period of guarantee

19.5.1 The period of guarantee, also termed as Defect Liability Period, for this Contract is specified in the Contract Data. The obligations, duties and responsibilities of the Contractor in this regard and other details are specified elsewhere in this document.

19.6 Guarantee period **Certificate**

19.6.1 The Contract shall not be considered as completed until a guarantee period certificate shall have been signed by the Engineer and delivered to the Employer stating that the Works have been completed and maintained to his satisfaction.

19.6.2 The guarantee period certificate shall be issued by the Engineer fourteen days after the expiration of the Defect Liability Period, which is the period of guarantee period, or as soon thereafter as any works ordered during the Defects Liability Period shall have been completed to the satisfaction of the Engineer and full effects shall be given to this clause notwithstanding any previous entry on the Works or the taking possession, working or using thereof of any part by the Employer.

19.7 Approval only by guarantee period **certificate**

19.7.1 No certificate other than the guarantee period certificate defined hereinabove shall be deemed to constitute approval of any work or other matter in respect of which it is issued or shall be taken as an admission of the due performance of the Contract or any part thereof or of the accuracy of any claim or demand made by the Contractor or of additional or varied work having been ordered by the Engineer nor shall any other certificate abridge or prejudice any of the powers of the Engineer.

19.8 Multiple guarantee period **certificates**

19.8.1 Where applicable due to existence of multiple completion certificates as specified hereinabove, multiple completion certificates shall be issued.

19.8.2 The last guarantee period certificate shall be deemed to be the last certification by the Engineer for closing all financial matters pertaining to this Contract and closure of the Contract.

~~**19.9 Retention Money**~~

19.9.1 ~~The Employer shall retain from each payment due to the Contractor, the proportion stated in the Contract Data until Completion of the whole of the Works, as a surety and guarantee of proper performance by the Contractor.~~

~~**19.10 Release of Retention**~~

19.10.1 ~~The parts and proportions of the Retention Money, for the purposes of its release, are specified in the Contract Data.~~

19.10.2 ~~The first part of the retention money shall become due to the Contractor when the Engineer issues final Completion Certificate and the second, being the last, part thirty days after the issue of the final guarantee period Certificate.~~

19.11 Completion

19.11.1 The Contractor shall request the Engineer to issue a Certificate of completion of the Works and the Engineer will do so upon deciding that the Work is completed.

19.12 Taking Over

19.12.1 The Employer shall take over the Site and the Works within seven days of the Engineer issuing a certificate of Completion.

19.13 Final Account

19.13.1 The Contractor shall supply to the Engineer, in the form and style of the Final Bill, a detailed account of the total amount that the Contractor considers payable under the Contract, fifteen days after the Taking over.

19.14 Components of Final Bill

19.14.1 The Final Bill shall be complete in all respects, showing all details as to the following accounts:

a) The Bill of Quantities Account.

b) ~~Advances that may have been made by the Employer to the Contractor~~.

c) Materials, if any, provided by the Employer, including reconciliation details.

d) Account of all penalties and / or damages payable to the Employer by the Contractor.

e) Payments by the Contractor to the Employer in respect of any item

Hooghly Cochin Shipyard Limited HOWRAH-09

f) Payments or costs incurred by the Employer in respect of any payments or dues to third parties or bodies or statutory bodies, where such costs were to be borne by the Contractor.

19.15 Documents to accompany Final Bill

19.15.1 The Final Bill shall be accompanied by the following, which may have been elaborated upon elsewhere in this document, in formats approved by the Engineer, failing which the Engineer may decide not to accept the Final Bill and treat it as due from the Contractor:

a) Completion certificates and guarantee period certificates.

b) Records of Quality Assurance, including test certificates and all records thereof.

c) Original Guarantees and Warranties obtained from others.

d) As-built drawings, Operation and Maintenance manuals, catalogues, Test Reports

e) List and copies of all change / variation orders issued by the Engineer, to the extent as may be specified by the Engineer at that time.

f) Clearance certificate from Labour Department.

g) Clearance certificate from PF authorities.

h) Clearance certificate from insurance authorities.

i) Certificates of payment in respect of sales tax or other applicable taxes.

j) No-claim undertaking by the Contractor.

19.16 Action on Final Bill

19.16.1 The Engineer shall certify Final Bill and any final payment that is due to the Contractor within 56 days of receiving the Contractor's Final Bill, if it is correct and complete. If it is not, the Engineer shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary.

19.16.2 If the Final Bill remains unsatisfactory after it has been resubmitted, the Engineer shall decide on the amount payable to the Contractor and issue a payment certificate, within 56 days of receiving the Contractor's corrected Final Bill.

19.16.3 In case the Contractor fails to submit a corrected Final Bill within 28 days of being called for, the Engineer, at his discretion may close the Contractor's Account, debiting and /or crediting it with the sums he deems fit, in which case the Employer may, notwithstanding the Engineer's certification, opt not to make any payments to the Contractor for as long as he deems fit. Such withheld payments shall not attract any interest whatsoever.

19.16.4 If the Engineer's certification as aforesaid indicates that money is due from the Contractor to the Employer, it shall be treated as a debt and shall be recoverable, with interest and / or damages, as per law, not in any way comforted by any provisions in this Contract, which anyway in such an event, shall be deemed as closed.

20.0 Termination of Contract

20.1.1 TERMINATION OF CONTRACT DUE TO REASONS NOT ATTRIBUTABLE TO THE CONTRACTOR

a. The Employer reserves the right to foreclose & terminate the Contract either in part or full due to reasons not attributable to contractor, at any time, should, in the Employer"s opinion, the

cessation of works becomes necessary, owing to any cause whatsoever. The Employer shall in such an event give fourteen (14) days" notice in writing to the Contractor of his decision to do so.

b. The Contractor upon receipt of such notice shall discontinue the work on the date and to the extent specified in the notice, make all reasonable efforts to obtain cancellation of all orders and contracts to the extent they are related to the work terminated and upon terms satisfactory to the Employer stop all further sub-contracting or purchasing activity related to the work terminated and assist the Employer in maintenance, protection and disposition of the works required under the Contract by the Employer.

c. In the event of such termination the Contractor shall be paid compensation for the value of approved materials actually brought to the site and reasonably required to execute the Works as per approved programme, and of Work done up-to-date by the Contractor, shall be paid for in full by the Employer, at rates specified in the Contract. Decision of Engineer in this regard shall be final and binding.

20.1.2 TERMINATION OF CONTRACT DUE TO CONTRACTOR'S DEFAULT :

Subject to other provisions contained in this clause, the Engineer-in-charge may, without prejudice to his any other rights or remedy against the contractor in respect of any delay, inferior workmanship, any claims for damages and/or any other provisions of this contract or otherwise, and whether the date of completion has or has not elapsed, by notice in writing absolutely determine the contract in any of the following cases:

a. If the contractor having been given by the Engineer-in-charge a notice in writing to rectify, reconstruct or replace any defective work or that the work is being performed in an inefficient or otherwise improper or unworkmanlike manner shall fail to comply with the requirement of such notice for a period of fifteen days thereafter.

b. If the contractor has, without reasonable cause, suspended the progress of the work or has failed to proceed with the work with due diligence so that in the opinion of the Engineer-in-charge (which shall be final and binding) contractor will be unable to secure completion of the work by the date for completion and continues to do so after a notice in writing of 14 days from the Engineer-in-charge.

c. If the contractor fails to complete the work within the stipulated date or stages of work with individual date of completion, if any stipulated, on or before such date(s) of completion and does not complete them within the period specified in a notice given in writing on that behalf by the Engineer-in-charge.

d. If the contractor persistently neglects to carry out his obligations under the contract and/ or commits default in complying with any of the terms and conditions of the contract and does not remedy it or take effective steps to remedy it within 14 days after a notice in writing is given to him in that behalf by the Engineer-in-charge.

HOWRAH-09
Cochin Shipyard Limited

e. If the contractor shall offer or give or agree to give to any person of employer or to any other person on his behalf any gift or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of this or any other contract for employer.

f. If the contractor shall enter into a contract with Employer in connection with which commission has been paid or agreed to be paid by him or to his knowledge, unless the particulars of any such commission and the terms of payment thereof have been previously disclosed in writing to the Engineer-in-charge.

g. If the contractor had secured the contract with Employer as a result of wrong tendering or other non-bonafide methods of competitive tendering or commits breach of Integrity Agreement.

h. If the contractor being an individual, or if a firm, any partner thereof shall at any time be adjudged insolvent or financially unsound or have a receiving order or order for administration of his estate made against him or shall take any proceedings for liquidation or composition (other than a voluntary liquidation for the purpose of amalgamation or reconstruction) under any Insolvency Act for the time being in force or make any conveyance or assignment of his effects or composition or arrangement for the benefit of his creditors or proposes to do so, or if any application be made under any Insolvency Act for the time being in force for the sequestration of his estate or if a trust deed be executed by him for benefit of his creditors If the contractor being a company shall pass a resolution or the court shall make an order that the company shall be wound up or if a receiver or a manager on behalf of a creditor shall be appointed or if circumstances shall arise which entitle the court or the creditor to appoint a receiver or a manager or which entitle the court to make a winding up order.

j. If the contractor assigns, transfers, sublets (engagement of labour on a piece-work basis or of labour with materials not to be incorporated in the work, shall not be deemed to be subletting) or otherwise parts with or attempts to assign, transfer, sublet or otherwise parts with the entire works or any portion thereof without the prior written approval of the Engineer -in-charge.

When the contractor has made himself liable for action under any of the cases aforesaid, the Engineer-in-charge shall have powers:

i. To determine the contract as aforesaid (of which termination notice in writing to the contractor under the hand of the Engineer-in-charge shall be conclusive evidence). Upon such determination, ~~the retention money already recovered~~, Performance Guarantee, or any other guarantee(s) available with Employer under the terms of the contract shall be liable to be forfeited and shall be absolutely at the disposal of the Employer.

ii. After giving notice to the contractor to measure up the work of the contractor and to take such whole, or the balance or part thereof, as shall be un-executed out of his hands and to give it to another contractor to complete the work at the

risk and cost of the terminated contractor. The contractor, whose contract is determined as above, shall not be allowed to participate in the tendering process for the balance work.

or and to take such whole, or the balance or part thereof, as shall be un-executed out of his hands and to give it to another contractor to complete the work at the risk and cost of the terminated contractor. The contractor, whose contract is determined as above, shall not be allowed to participate in the tendering process for the balance work.

All costs, damages or expenses which the Employer may have paid for which under the „Contract" the contractor is liable, will be claimed by the Employer from the Contractor and shall be paid by the Contractor from any money due or becoming due to the Contractor under the „Contract" and balance if any may be recovered by actions of law or otherwise. In the event of above courses being adopted by the Engineer-in-charge, the contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased or procured any materials or entered into any engagements or made any advances on account or with a view to the execution of the work or the performance of the contract. And in case action is taken under any of the provision aforesaid, the contractor shall not be entitled to recover or be paid any sum for any work thereof or actually performed under this contract unless and until the Engineer-in-charge has certified in writing the performance of such work and the value payable in respect thereof and he shall only be entitled to be paid the value so certified. Terminated contractor shall dismantle and demobilize all plant and machinery, equipments, other temporary site establishments belonging to him within two months of termination of contract failing which Employer shall be at full liberty to take possession of those items and liquidate the same at the risk and cost of the terminated contractor.

20.1.3 TERMINATION OF CONTRACT BY THE CONTRACTOR

If the suspension of the whole of the Works, or any part or group of the Works by the employer or due to Force Majeure defined above exceeds 120 days without any reasonable update, the Contractor shall have the option to ask for closure of the Contract, or deletion from the Contract of that part of Works which has been suspended. In case contractor wants to close the contract, he shall give notice to the employer stating the failure on the part of employer to restart the work. In that event, the Contractor shall not be entitled to any compensation for damage or loss, alleged or actual and for loss of any profits anticipated, but the Contractor shall be eligible only for the payment of actual work executed at site. In such eventuality, the Performance Guarantee of the contractor shall be refunded within 30 days from the date of closure of the contract

21.0 RISK PURCHASE

21.0.1 During the course of execution of the job, in case the Contractor has done any substandard work, he shall be asked in writing to dismantle and redo the same at his own expense. If the Contractor fails to comply with the above instructions immediately, then CSL shall proceed with the above rectification work, through another agency or agencies at the risk & cost of the Contractor.

21.0.2 Similarly, if the Contractor goes slow on any particular item or items of work, CSL shall have the right to execute this item or items through another agency or agencies, including its own department at the risk & cost of the Contractor.

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

21.0.3 Extra cost and expenses incurred for completing the work of balance work or carrying out the rectification of any work as mentioned above through another agency or agencies including its own department, shall be debited to Contractor's account and shall be recovered from any money due or that may become due to the Contractor without prejudice to any other remedy that may be available to the Client in law. If there is any savings in cost due to re-arrangement or supplementing through other agencies, the original Contractor will not have any claim on this.

ginal Contractor will not have any claim on this.

21.0.4 The Contractor shall not in any manner do or cause to be done any act, matter or things whatsoever to prevent the person or persons so employed by the Employer from removing defective work and re-building or replacing the same in a manner satisfactory to the Employer and/or from, completing the work in the manner aforesaid

21.0 Disputes and Stages of dispute settlement

21.0STAGES OF DISPUTE SETTLEMENT

21.1.1 Amicable dispute settlement

Any dispute(s) or differences arising out of or in connection with the Contract shall, to the extent possible, be settled amicably between CSL and the contractor. Any grievance in connection with the work/Contract or decision taken by Engineer can be addressed to Employer

If any dispute arises out of or in connection with this contract or decision taken by Engineer, representatives of the employer and contractor with authority to settle the dispute will, within 30 days of receipt of written request from one Party to the other, meet in good faith and take all efforts in good faith to resolve the dispute. If the dispute is not resolved at that meeting, the Parties will attempt to settle it by Arbitration.

21.1.2 Arbitration

Unless settled amicably under mediation, disputes shall be settled by arbitration under the provisions of Indian Arbitration and Conciliation Act (Amendment act 2015). The seat of arbitration / arbitrator shall be at Ernakulam.

21.1.3 Court of law

No suit or other proceedings relating to the contract shall be filed or taken by the contractor in any Court of Law, except the courts at Ernakulam, Kerala.

22.0 FORCE MAJEURE

22.0.1 Force Majeure is herein defined as any cause which is beyond the control of the Contractor/ Sub-vendor/ or Employer as the case may be which they could not foresee or with a reasonable amount of diligence could not have been foreseen and which substantially affect the performance of the "Contract" such as:

a. Acts of God, War, natural calamities, including but not limited to floods, droughts, earthquakes, famines and epidemic, pandemic;

b. Acts of any Govt., domestic or foreign, including but not limited to war, declared or undeclared priorities, lockdown, quarantines, embargoes;

c. Acts of public enemy, accidents and disruptions, including but not limited to explosions;

d. Transportation delay due to force majeure

e. Strikes, Hartal, Lockouts and sabotages by persons other than contractors & subcontractors personnel and other employees ofthe contractor

f. Riots and civil commotion

h. Fire caused otherwise than by any act or omission on the part of the contractor or its agents, servants or employees or its subcontractor

The Contractor or the Employer shall not be liable for delays in performing their obligations resulting from any force majeure cause as referred to and/or defined above.

22.0.2 Notice for Force Majeure

Either party shall within fourteen (14) days from the occurrence of such a cause notify the other in writing with necessary supporting documents of such causes. If neither party issues notice regarding the event within 14 days of its occurrence, the said event shall be deemed not have occurred and the Contract will continue to have effect as such. In case of doubt or dispute, whether a particular occurrence should be considered as an “event” as defined under this clause, the decision of the Engineer shall be final and binding.

22.0.3 Consequence of Force Majeure

The obligation under the Contract shall be resumed as soon as practicable after the event has come to an end or ceased to exist. If the contractor suffers delay in due execution of the contractual obligation due to delays caused by force majeure as defined above, the agreed time of completion of the job covered by this contract or the obligations of the contractor shall be extended by a period of time equal to actual period of delay i.e. from start date of hindrance to end date of hindrance provided that on the occurrence of any such contingency, the contractor immediately should report in writing to CSL. For the purpose of assessing delay due to force majeure, fraction of a day shall be treated as full day. If the delay due to force majeure at any instance exceeds 7 days in a stretch, then extension of time to the tune of actual period of delay plus 25% (twenty five percent) shall be granted. Only extension of time shall be considered for Force Majeure conditions as accepted by the Employer and no additional cost on account of force majeure shall be admissible. If the Contract is terminated under this Clause, the Contractor shall be paid fully for the work done including completed workexecuted/supply part under the Contract, but not for any defective work or rejected material or work done which has been

HCWRAH-09 Cochin Shipyard Limited

destroyed or damaged before its measurement. Works that have already been measured shall be paid for by the Employer even if the same is subsequently destroyed or damaged as a result of the event. The Employer shall have the option to take over any plant and material lying at site, at rates provided for in the Contract.

If the performance in whole or part by the Vendor/Contractor or any obligations under the Contract is prevented or delayed by "Force Majeure" condition for the continued or aggregated period exceeding 120 days, the Employer may at his option terminate the Contract by issuing notice in writing.

22.0.4 Force Majeure affecting Sub-Contractor

Authorized sub-contractors executing works under the scope of this contract are also entitled for extension in time due to delays caused byForce Majeure events listed above

23. Independent Monitor

23.1. The Cochin Shipyard Ltd has appointed Independent Monitor for this pact in consultation with the Central Vigilance Commission.

1) Dr. Rajan S. Katoch, IAS (Retd.)
A-91, Alkapuri, Bhopal (MP)-462022
Mobile : 8800919222
Email: rkatoch@nic.in

2) Dr. Vinod Bihari Mathur, IFoS (Retd)
D302, Arborea Luxury Homes, Tarla Nagal, Near Doon Helidrome,
Dehradun, Uttarakhand- 248001
Mobile: 9412054648
Email: vbm.ddn@gmail.com

The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

23.2. The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the Chairperson of the Board of the Cochin Shipyard Ltd.

23.3. The Monitor has the right of access without restriction to all Project documentation of the Cochin Shipyard Ltd. The Contractor will also grant the Monitor, upon his request and demonstration of a valid interest, unlimited access to his project documentation. The same is applicable to Subcontractors. The Monitor is under contractual obligation to treat the information and documents of the Bidder /Contractor /Subcontractor with confidentiality.

23.4. The Cochin Shipyard Ltd will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the Cochin Shipyard Ltd and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

24.5. As soon as the Monitor notices; or believes to notice, a violation of this agreement, he will so inform the Management of the Cochin Shipyard Ltd and request the Management to discontinue or heal the violation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

22.6. The Monitor will regularly submit a written report to the Chairperson of the Board of the Cochin Shipyard Ltd and, should the occasion arise, submit proposals for correcting problematic situations.

हावड़ा-०९ HOWRAH-09

25.7. If the Monitor has reported to the Chairperson of the Board a substantiated suspicion of an offence under relevant Anti-Corruption Laws of India, and the Chairperson has not, within reasonable time, taken visible action to proceed against such offence, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

26.8. Integrity Pact to be submitted by the bidder is placed at **Annexure-15**

DEVELOPMENT OF SHIP REPAIRING FACILITY WORK
AT PANDU, GUWAHATI

PACKAGE II: TENDER FOR ELECTRIFICATION WORKS

SPECIAL CONDITIONS OF CONTRACT

INDEX for SCC

1.0	Context
2.0	Design
3.0	Drawings
4.0	Electrical License
4.1	Secured advance on materials
5.0	Selection of items and installation practices
6.0	Bye Laws, Regulations and Statutory Clearances
7.0	Patent Rights & Royalties
8.0	Inspection
9.0	Inspection by Engineer
10.0	Acceptance Tests
11.0	Testing and commissioning facilities
12.0	Electricity
13.0	Stores at the Site
14.0	Material Substitution
15.0	Maintenance Period
16.0	Works not to be Misused
17.0	Guarantees obtained from Manufacturers to be Transferred to the Employer
18.0	Carriage of Materials
19.0	Taxes
20.0	Time of completion
21.0	No claim for reduction of Work
22.0	Bills
23.0	Performance Guarantee
24.0	Training of Employer's personnel
25.0	Maintenance during Defects Liability Period
26.0	Taking over / use of system
27.0	Other terms & conditions
28.0	Uniformity of rates
29.0	Contract Data

1.0 Context

1.1 These Special Conditions of Contract are complementary to the other parts of the tender document and the Contract and shall be read in conjunction with them.

1.2 All the conditions herein below refer to related clauses and conditions and stipulations in the Invitation to Tender, General Conditions of Contract, Specifications, Preamble to Bill of Quantities, Bill of Quantities, Schedule of Key Material Inputs, drawings and / or other supplementary documents detailing the work and the Contract.

2.0 Design

2.1 The design for the system, items, equipments, materials and accessories covered in this Contract are the responsibility of the Contractor, at his cost.

2.2 The design parameters specified in this tender document shall form the basis for such design and details, in so far as they are relevant and shall be treated as a guide and a means for the Employer to obtain bids of fairly equitable and technically comparable nature.

2.3 Anything in the design parameters stipulated in this tender document that requires review by the Engineer, to facilitate proper manufacture / installation / functioning of the work under this Contract shall forthwith be brought to the Engineer's notice, by the Contractor, in writing.

3.0 Drawings

3.1 Before submission of tender, the tenderer may see the relevant drawings and site plan in the office of Hooghly Cochin Shipyard Limited. The tenderer shall visit the site also before submitting the bid.

3.2 Anything in the drawings that requires review by the Engineer, to facilitate proper functioning / installation / drawing details pertaining to the work under this Contract, shall forthwith be brought to the Engineer's notice, by the Contractor, in writing.

3.3 The Contractor shall examine all architectural, structural, plumbing and electrical and other services drawings, pertaining to works by other Contractors and as available for perusal with the Engineer, before starting his work under this Contract and report to the Engineer anything that does not correlate with the work under this Contract or any rules / regulations / norms.

3.4 All Work shall correlate well with the dimensions and conditions actually available at site, irrespective of anything in the drawings enclosed to this tender document or any drawings made available by the Engineer. To this end, the Contractor is required to physically ascertain the dimensions and site conditions, at his own responsibility and cost and bring to the Engineers' notice anything that does not correlate well with the drawings. Communication of such instances shall be in writing and with sufficient detail that would enable the Engineer or consultant to clarify the issue or issue amendments to the work or drawings, as to be decided by them.

3.5 The samples shall be properly indexed and the accompanying documentation shall contain name plate particulars of the individual items and the details of construction, size, arrangement, operating clearances, performance characteristics and also the details of all related items of work by other contractors, if any.

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

3.6 In addition to the above stipulations, all other stipulations in the General Conditions of Contract in respect of drawings, including as-built / completion drawings, shall be applicable.

4.0 Electrical License:

4.1 The electrical contractor executing this work shall have a valid Grade A Electrical Contractor license issued by the Government for carrying out installation work of the voltage class involved under the direct supervision of a person holding a certificate of competency for the same voltage classes issued or recognized by the Government.

5.0 Selection of items and installation practices

5.1 Items for this Work shall be carefully selected, to conform to the requirements of this tender document and shall be standard catalog products of established manufacturers, unless specifically mentioned to the contrary in the specifications and price schedules of this tender document.

5.2 Preferred makes, wherever specified in this tender document, shall only be selected. In case of non-availability of items from the preferred makes, supporting documents shall be submitted in such cases to Engineer.

5.3 Where the Work involves a composite system formed by installing together various items, the system as a whole shall be well balanced, each item affording good compatibility under various working conditions.

5.4 Safety, energy efficiency and ease of operation, inspection and maintenance shall be ensured in respect of individual equipment / items as well as the overall system and its installation.

6.0 Bye Laws, Regulations and Statutory Clearances

6.1 The Work shall be in conformity with the Bye Laws, Central Electricity Authority Regulations, other Regulations and Standards of the local or other authorities concerned in so far as these become applicable to the Work.

6.2 If the drawings or Specifications or design require something which violates the Bye Laws and Regulations, then the Bye Laws and Regulations shall govern the requirement of this Work.

6.3 All fees and payments in regard to inspections and / or clearances from statutory authorities shall be borne by the Contractor, at his cost. Proof of remittance in all such cases shall be furnished to the Engineer without any delay.

7.0 Patent Rights & Royalties

7.1 The Contractor shall save harmless and indemnify the Employer from and against all claims and proceedings for or on account of infringement of any The details and methodology FAT shall be as described in the Specifications, or othent rights, design, trademark or name or other protected rights in respect of any item, work or material used for or in connection with the Works and from and against all demands, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

8.0 Inspection

8.1 The Work is subject to independent and / or joint inspection by the Engineer / in team with the Contractor, as the case may be, to assess conformity with the specifications and drawings in respect

of no. of items of particular types, their technical details, general arrangement, spacing, etc. at all stages of fabrication and / or installation, as the case may be.

8.2 Such inspections are apart from the various tests, including acceptance tests, and may or may not be in conjunction with the same and are in addition to inspections by any statutory or local authority.

8.3 In this regard, all stipulations in the General Conditions of Contract shall apply.

8.4 All testing and measuring instruments shall be arranged by the Contractor in good calibration as certified by third parties acceptable to the Engineer.

8.5 The Engineer's representative may opt to witness the tests on the system and associated items at the manufacturing points, towards which the contractor shall arrange for lodging, boarding and local conveyance for the required durations. The Engineer's representative, for this purpose, shall denote a team of two to four persons. In case Employer is witnessing the Factory tests then lodging, boarding and local conveyance for the required durations will be borne by Employer.

9.0 Inspection by Engineer:

9.1 The contractor has to offer the works in staged manner for inspection like conduiting, wiring, cabling, panel erection, DB erection and switch box erection and other works including factory acceptance tests.

9.2 General: Not withstanding what is stated above or in the various tender documents.

9.3 All materials, workmanship, inspection, sampling and testing and interpretations of test results and their applications shall be in accordance with the latest editions of the Indian Standard specifications and / or codes or practice and Central Electricity Authority Regulations. In case where Indian Standard specifications are not available equivalent IEC and / or codes of practice shall be applicable.

9.4 No claim shall be entertained due to escalation on rates for labour and materials, statutory or otherwise, and the contractor's rates shall be held to cover any such price fluctuations.

10.0 Acceptance Tests

10.1 The Work under this Contract is subject to acceptance tests, termed as Final Acceptance Tests (FAT).

10.2 The details and methodology for FAT shall be as described in the Specifications, or other parts of this tender document.

10.3 The timing of the FAT shall be decided by the Engineer, based on his own assessment of the feasibility on any particular dates and times and his own / Employers activities around / about or concerning his dependency on the system.

11.0 Testing and commissioning facilities

11.1 The Contractor has to make his own arrangements for testing and commissioning of the works at his own cost, to the satisfaction of the Engineer. The requirements of site laboratory are indicted in the Contract Data.

12.0 Electricity:

12.1 No power supply will be given by the employer and the contractor shall make his own arrangements for the construction power required for progress of the work.

13.0 Stores at the Site:

13.1 The contractor shall provide for all necessary storage at the site in specified areas for all materials such as panels, switchgears, transformers, switches, wires cables and such other materials, which are likely to deteriorate by the action of sun, winds, rain or other natural cause due to the exposure in the open, either in the compounds or in stores, in such manner that all such materials, tools etc., shall be duly protected from damage by weather or any other. All such stores shall be cleared away and the whole site left in good order on completion of the contract. All materials shall be stacked in such a manner as to facilitate rapid and easy checking of quantities of such materials. The contractor will not be permitted to store any of his material in the building under execution or already executed by him without prior approval of the Engineer in writing. All materials issued by the Employer shall be stored properly and safely. A register showing daily stock and receipts and issued duly signed by the representative of the contractor shall be kept at the stores for these materials. These materials shall be subject to check / inspection by the Engineer or his representative or Employer's representative.

14.0 Maintenance Period:

14.1 The Guarantee period for the work shall be 24 months which shall be counted from the date of completion work as mentioned in completion certificate by the Engineer.

15.0 Works not to be Misused:

15.1 All works under or in course of execution or executed shall not be used by the contractor for any of his purposed storing materials, using as residential or office accommodation etc. without the written approval of the Engineer.

16.0 Guarantees obtained from Manufacturers to be Transferred to the Employer:

16.1 All the test certificates and guarantees for the entire works as obtained from the manufacturer's shall be transferred to the Employer by the contractor after completion of the work.

17.0 Carriage of Materials:

17.1 The transportation of materials from Manufacturer's works/Stores and transportation within the site is covered under the scope of the Contractor

18.0 Taxes:

18.1 The rates quoted shall include all taxes, levies, duties as applicable from time to time. Deduction shall be made towards income tax as per the prevailing income tax rules from each payment released to the contractor.

18.2 Recovery at source towards Income Tax calculating at the rates prescribed from time to time under Section 1940 of the Income Tax Act 196 and other relevant provisions of Income Tax Shall be made from the bills of the contractor and the amount so recovered shall be deposited with the Income Tax Department.

18.3 Statutory deductions as applicable will also be deducted.

19.0 Time of completion:

19.1 Time is the essence of the contract. The contractor shall complete all works under this contract within specified time from the date of placement of order.

19.2

20.0 No claim for reduction of Work:

20.1 In case of reduction in the scope of the work, either in part or full at any stage of work due to unforeseen circumstances or any other reasons beyond the control of the employer, the contractor shall have no claim whatsoever against the employer.

20.2 While recruiting the labour and the supervisory staff for his works, the contractor has to notify the vacancies to the concerned employment exchange and recruit the staff in accordance with the rules and regulations in force.

20.3 The contractor shall comply with all rules, regulations and legislations covered under contract labour (regulations and abolition) Act 1979, not withstanding anything contained to the contrary in the General Conditions of the contract or any other document forming part of the tender.

21.0 Bills:

21.1 The contractor shall prepare bills, on account as well as final based on agreed measurements and at contract rates in approved printed forms and shall submit to the Engineer in 3 (three) copies in individual folders along with original triplicate measurement sheets for payment. After the bills have been passed for payment. One copy of the bill shall be returned to the Contractor for his record.

21.2 The final bill shall be submitted by the contractor within 2 (two) months from the date of completion certificate to be issued by the Engineer. The final payment shall be made by the Employer with 3 (three) months from the date of contractor's submission of 'No demand certificate' and in the case of dispute if any, within 2 (two) months from the date of settlement of all disputes.

22.0 Performance Guarantee

22.1 In addition to the guarantees and warranties to be furnished to the Engineer, the Contractor shall expressly guarantee the performance of the system installed as a whole and the Work under this Contract and the details have been mentioned elsewhere in the contract.

22.2 n to the guarantees and warranties to be furnished to the Engineer, the Contractor shall expressly guarantee the performance of the system installed as a whole and the Work under this Contract and the details have been mentioned elsewhere in the contract.

22.3 All guarantees and warranties, as described herein and in the General Conditions of Contract and the Specifications, are to be considered as complementary to each other and none of them shall absolve the Contractor of his responsibilities in any way and more particularly in respect of the Defect Liability and maintenance.

22.4 Demonstration of satisfactory performance shall be witnessed during FAT, under simulated and / or actual conditions of duty.

22.5 Any shortcoming in the performance shall be considered as a Defect in terms of this Contract and shall be rectified by the Contractor, at his cost and within reasonable time that may be allowed by the Engineer, irrespective of whether such making good involves redesign, new manufacture, supply for replacement / addition, fabrication, installation and testing and any or all other attendant activities and costs.

22.6 Instances where performance is not immediately affected, but the situation as existing may lead to a potential defect or under-performance or compromise on safety, if allowed to continue, shall also be considered as Defects.

23.0 Training of Employer's personnel

23.1 The Contractor shall, during execution of work and commissioning of the system, arrange to train, free of cost, personnel of the Employer in the following and relevant aspects:

23.2 Good operating practices, documentation and logging.

23.3 Safety related procedures and handling of emergencies.

23.4 Diagnosing and attending to faults and defects which may generally occur during operations.

23.5 The above shall in no way discharge the Contractor of his responsibilities during the Defect Liability Period and any subsequent period where further maintenance is assigned to him.

24.0 Maintenance during Defects Liability Period

24.1 The Contractor is under obligation to maintain the system in good condition during the Defects Liability Period, its duration being as specified in the Contract Data.

24.2 This maintenance includes preventive maintenance and setting the system to good operating conditions, trouble-shooting, repair, rectification, testing and re-commissioning as necessary.

24.3 Fair wear and tear during this period shall also be attended to by the Contractor, at his own cost.

24.4 Spares and substitutes, consumables, gadgets, tools, tackles, plant and equipment, supervision, documentation and labour shall be arranged by the Contractor, at his own cost. However, the Employer shall arrange for any electricity / water at his cost.

24.5 Where required, the Contractor shall carryout maintenance activities during holidays / off-peak hours / nights, to ensure least disturbance to the activities of the Employer.

24.6 Prompt attention shall be forthcoming from the Contractor and the system down-time shall not exceed eight hours or such other duration that may be indicated by the Employer from time to time.

24.7 The Contractor and his representative shall be accessible at all hours and on all days to receive any complaints from the Employer and initiate immediate action on the same.

24.8 Non-compliance of any of the above conditions shall attract penal action in terms of this Contract, as well as any other action as the Employer deems fit and at his sole discretion. Cost of such works carried out by Employer will be recovered from the Contractor.

25.0 Taking over / use of system

25.1 Taking over of the Work shall be as described in the General Conditions of Contract.

25.2 The Engineer reserves the right to put to use the whole or parts of the system, ahead of its formal acceptance, to meet exigencies of the situation, in which case also the Defects Liability Period shall commence upon formal acceptance and taking-over only.

26.0 Other terms & conditions

26.1 Save for anything expressly stated to the contrary in these Special Conditions of Contract and / or Contract Data appended hereto, all the stipulations made in the General Conditions of Contract, Specifications, etc. as forming part of this tender document shall be applicable.

26.2 These include, inter alia, aspects pertaining to temporary works and utilities, cooperation & coordination, safety & security, protection of environment, care of works, plant, materials & labour, manpower, time, quality, defects liability period, cost & payment and closing the contract.

26.3 No plea of the Contractor, citing ignorance or misinterpretation or dilution of meaning, shall be entertained in this regard.

27.0 Uniformity of rates

27.1 In case of any extra work in respect of any schedule of quantities being executed, the rate for such extra work shall be the same in for such items of work if so included in the schedule of quantities/BOQ.

In case there is any conflict of meaning between the Special Conditions of Contract and the General Conditions of Contract the provisions of the Special Conditions shall override corresponding provisions of the General Conditions of the Contract. Similarly the specific stipulations in BOQ and Preamble shall override the stipulations in Specifications and Special Conditions of Contract. In case of any conflict of meaning either in the same documents or between the other documents (other than the above stipulations), the Engineers decision shall be final, binding and conclusive and Contractor shall carry out the work without any additional cost implication to the Employer.

HOWRAH-09 Hooghly Cochin Shipyard Limited

28.0 CONTRACT DATA

Sl. no.	Parameter	Detail / value specific to this Tender
1	Engineer	Biswajit Ch Das, Project Officer (Electrical), HCSL
2	Time allowed for executing Contract Agreement.	Fifteen days from the date of issue of Letter of Acceptance.
3	Date for Engineer giving possession of Site to Contractor.	Same as Start Date.
4	Start Date for the work. (SD)	Same as date of issue of Letter of Acceptance, or any other date specified in Letter of Acceptance.
5	Completion Date for the work.	➢ 04 (Four) Months from the issue of Letter of Acceptance. ➢ The Contractor shall supply the DG SET within 1.5 months from the date of award of work. ➢ The Contractor shall complete the shore power panels and deck cabling within 2 months from the date of award of work.
6	In-part Completion Dates.	None.
7	Duration of Defect Liability Period.	Twenty-Four months, reckoned from the corresponding Completion Certificate.
8	Time allowed for Contractor for submitting Programme.	Five working days from issue of Letter of Acceptance.
9	Intervals at which programme has to updated by the Contractor.	Fortnight.
10	Amount to be withheld for non-submission of updated Programme.	Rs. 5,000/-
11	Liquidated Damages against failure to complete work.	Time is the essence of contract. In case the contractor fails to complete the whole work, contractor shall be liable to pay liquidated damages (not by the way of penalty) at the rate of 0.5% of the value of contract per week per stage of work and when the delay is not a full week or in multiples of a week and involves a fraction of week, the compensation payable for that fraction shall be proportional to the number of days involved subject to a maximum of 10% of the executed value of works. However, a grace period of 10 days from each stage(s) of work shall be granted by the employer beyond which liquidated damages not by way of penalty shall be levied.

12	Validity	The offer should be valid for a minimum period of 3 months from the date of technical bid opening.
13	Earnest Money Deposit (EMD)	EMD shall be remitted directly to INR 2,60,000/- (Two Lakh Sixty Thousand) through NEFT/RTGS shall be valid for a period of 6 (Six) months from the due date of opening of Techno-commercial Bids, Bank details provided below. Bank account details: 00000045548156100 IFSC Code: SBIN0008614 Account Number: SBININBB395 EMD is exempted for MSME firms upon submission of relevant certificates along with bid.
14	Completion Period	The entire supply, Installation and commissioning shall be completed within 120 DAYS from the date of acceptance of the work order. The entire work should be carried out as per details mentioned in the tender and as per direction of Engineer deputed for the work. In case of any site hindrances noticed during execution of the work which are not attributable to the Bidder, completion period will be extended suitably. Bidder has to report such hindrances, if any during execution of the work. In this regard, decision of Officer-in-Charge will be final and the same shall be accepted by the Bidder.
15	Payment Terms	BOQ items 85% of supply value would be paid on supply of respective materials mentioned in BOQ/Schedule of Rates along with required documents, certification by Consultant upon delivery at Project site 10% of supply value mentioned in BOQ/Schedule of Rates and 70% of installation charges mentioned in BOQ/Schedule of Rates would be paid on completion of installation of equipments/items in all respects on pro-rata basis and certification by Consultant. 30% of installation charges mentioned in BOQ/Schedule of Rates would be paid system wise/area wise / building wise as applicable on successful commissioning and certification by consultant 5% of supply value mentioned in BOQ/Schedule of Rates would be paid system wise/area wise / building wise as applicable after getting statutory approvals as

		required and on compliance of all contractual requirements and certification by consultant. Examples of system wise /area wise/ building wise commissioning are as below 1. Substation wise commissioning in all respects 2. RFPs and FCs commissioning area wise in all respects 3. cabling commissioning area wise in all respects 4. earthing works area wise in all respects 5. lighting works area wise and building wise in all respects Lumpsum works (Mentioned as Lot in BOQ/Schedule of rates) In the case of lumpsum works 90% payments (cumulative of supply and installation charges) would be released on satisfactory installation of the system as per specification and drawings and on certification by consultant. Balance 10% (cumulative of supply and installation charges) would be released on successful commissioning, getting statutory approvals as required and on compliance of all contractual requirements and on certification by consultant.
16	Security Deposit (SD):	The successful tenderer has to furnish a Security Deposit equal to 5% of the contract value within 15days from the receipt of the work order. This can be furnished in the form of Bank Guarantee from a Nationalized Bank or scheduled bank as per CSL format / Demand draft drawn in favour of Cochin Shipyard Ltd. The EMD remitted can be adjusted towards security deposit on request from the Bidder. The security deposit will be released within 30 days after successful completion of the work. If the Bidder abandons the contract or fails to commence or carry out the work as per the terms and conditions of the work order in time, CSL will have the rights to terminate the contract within 15 days of notice forfeiting the EMD and Security Deposit and also to initiate alternative arrangements at the risk and cost of the Bidder. Format of Bank Guarantee towards SD is enclosed at Annexure-6.
17	Performance Guarantee for Defect Liability Period	The Bidder has to guarantee the installation for a minimum period of TWO YEARS from the date of commissioning and acceptance of the same by HCSL against defective workmanship / inferior quality of materials used. Any defects found during the above period have to be rectified by the Bidder at his own expenses including replacement of components if any required. Towards the above guarantee, the Bidder has to furnish a performance guarantee equivalent to 5% of

		the order value (rounded off to next fifty rupees). This can be furnished in the form of Bank Guarantee from a Nationalized Bank or scheduled bank as per HCSL format. If the Bidder fails to attend the defects reported, HCSL will have the rights to arrange the work through other agencies at the risk and cost of the Bidder and by encasing the security deposit/ Bank Guarantee. Format of Bank Guarantee towards Performance Guarantee is enclosed at Annexure-6.
18	**Tender Drawings**	Certain drawings are **attachment through the link below**. These are to be considered as only for the guidance of the tenderer. https://workdrive.publicmgovcloud.in/external/a1d27732d727a778bc4dee5cebb308af/download
19	Number of copies of drawings to be provided by Engineer to Contractor.	Three.
20	Interval between submissions of bills by contractor.	One month.
21	Number of days from the date of certification of Bill by which Employer shall pay the Contractor the amounts certified by the Engineer.	30 days.
22	Mode of payments by Employer to Contractor.	In Indian Rupees, in the form bank transfer

ELECTRIFICATION WORKS
FOR
SHIP REPAIRING FACILITY AT PANDU, GUWAHATI

TECHNICAL SPECIFICATIONS
FOR
ELECTRIFICATION WORKS

1. GENERAL

1.1 The technical requirements for various types of electrification and communication system works are indicated in these specifications and are complementary to and shall be read in conjunction with other documents forming the Contract, viz: Tender Notice, General Conditions of Contract including Form of Tender, Invitation to Tender and Articles of Agreement for Electrification Work, Special Conditions of Contract, Bill of Quantities (BOQ) and Drawings.

1.2 All the conditions specified in the above parts shall apply unless otherwise specifically indicated herein to the contrary, in regard to all aspects of the work, coverage of costs, enabling and attendant works and actions required of the Contractor.

1.3 The specifications for various types of work are included herein, segregated into chapters. Such chapterisation does not preclude application of the specifications to similar works covered / not covered in any chapter as above.

1.4 In these specifications, various types of work are covered, some of them related only indirectly to the works envisaged under a particular Contract for works.

1.5 The conditions applicable to those parts of the works involving items and equipments for which the contractor is required to provide the detailed design shall be as detailed elsewhere in this tender document for turnkey works, in addition to any stipulations here below.

1.6 **Quality:**

1.6.1 The methodologies and systems to be followed for quality assurance and the quality control aspects are elaborated in the Conditions of Contract and Additional Conditions of Contract. The technical requirements, for various types of work are indicated in these specifications.

1.6.2 The requirements in regard to materials, procedures and workmanship and their sampling and testing as specified herein shall be strictly adhered to, failing which a Defect, in terms of the Contract, shall be deemed to have occurred.

1.6.3 All work shall be in conformity with the requirements of codes, guidelines and specifications of applicable standards such as those of Bureau of Indian Standards, etc., whether or not indicated as such in these Specifications.

1.6.4 In the absence of applicable standards as above, the work shall be in line with the requirements of IEC, British, American or German standards and / or generally accepted practices, as may be directed by the Engineer.

1.6.5 Where any material / system of construction is not covered herein, the guidelines of the manufacturer / system-provider of such material / system in respect of storage, application, use, procedures, testing, etc. shall be strictly adhered to.

1.6.6 In all the aforesaid cases, it is the responsibility of the Contractor to submit the details thereof in time and obtain approval of the Engineer.

1.6.7 Materials and manufactured items are to be carefully selected, to meet the requirements of these specifications, the applicable Standards, the drawings and instructions of the Engineer.

1.7 **Preferred makes:**

1.7.1 Makes and brands of certain manufactured materials and items that are to be chosen in preference to others may be listed in these specifications and / or indicated in the Bill of Quantities / Price Schedules. The tendered rates shall be inclusive of the same.

1.7.2 For fabricated items, local manufacturers can be considered, at the sole discretion of the Engineer.

1.7.3 All items / components / equipments, etc. supplied / installed shall be new. Refurbished, prefabricated, or recycled items are expressly prohibited. An undertaking to this effect shall be furnished to the Engineer, wherever and whenever he deems it necessary.

1.7.4 The conditions in respect of quality, makes and related aspects as stipulated in this tender document, are contractually binding.

1.8 **Drawings:**

1.8.1 The drawings enclosed to this tender document and / or available with the Engineer-in-charge for perusal of the tenderers / contractors shall form the basis for the drawings to be developed by the Contractor, at his cost.

1.8.2 Anything in the above drawings that requires review by the Engineer-in-charge, to facilitate proper functioning / installation / drawing details pertaining to the work under this Contract, shall forthwith be brought to the Engineer's notice, by the Contractor, in writing.

1.8.3 The Contractor shall examine all architectural, structural, plumbing and other services drawings, pertaining to works by him or other Contractors and as available for perusal with the Engineer, before starting his work under this Contract and report to the Engineer-in-charge anything that does not correlate with the work under this Contract or any rules / regulations / norms.

1.8.4 All work shall correlate well with the dimensions and conditions actually available at site, with due regard to the drawings enclosed to this tender document or any drawings made available by the Engineer and / or any drawing to be prepared by the contractor. To this end, the Contractor is required to physically ascertain the dimensions and site conditions, at his own responsibility and cost.

1.8.5 Within one month after the award of the contract, the Contractor shall furnish, for the approval of the purchaser, detailed shop and installation drawings of all equipment and materials including control wiring layouts required to complete the project as per specification and as required by this Contract.

1.8.6 The drawings shall contain name plate particulars of the individual equipment / items and the details of construction, size, arrangement, operating clearances, and performance characteristics and also the details of all related items of work by other contractors, if any.

1.8.7 As fitted schematic diagrams of the control system, electrical system, etc. shall be exhibited, permanently, for the guidance of the operating and maintenance personnel and the users, to the extent directed by the Engineer. The formats, sizes, material of the display and locations of such exhibits shall be as approved by the Engineer. Also all hard and soft copies of all as built drawings shall be handed over.

1.9 **Statutory approvals:**

1.9.1 The Contractor executing this work shall be an electrical contractor of the approved A class who shall have a valid license issued by the Government Licensing Authority for carrying out installation work of the voltage class involved under the direct supervision of a person holding a certificate of competency for the same voltage classes, issued or recognized by the Government. Requirement of license for obtaining statutory approvals shall be ensured. Necessary documents shall be submitted in this regard.

1.10 **Licenses:**

1.10.1 The Contractor executing this work shall be an electrical contractor of the approved class who shall have a valid license issued by the State Government for carrying out installation work of the voltage class involved under the direct supervision of a person holding a certificate of competency for the same voltage classes, issued or recognized by the State Government.

1.10.2 In addition to the above stipulations, all other stipulations in the General Conditions of Contract in respect of drawings, including as-built / completion drawings, shall be applicable.

1.11 **Time factor:**

1.11.1 No stipulation herein shall become diluted in the context of time or the effect of prevailing conditions on the time available.

1.12 **Costs:**

1.12.1 The tenderer is deemed to have visited the site and ascertained the local conditions, entry, traffic restrictions, obstructions, if any, climatic conditions and also the site conditions, statutory requirements and any other aspect that may have a bearing on the work, its progress, completion and maintenance.

1.12.2 The tenderer is also deemed to have studied the Specifications, bill of quantities / price schedules, tender drawings and other drawings that may be available with the Engineer for perusal of tenderers, all before preparation and submission of his tender.

1.12.3 The tenderer is deemed to have taken into account all the above in his tender, fully covering all the costs and expenditures in respect of any and all extras likely to be incurred due to all the above, including quality and time aspects, contingencies, etc. as well as the General and Special Conditions of Contract and other documents forming the Contract.

1.13 **Measurements and coverage of costs in rate:**

1.13.1 Unless otherwise indicated in the BOQ/ Price Schedules, the rates for the various Items of work are deemed to include the cost of all materials, consumables, wastages, necessary scaffolding for working at various heights, all necessary hardware and consumables required for the entire installation, transportation, labour, supervision, tools, tackles, plant, machinery, sampling, samples, testing, documentation, obtaining and transferring

guarantees and warranties from manufacturers / specialist agencies, preparing and furnishing as-built drawings.

1.13.2 The rates in the BOQ / Price Schedules are also deemed to include all costs towards licenses, patents, royalties, cess, seignorages, taxes, insurance, safety practices, watch and ward, security, medical aid, temporary works, utilities and services, adherence to all applicable local and government rules and regulations, cost of money, capital and funds and bidding for and operating under the Contract.

1.13.3 Power, water, material handling facilities required for the work shall be arranged by Contractor at his risk and cost

1.13.4 Measurements for electrification works shall be as per standard practice.

1.14 **Guarantees, warranties and defects liability:**

a) All stipulations as per General Conditions of Contract and Special Conditions of Contract shall apply.

1.15 **Safety:**

a) The Contractor shall take adequate precautions to ensure complete safety and prevention of accidents at site, during installation, testing and commissioning and during operation, as elaborated in the General Conditions of Contract and / or Special Conditions of Contract.

b) The safety precautions shall conform to the relevant Indian Standard Codes and international codes and recommendations wherever applicable.

1.16 **Codes, standards, bye-laws and regulations:**

a) Compliance with codes, standards, bye-laws and regulations, and actions to be taken by the Contractor are described in the General Conditions of Contract and / or Special Conditions of Contract.

b) The standards to which the system and the components as offered conform to shall be clearly spelt out by the tenderer by suitably filling in the information in the relevant Technical Schedule forming part of this Tender Document.

1.17 **Verification of Dimensions:**

a) The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and shall advise the Engineer of any discrepancy before performing the work.

1.18 **Delivery and Storage:**

a) All equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variation, dirt and dust, or other contaminants. . Necessary storage shed for storing electrical items shall be constructed by Contractor at his risk and cost.

1.19 **Spare Parts:**

a) The Contractor shall submit spare parts data for each different item of materials and equipment specified, after approval of the detail drawings and not later than two months prior to the date of commissioning of the system.

b) The data shall include a complete list of parts and supplies, their catalogue numbers, and their current unit prices and sources of supply.

c) Spares listed in this specification shall be delivered along with the equipment's and equipment cost is inclusive of the same.

हावड़ा-09
HOWRAH-09

2. SCOPE OF WORK

2.1 The scope of work covered by this specification includes the supply and installation of all the electrical equipment and materials including testing and commissioning, unless indicated to the contrary in the Bill of Quantities / Price Schedules.

2.2 Any equipment, device and component of work not specifically mentioned in this specification but considered essential for proper design, installation and operation shall be included by the tenderer in his offer.

2.3 The successful tenderer shall carryout the installation as per the arrangement and details shown in the construction drawings, standards and instructions given by the Engineer-in-charge.

2.4 Any variation or changes to be carried out at site shall be done with the approval of the Engineer-in-charge.

2.5 The scope of work shall include, but not be limited to the supply, installation, testing and commissioning of the following:

2.5.1 HT Panels.

2.5.2 Transformer.

2.5.3 Diesel Generators erection.

2.5.4 415V LT Switchboards.

2.5.5 LT Bus Duct.

2.5.6 DC Distribution system

2.5.7 Excavation of cable trenches and backfilling.

2.5.8 11 KV grade aluminium / copper XLPE / PVC insulated and PVC sheathed armoured power cable terminations.

2.5.9 1.1 KV grade aluminium / copper conductor XLPE / PVC insulated and PVC sheathed armoured / unarmoured power / control cables and cable terminations.

2.5.10 Power and communication system cable trays.

2.5.11 Distribution boards.

2.5.12 Miniature Circuit Breaker Distribution Boards, MCBs, MCCBs, ELCBs, RCCBs and RCBOs.

2.5.13 Earth electrode stations and earthing conductors.

2.5.14 Lightning protection system.

2.5.15 Switch / socket boxes, junction boxes, draw boxes and inspection boxes.

2.5.16 Switches, sockets and accessories.

2.5.17 Wiring materials such as conduits, conduit clamping accessories.

2.5.18 Telecom / telephone conduiting & cabling.

2.5.19 Networking system conduiting & cabling.

2.5.20 Public address system conduiting & cabling.

2.5.21 Closed circuit television system conduiting & cabling.

2.5.22 1.1 KV grade copper conductor, FRLS multistranded PVC insulated wires.

2.5.23 All other installation materials, hardware and consumables.

2.5.24 Preparation of drawings and documents for approval of statutory authorities.

2.5.25 Obtaining statutory approvals.

2.5.26 Coordination activities with APDCL to obtain required KVA demand power supply.

2.5.27 Ambient temperature of 40 deg. Celsius with 98% humidity for the detailed design of electrical system

2.6 BATTERY LIMITS

2.6.1 The scope of work as envisaged in this contract is bounded by the following physical battery limits, defining the inclusions and exclusions as applicable:

Sl. No.	Description	Included in the scope of work under this Tender Document	Excluded (To be arranged by the Owner / Other vendor)
1)	Distribution transformers	Supply, erection, testing and commissioning with all complete.	None.
2)	HT breakers	Supply, erection, testing and commissioning with all complete.	None.
3)	DG sets with Auto Start/Stop panel	Supply, erection, testing and commissioning with all complete.	None.
4)	LT Panels & switch gear with enclosures	Supply, erection, testing and commissioning with all complete.	None.
5)	LT bus ducts	Supply, erection, testing and commissioning with all complete.	None
6)	Distribution boards	Supply, installation, testing and commissioning with all complete.	None.
7)	HT & LT cabling	Supply, laying, testing and terminations with all complete.	None.
8)	Cable trays	Supply, erection and painting with all complete.	None.
9)	Wiring (point / circuit / main circuit)	Supply, installation, testing and commissioning with all complete.	None.

हावड़ा-०९
HOWRAH-09
Cochin Shipyard Limited

Sl. No.	Description	Included in the scope of work under this Tender Document	Excluded (To be arranged by the Owner / Other vendor)
10)	Earthing system	Supply, erection, testing and commissioning with all complete. Including excavation and backfilling etc.	None.
11)	Lightning protection system	Supply, erection, testing and commissioning with all complete.	None.
12)	Aviation system.	Supply, installation, testing and commissioning with all complete.	None.
13)	UPS	Supply, installation, testing and commissioning with all complete.	None.
14)	Inverters	Supply, installation, testing and commissioning with all complete.	None.
15)	Light fixtures	Supply,Installation, testing and commissioning. (but including supply of all required fixing accessories)	None.
16)	Ceiling fans	Supply,Installation, testing and commissioning. (but including supply of regulator and all required fixing accessories)	None.
17)	Exhaust fans	Supply,Installation, testing and commissioning. (but including providing aluminium louvers supply of all required fixing accessories)	None.
18)	Telecommunication & EPABX system	Supply and installation of RJ-11 outlets,EPABX, handset and cabling from outlets to communication rooms @ respective floor and all terminations.	None.
19)	Data networking system	Supply and installation of RJ-45 outlets, Jack/network switch/hub/racks and cabling from outlets to server room @ respective floor and all terminations.	Server

Sl. No.	Description	Included in the scope of work under this Tender Document	Excluded (To be arranged by the Owner / Other vendor)
20)	Computers,Printers & Scanners	Supply and installation of computers,keyboard, mouse,printers & scanners	None.
21)	Audio & Video	Supply and installation of projector,screen,mic,speakers,amplifier,smart tv	None.
22)	Public address system	Supply, installation of Speakers, Amplifiers / Consoles, CD/DVD players / Microphone and laying of cables/wires from speakers to communication rooms @ respective floor and all terminations.	None.
23)	CCTV (camera) system	Supply,installation of Cameras, DVRs, Monitors and laying of cables/wires from cameras to communication rooms @ respective floor and all terminations.	None.
24)	Television system	Supply and installation of TV outlets and cabling from outlets to communication rooms @ respective floor and all terminations.	None.
25)	Power supply for VRV Units.	Supply and installation of incoming cable upto MCB control and its terminations.	Cabling between MCB control to ODU Unit.
26)	Power supply for Indoor Units	Supply and installation of wires from DB to Indoor units	
27)	System earthing for Air conditioning system	Provide 150mm length, 25x3mm copper flat as tapping point nearby Chillers, cooling towers, condensor water pumps, chilled water pumps, AHUS / blowers, FCUs .	Earth links between items of airconditioning system and the nearest available earth flats.

हावड़ा-०९
HOWRAH-09
Cochin Shipyard Limited

Sl. No.	Description	Included in the scope of work under this Tender Document	Excluded (To be arranged by the Owner / Other vendor)
28)	Power supply for pumps.	Provide power supply tapping point (panel/switch with enclosure) nearby pumps.	Starter / control panel & Cabling between starters to pumps.
29)	Earthing system for pumps.	Provide 150mm length, 25x3mm copper flat as tapping point at pump rooms.	Earth links between pumps and tapping from the nearest available earth flats.
30)	Scaffolding, all material handling equipments, hoists and all required machineries, tools and tackles, electricity and water for the work, etc.	All as required.	None.

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

Sl. No.	Description	Included in the scope of work under this Tender Document	Excluded (To be arranged by the Owner / Other vendor)
31)	Liasion with CEA/CEIG.	Preparation and submission of complete set of as-built/schematic drawings, substation layout, physical layout and the technical documents with CEIG/CEA. Coordination with CEIG/CEA & Client for making official payments (fees & Deposits). Continuous follow-up With CEIG/CEA for obtaining drawing approval and safety certificate for energising the substation. Rectification of defects pointed out by CEA/CEIG {The scope covers complete electrical system with all equipments / switchgears including DP structure yard, HT breakers, Transformer, LT panels, DG sets, HT & LT cables, Earthing, Lightning protection system, Aviation, DBs, wiring, luminaires and fixtures, Elevators, Escalators and motors & pumps etc.}	Making payment towards CEIG/CEA fees & deposits. (Payment to Government only).

हावड़ा-०९
HOWRAH-09

Sl. No.	Description	Included in the scope of work under this Tender Document	Excluded (To be arranged by the Owner / Other vendor)
32)	Liasion with APDCL.	Preparation and submission of application & documents with APDCL. Coordination with APDCL & Client for making official payments (fees & Deposits). Continuous follow up with APDCL for obtaining required Demand power (till energizing the substation).	Making payment towards APDCL fees & deposits.

3. STANDARDS

3.1 The equipment and the installation work shall conform to the requirements of the Indian Electricity Rules and Act, Central Electricity Authority Rules and Regulations, IS: 5216: Safety procedures & practice in electrical work with it latest amendments and all relevant Standards and codes of practice of the Bureau of Indian Standards which shall include but not be limited to the following:

IS 732	Code of practice for electrical wiring installation
IS 1248	Direct acting indicating analogue electrical measuring instruments and their accessories
IS 1255	Code of practice for installation and maintenance of power cables upto and including 33KV rating
IS 1293	Plugs and socket outlets of rated voltage upto and including 250 volts and rated current upto and including 16 amperes
IS 1554	PVC insulated (heavy duty) electric cables
IS 2705	Current transformers
IS 3043	Code of practice for earthing
IS 5216	Safety procedures and practices in electrical work
IS 5578	Guide for marking of insulated conductors
IS 5831	PVC insulation and sheath of electric cables
IS 8130	Conductors for insulated electric cables and flexible cords

Hooghly Cochin Shipyard Limited HOWRAH-09

IS 9537	Conduits for electrical installations
IS 11353	Guide for uniform system of marking and identification of conductors and apparatus terminals
IS 13947	Specification for low voltage switchgear and control gear
Any additional standards which are to be considered apart from the below requirements shall be brought into the notice of the Engineer/Employer during detailed design.	

4. GENERAL REQUIREMENTS

4.1 Galvanising:

4.1.1 Wherever galvanising is specified, it shall mean hot-dip galvanising with zinc coating in the range of 710-810 g/sq.m. of surface area.

4.2 Painting:

4.2.1 All enclosures and metal parts of the electrical equipment and installation shall be cleaned of oily substances and foreign materials such as dirt, rust, scale, oil, grease, welding flux, etc. by surface treatment encompassing degreasing, de-rusting and phosphatising.

4.2.2 Unless otherwise specified, all enclosures / metal parts of electrical equipment other than the panel, transformers shall be painted with two coats of primer followed by powder-coated paint or stoving grade enamel. The shade of the final coat shall be subject to Engineer's approval.

4.3 Earthing:

4.3.1 The metallic enclosures of single-phase equipment shall be earthed at one point while those of three-phase equipment shall be earthed at two points.

4.3.2 The earth electrode stations conforming to IS 3043 specifications of shall be installed to obtain an effective earthing system. The earth stations shall be provided with heavy duty SFRC / RCC covers of appropriate size.

4.3.3 The distance between two earth electrodes shall not be less than 3 meters. A minimum clearance of 1.5 meters shall be ensured from buildings.

4.3.4 Joints in the GI strips shall be welded with a lap weld of 20 mm length while those in copper shall be tinned at joints, bolted/rivetted. The welded joints shall be painted with bituminous paint and covered with bituminous gunny tape. All wires shall be terminated with tinned copper crimping type lugs.

4.3.5 The sizes of the earthing conductors shall be as indicated in the Bill of quantities.

4.3.6 The armour of the cables shall be effectively earthed at the cable gland by earthing the gland using copper earth clips.

4.3.7 All galvanized iron / copper earthing conductors to the earth stations shall be laid at a depth of not less than 600mm from formed ground level.

4.3.8 All the metal conduits / enclosures shall be earthed at one point.

4.3.9 The earthing conductor wires unless otherwise specified shall be as follows :

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

a) Main earthing conductor from Main switch board to the earth electrode: 2 runs of 25 x 3 mm copper strip.

b) Earth conductor inside the MSB and between MSB and all sub-switch boards: 1 run of 25 x 3 mm copper strip.

4.4 Electricity supply particulars:

4.4.1 All equipment and installation covered under the scope of work shall be designed for electricity supply of the following specification:

Voltage	415 V (3Phase) /240 V (1Phase ± 10%
No. of phases	3/1
Type of system	3-phase, 4-wire / 1-phase, 2-wire
Frequency	50 Hz ± 3%
Type of neutral earthing	Solidly earthed
Short circuit level	Not exceeding 35 MVA at 415 V

5. EQUIPMENTS AND ACCESSORIES

5.1 LT PANEL BOARDS

5.1.1 ***1.1.1 General***

a) The SBs shall be manufactured and installed as per CEIG standards.

b) The enclosures shall be designed to take care of normal stress as well as abnormal electromechanical stress due to short circuit current.

5.1.2 ***Body and construction***

a) The Switch Boards (SBs) shall be floor mounted free standing or wall-mounting type, as specified, multi-tier compartmental cubicle type fabricated out of CRCA sheet steel. The non-load bearing members of the panel boards shall be fabricated out of 14 SWG or 2mm CRCA sheet. The panel manufacturer shall take care of the sheet thickness and material of load bearing members and inner partitions to ensure the strength and smooth operation.

b) All panels shall be complying to Form 3b as per IS 8623: 1993. However, a partition between upper and lower cable chamber shall be provided in the case of two tier panels.

c) The SBs shall be single front, fixed design, having individual compartments to house each of the circuits and shall be extensible on both side..

d) Gland plate thickness shall be minimum 3.0mm thick CRCA.

e) The SBs shall be provided with a fabricated base frame of 75 mm height at the bottom, having adequate provision for grouting the Switchboards (SB's) on the foundation, in case of floor-mounting type.

f) The indoor SBs shall have a degree of protection of not less than IP52.

g) The rear cover of SBs shall be bolted to the framework.

h) All doors shall be provided with fixed neoprene gaskets or similar. The doors shall be provided with quick opening type Bakelite moulded knobs with circlips.

i) The SB's shall be painted as specified elsewhere to this specification and shall undergo suitable pre-treatment prior to painting.

j) All hardware e.g. Nuts, bolts & gasket, anchor fasteners, gasket etc., are included in the bidder's scope

k) Mechanical and electrical interlocks shall be provided in panels with two incomers/bus coupler

l) Control supply voltage shall be 24V for indoor main switchboards

m) In the case of outside switchboards additional KIOSK covering complete switchboard shall be provided.

n) Specification of RFP and FC have been specified separately

5.1.3 ***Busbar:***

a) The SBs shall be of single/double busbar type with horizontal/vertical busbars.

b) A horizontal / vertical busbar chamber shall be provided to connect individual feeders.

c) All joints in busbars system shall be of the bolted type and spring washers shall be provided at all such joints.

d) The busbar chamber shall be totally segregated from the rest of the compartments and shall be inaccessible under normal operating conditions.

e) No equipment shall be mounted on the busbar chamber.

f) The busbar shall be of aluminium and shall have a continuous rating as indicated in the drawings. The neutral busbar shall be half the size of the phase busbar.

g) The busbar shall be covered with heat shrinkable PVC sleeves in the colours red, yellow, blue for the phase busbars and black for the neutral busbar.

h) The busbar shall be supported with high quality non-hygroscopic resin bonded on DMC / SMC insulators designed for the specified short circuit level.

i) The higher rating panels shall be supplied along with the test certificate to guarantee the fault withstanding capability of 35MVA (50kA) at 415 Volts.

j) Tappings from the busbars to the feeder switch shall be by means of insulated or sleeved busbars depending on the rating and terminal capacity of the switch.

k) All the busbars and live parts are shrouded properly to avoid danger of accidental contact with live parts of the Switchboard.

l) Current density of Aluminium busbar shall not be less than 0.7A/square mm.

5.1.4 ***Switch board interconnection***

m) All connection and tap offs shall be through adequately sized connectors appropriate for fault level at location.

n) For unit ratings upto 100 Amps, FRLS PVC insulated copper conductor wires of

हावड़ा-०९
HOWRAH-09

adequate size to carry full load current shall be used.

o) The terminations of such interconnections shall be crimped properly.

p) Solid connections shall be used for all rating of 100 amps and above.

q) All connections, tappings, clampings shall be made in an approved manner to ensure minimum contact resistance.

5.1.5 *Draw out features*

a) Air Circuit Breakers shall be provided in fully draw out cubicles, unless otherwise stated.

b) These cubicles shall be such that draw out is possible without disconnection of the wires and cables.

c) The power and control circuits shall have self aligning and self isolating contacts.

d) The fixed and moving contacts shall be easily accessible for operation and maintenance.

e) Mechanical door interlocks shall be provided on the draw out cubicles to ensure safety and compliance to relevant Standards.

5.1.6 ***Instrument Accommodation***

a) CT shorting terminals shall be provided.

b) The current transformers for metering and for protection shall be mounted on the solid aluminum bus bars with proper supports.

5.1.7 ***Earthing:***

a) Two runs of copper earth strip of size 25 x 3 mm shall be provided between the earth electrode and the panel board.

b) Each compartment shall be connected to the earth strip at the bottom of the board with a PVC insulated multistranded copper wire of size 6 sq.mm.

c) A copper earth strip of size 25 x 3 mm shall be provided at the top/bottom throughout the length of the board with arrangements to join with external earth strip at both ends.

d) The door shall be earthed with the main body through flexible copper wire.

5.1.8 ***General features:***

a) Clamping arrangement shall be provided in the cable alley. All cable entries shall be from the top or bottom as per site condition or as directed by the Engineer-in-charge. Vertical cable alley common to vertical sections shall be provided for running cables.

b) Each compartment door shall be interlocked with the switch handle such that the door cannot be opened with the switch in ON position.

c) The size and layout of each compartment shall be as such as to enable easy maintenance of the equipment mounted therein.

d) The height of the SBs shall be restricted to 2300mm as far as possible including the busbar compartment at the top and the base frame at the bottom.

e) The minimum operating height from the finished floor level shall not be less than 200mm

for switches with a rating of less than 100A and 400mm for switches with a rating of 100A and above. The maximum operating height shall not exceed 1800mm. from the finished floor level.

f) The SB's shall be powder coated to Siemen's grey shade after undergoing 7-tank treatment process.

5.1.9 ***Electrical components:***

a) All equipment shall be fixed in the compartments in such a way that they are removable and replaceable from the front only.

b) The current transformers shall be of the epoxy moulded window type suitable for busbar mounting.

c) Metering current transformers shall be of Class-1 type and accuracy class of 0.1s.

d) The ratio and rated burden of the current transformers shall be as specified in the drawings.

e) The meters shall be flush-mounting type. The voltmeter and ammeter on the incoming & outgoing feeders shall be of suitable size digital type multi function meter.

f) All switches and fuse-switch / switch-fuse units / change over switches shall conform to duty category AC 23 as specified in IS 13947.

g) All contactors shall conform to utilisation category AC 3 as specified in IS 2959.

h) The isolators for the switch fuse units shall be on the busbar side and the fuses on the load side. Shrouds shall be provided to screen the live parts.

i) The fuses shall be of the HRC link type capable of clearing the fault level specified.

j) All energy meters, ammeters and voltmeters shall be mounted in a separate meter compartment and shall be located at a convenient reading height.

5.1.10 ***Circuit:***

a) The following colour code shall be adopted for the wiring of the Switch Boards (SBs):

Phase: Red, Yellow & Blue; Neutral: Black; Earth: Green.

b) Plastic engraved labels shall be provided for each circuit and for the board itself.

c) Details of the feeders of the switchboard shall be as shown in drawing.

d) CPRI approved panel manufacturer of maximun rated capacity shall be selected for fabricating the switchboard.

5.1.11 ***Name plates and labels***

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

5.1.12 ***Drawings:***

a) The Contractor shall submit for approval three sets of general arrangement, wiring drawings and bill of materials (with make) of the switchboard before commencing manufacture.

b) No fabrication works shall be taken up without the approval of the Engineer-in-charge.

हावड़ा-०९
HOWRAH-09

5.2 LT BUS DUCT

5.2.1 This specification covers the technical requirements of design, manufacture, test at works, supply, installation, testing and commissioning at site of air-insulated 415V, 50 kA / Sec. Non-segregated phase bus ducts without interleaved bus bars and accessories for efficient and trouble free operation with MS CRCA sheet steel enclosure.

5.2.2 The bus duct assembly shall be weather, dust, vermin and corrosion proof construction totally enclosed compartmentalized cubicle design with removable top and bottom covers and drain points at suitable locations.

5.2.3 The bus duct shall be suitable for the following operating system.

Rated voltage	:	415 V ± 10%, 3 phase, 4 wire
Rated frequency	:	50Hz ± 5%
Fault level	:	60KA for 1 second
Enclosure	:	IP 55

5.2.4 The bus duct shall be metal enclosed self cooled, non-segregated and shall include as standard manufactured components, all straight lengths, elbows, phase change over boxes, flexible joints and termination chambers. It shall be the responsibility of the supplier / contractor to manufacture the bus duct to suit the terminal flange arrangements of the transformer and LT switch gear.

5.2.5 The bus duct enclosure shall be dust and vermin proof rectangular in cross-section and shall be fabricated out of MS angle and 14 SWG MS CRCA sheets. It shall be rigid and robust in construction and shall be bolted and shall be provided with neoprene gaskets. All retaining catches, screws bolts and nuts etc., shall be nickel plated. Ends of bus duct connecting to transformers and MSBs shall be provided with flange connectors and flexible.

5.2.6 The bus duct shall be designed to keep enclosure losses to a minimum due to temperature rise. Provision shall be made for the expansion and contraction due to temperature variations. Wherever required necessary phase crossover chambers shall be included. The bus duct enclosure shall have inspection openings of sufficient size on the enclosures to facilitate inspection / maintenance of supports and bus bar joints.

5.2.7 The bus duct enclosure shall be earthed by a continuous copper earth bus bar of 25mm x 6 mm size, running on both side of the enclosure throughout the entire length of the bus duct.

5.2.8 Bus duct enclosure shall be prepared, primed, filled and painted to the highest standards. Care shall be taken in workmanship and selection of materials to prevent the occurrence of any form of damage or corrosion.

5.2.9 All items shall be cleaned and de-burred after fabrication and welding is complete. External surfaces shall be filled and rubbed down as necessary to obtain a perfectly flat smooth surface, free from blemishes and imperfections and the whole shall be painted with under coats followed by two coats of epoxy paint. The interior of the enclosure and the bus bars shall be painted mate black and the exterior of the bus duct enclosure colour shall be approved by the engineer / employer at site. The bus duct construction shall have removable top and bottom covers.

5.2.10 The bus duct shall be designed for the current ratings as specified in the bill of quantities and for a maximum temperature rise of 40°C over an ambient temperature of 45°C.

5.2.11 The bus-bars shall be supplied with flexible expansion joints at both the ends and also at bends.

5.2.12 The supports and expansion arrangement shall be so chosen to avoid undue stress to the bus-bars, supports and end connections.

5.2.13 Dust excluding gaskets of neoprene shall be used for enclosure to ensure water and dust

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

tightness.

5.2.14 The duct shall be (mostly) suitable for outdoor installation. Minimum two numbers space heaters wit thermostats shall be provided to prevent moisture condensation and maintain cubical temperature 5°C above the ambient.

5.2.15 The bus bars shall be of high conductivity aluminum conductor of electrical grade as per relevant IS. The bus bars shall be of rectangular cross section and of uniform cross section along its entire length. No tapering of the bus bar cross section is allowed.

5.2.16 The bus bars shall have a continuous current rating and fault withstand capacity.

5.2.17 The bus bars shall be TP & N and identified with red, yellow, blue and black colour tape bends at appropriate places and at terminations.

5.2.18 The bus bars shall be suitably supported at appropriate intervals, not more than 500mm withstand the electromechanical stresses during short circuit.

5.2.19 The bus bars shall be supported on tough non-hygroscopic, resin bonded, self extinguishing fire retardant insulators preferably of SMC / DMC with ribbed construction.

5.2.20 The clearance between the individual bare phase power bus bars and between the phase and earth bus bars in air shall be not less than 25mm and 19mm respectively.

5.2.21 The end terminations and length beyond 4.5 M shall be provided with necessary flexible connectors for bus expansion and contraction.

5.2.22 Bolted type bus bar joints shall be considered for connecting successive bus bars of its same phase. Bolted type splice plates, zinc plated bolts and nuts with washers shall be used. The joints shall be treated by the application of joint compound to render the joint moisture – proof. The contact pressure must be ample and this shall be maintained during the time the panel is in service.

5.2.23 The joints in the bus-bars shall be of the bolted type and it shall be ensured that the following precautions are observed:

i. The contact pressure must be ample and this shall be maintained during the time the panel is in service.

ii. The surfaces of the conductors must be clean.

iii. With the flat conductors, the overlap should be equal to or greater than the width of the bars are ten times the thickness of the bar whichever is greater.

iv. The joints shall be treated by the application of paint to render the joint moisture- proof.

v. For the joints, bolts of cadmium plated high-tensile MS, having expansion characteristics due to temperature change similar to those of the conductor, may be used.

vi. Smearing the surface with oxide inhibiting grease just prior to making the joints in order to preserve the efficiency of the joints. The joints shall be thoroughly shrouded.

5.2.24 The bus bars shall have a short circuit withstand capacity of 50 KA rms for 1sec.

5.2.25 The bus duct shall be subjected to the following routine tests:

a) Visual inspection and dimensional checks.

b) Insulation resistance test

c) Power frequency withstand voltage test 2.5 KV

5.2.26 The bus duct shall be subjected to the following type tests as per the latest revision of relevant IS.

a) Temperature rise test

b) Short circuit test

c) Degree of protection

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

5.2.27 The contractor shall furnish the details and the cross section of the bus ducts showing the following along with tender documents.

a) Size of enclosure
b) Size of bus bars
c) Type of Bus support and spacing
d) Type of joints and flexible
e) Details of the sizing calculations.

5.2.28 **Tests:**

a) Bus duct shall be completely assembled, adjusted and tested for operation under simulated conditions to ensure proper functioning of all equipments.

b) The bidder shall furnish two (2) sets of type test certificates for all the tests conducted as mentioned above. The temperature rise test shall be conducted on atleast one section of the straight runs of each bus duct specified in the schedule of quantities which will be witnessed by the Engineer or his representative.

5.3 AIR CIRCUIT BREAKERS:

a) **Air Circuit Breaker**

i) The ACBs shall be of drawout type.

ii) For safety of users, interlock should be provided between breaker operating mechanism and the arc chutes to prevent closing of ACB in case the arc chutes are not properly secured.

iii) Draw out breakers should not close unless in distinct Service / Test / Isolated positions.

iv) It should be possible to know the control voltage ratings for all electrical accessories without opening the panel door.

v) Circuit breaker should provide an electrical indication when all pre-requisites for closing the breaker are fulfilled.

vi) A padlocking arrangement shall be provided to prevent unauthorized racking operation.

vii) It should not be possible to rack out the breaker, unless a persistent OFF command is maintained.

viii) It shall not be possible to commence racking operation, with breaker ON. Additionally, it should not be possible to close the breaker during racking operation, even by a remote closing command.

ix) It should be possible to lock the breaker in OFF condition, by way of a key interlock.

x) Any changes in the busbar & dropper orientation / layout in the panel shall not call for any rework on the cradle / breaker.

xi) Withstand capacity (Icw) shall not be lower than Icu, atleast for the maximum short-time delay setting provided on the protection releases.

b) **Protection Release**

i) The breaker should be equipped with micro-controller based release, offering following features:

- Overload, short circuit and earth fault protection with settable time delays for all protections.
- The release should be able to communicate on MODBUS RTU protocol using RS485 port.
- The release shall be equipped with thermal memory and users should be able to selectively enable the feature.
- The release should be able to provide protection for 50% and 100% Neutral rating.

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

- On-line change of settings should be possible.
- It should be possible to carry out testing of release without tripping the breaker.

Sl. no.	Technical Specification	800A	1000A	1250A	1600A	2000A
1	Rated Current (In) 50/60 Hz at Main Conductors (in Amps)	800	1000	1250	1600	2000
2	40°C ambient temperature N Conductor (In amps)	800	1000	1250	1600	2000
3	Number of poles	4	4	4	4	4
4	Type of Operation	Electrical Drawout	Electrical Drawout	Electrical Drawout	Electrical Drawout	Electrical Drawout
5	Rated operational voltage Ue 50/60 Hz, 3 Phase.	upto 415V	upto 415V	upto 415V	upto 415V	upto 415V
6	Rated insulation voltage (V), 50/60Hz, Ui	1000	1000	1000	1000	1000
7	Rated impulse Voltage, Uimp to withstand:					
a)	In Main conducting paths (in kV)	8	8	8	8	8
b)	In Auxiliary Circuit (in kV)	4	4	4	4	4
8	Utilization category as per IEC 947-1 & 2	B	B	B	B	B
9	Rated service short circuit breaking capacity, Ics (RMS) upto 440 V (Ics = Icu)	50	50	50	50	50
10	Rated short time withstand current, Icw.					
a)	For 0.5 sec at 50/60 Hz (KA Peak)	50	50	50	50	50
b)	For 1 sec at 50/60 Hz (KA Peak)	50	50	50	50	50

5.4 MOULDED CASE CIRCUIT BREAKER (MCCB)

5.4.1 MCCB should be suitable for working on 415 V, 50 Hz supply.

5.4.2 It should be manually operated fixed type with external operating handle.

5.4.3 It should be double break type.

5.4.4 The breaker should be tested as per IS: 13947-2, IEC 60947-2, EN 60947-2.

5.4.5 The rated short time withstand capacity of the breaker should be 25KA/36KA/50KA, RMS as specified in SLD.

हावड़ा-०९
HOWRAH-09

5.4.6 MCCB shall be microprocessor type. The MCCB shall be of suitable breaking capacity as specified in drawing with microprocessor suitable for adjustment. Terminals should be suitable for termination of copper / aluminum conductor cable. Spreader shall be provided for MCCB for terminating the cable.

5.5 MINIATURE CIRCUIT BREAKER (MCB):

5.5.1 The MCBs shall be of the thermal-magnetic type and shall have a short circuit rating of not less than 9KA, suitable for DIN rail mounting and shall be ON in the up position and OFF in the down position of the operating knob.

5.5.2 The Miniature circuit breaker (MCB) shall be heat resistant, moulded type designated, manufactured at tested as per (IS8828).

5.5.3 The MCB shall have inverse time tripping characteristic against overloads and instantaneous trip against short circuit.

5.6 RESIDUAL CURRENT CIRCUIT BREAKER (RCCB/RCBO):

5.6.1 Residual Current circuit breaker shall be 415 / 240V, 4 / 2-pole current-operated type, with a sensitivity of 30 milliamps in 30 milliseconds or less tripping time, suitable for DIN rail mounting inside MCB DBs.

5.6.2 The RCBO/RCCB shall work on direct-current operating principle using core balance current transformer.

5.6.3 The unit shall have a test button for testing its function.

5.6.4 The RCBO/RCCBs shall not have a bypassing arrangement.

5.7 FUSE SWITCH UNIT / CHANGE OVER SWITCH:

5.7.1 The fuse switch unit shall be of continuous rating and of heavy-duty load break type.

5.7.2 The switch-operating handle shall be interlocked with the door such that it opens only when the switch is in OFF position.

5.8 MCB / MCCB DISTRIBUTION BOARD (MCB/MCCB DB):

5.8.1 The Distribution board shall be factory-made pre- wired, phase-segregated type having an enclosure made from 1.6 mm (16 SWG) CRCA sheet, with welded back and sides and detachable gland plates or suitable knockouts at top and bottom. All removable plates shall be provided with neoprene gaskets.

5.8.2 Only the operating handle of the MCB/MCCB shall be projecting outside the cover plate.

5.8.3 The incoming switch terminals shall be suitably shrouded to avoid accidental contact. Each phase or way shall also be suitably shrouded with hylam sheet.

5.8.4 The incoming and outgoing terminals shall be suitable for terminating cables as per the termination sheet.

5.8.5 The MCB Distribution board shall undergo suitable pretreatment followed by two coats of primer and two coats of stoving grade synthetic enamel paint or powder coated, as specified elsewhere in this specification.

HOWRAH-09 Hooghly Cochin Shipyard Limited

5.8.6 The connections to the busbars shall be by solid copper links.

5.8.7 The DB's shall have phase / Neutral / Earth terminal blocks for termination of incoming and outgoing wires.

5.8.8 All the device wires and terminal blocks within the board shall be clearly identified by durable and legible tags corresponding to those in applicable drawings. All wiring shall be easily identified by ferrules (interlocking type) accessible for maintenance checks.

5.8.9 Terminal blocks should be suitable for termination of conductors / cable of required size but minimum rated cross section of the terminal block should be 6 sq.mm.

5.8.10 Terminal block shall be made of flame retardant polymide material. Coloured terminal blocks & FRLS wires shall be used for easy identification of RYB phases, neutral and earth.

5.8.11 The design of the Distribution board shall be such that the MCBs/MCCBs can be mounted without additional wiring.

5.8.12 All the low voltage internal wiring of the distribution boards shall be of 1.1KV grade stranded copper conductor, FRLS PVC insulated, PVC sheathed wires of core size 2.5 sq.mm for control wiring.

5.8.13 The DB should have name plate with its designation inscribed on it. The name plate shall be made of durable material with legible lettering. Refer its relevant SLD's for designation of DB's.

5.8.14 The Distribution board shall be suitable for DIN rail mounting type MCBs. The MCBs shall be mounted on the Distribution board in one or more horizontal rows such that the MCBs are ON in the up position and OFF in the down position of the operating knob.

5.8.15 The busbars shall be made of cadmium-coated copper and shall have a continuous rating of not less than 100A.

5.8.16 The DB's shall be of recess / surface mounted type with integral loose wire box. The type of DB (recessed / surface mounted) shall be subject to Engineers approval.

5.8.17 Multi-way neutral and earth connectors / busbar shall be provided inside the MCB Distribution board to terminate the incoming and outgoing neutral / earth conductors.

5.8.18 Plastic engraved identification labels shall be provided for each circuit and Distribution board itself.

5.8.19 Proper danger plate shall be provided on each board as per relevant IS.

5.8.20 The MCB Distribution board shall be supplied and installed as per electricity utility / CEIG Standards.

5.9 MCCB/MCB IN SHEET STEEL ENCLOSURE:

5.9.1 The MCCB/MCB shall have an enclosure of 1.6mm (16 G) CRCA sheet.

5.9.2 The enclosure shall have welded back and sides, suitable knockouts at the top and bottom and a removable front cover.

5.9.3 The front cover shall have a suitable cutout such that the dolly of the MCB is accessible from the front.

5.9.4 The enclosure shall be painted as specified elsewhere in this specification.

HOWRAH-09

5.10 CABLES:

5.10.1 Cable shall be XLPE / PVC insulated and PVC sheathed, GI round / flat armoured / unarmoured, 1.1 KV grades, with copper or aluminium/ copper conductor as specified conforming to IS 1554.

5.10.2 The 11KV HT underground cables shall carry ISI Certification.

5.10.3 11KV HT cable terminations shall carry ISI certification and should be of heat shrinkable trifurcating type.

5.10.4 The insulation thickness and sheathing of cable shall be as per relevant standards.

5.10.5 The LT underground cables shall carry ISI.

5.10.6 The LT Underground Cables of size 6 sq.mm. and above, shall have multi-stranded conductors.

5.10.7 Cable glands shall be of single compression Siemens type made of brass with earth clip.

5.10.8 Cable lugs shall be of tinned copper and shall be of crimping type.

5.10.9 The insulation thickness of cable shall be as per table 1 of IS 1554 (Part I).

5.10.10 The sheathing of cable shall be extended type, as per Table-3 & 6 of IS 1554 (Part 1).

5.11 LADDER - TYPE FABRICATED STEEL TRAYS:

5.11.1 All members and hangers, including spacers, shall be of mild steel and of sizes as specified in the BOQ and / or the tender drawings.

5.11.2 Transverse members shall be spaced at 300 mm, maximum.

5.11.3 Twin transverse members shall be provided at support points of the trays.

5.11.4 Junctions, changes in levels, etc. shall be of suitable construction, generally matching the tray construction, and independently supported.

5.11.5 Individual tray unit, including cleats, shall be fabricated by welding, with all holes pre-drilled.

5.11.6 Each tray unit shall be galvanised. All hangers shall be galvanised after threading.

5.11.7 Galvanising shall be to the extent of 710 to 810 grams per sq.m.

5.11.8 All installation (after galvanisation) shall be by means of bolting only.

5.11.9 All hardware, including bolts & nuts shall be of GI only.

5.11.10 Spacing of supports shall be as specified in the tender drawings.

5.11.11 Where it is not feasible to provide hanger supports, galvanised MS brackets shall be used.

5.11.12 Bracket supports shall be galvanised mild steel angles, size same as the longitudinal members of the tray, secured to ceilings / walls by means anchor fasteners or inserted into the wall and grouted with cement concrete. The choices for various locations shall be approved by the Engineer.

5.11.13 **Clearances for all types of trays:**

a. For horizontal trays :

i. A clear gap of 200 mm shall be maintained between the tray and the ceiling and ceiling projections.

HOWRAH-09 Hooghly Cochin Shipyard Limited

ii. The vertical spacing between the trays in multi-tier stretches shall be as approved by the Engineer and in no case lesser than 300 mm.

iii. The distance between the ceiling / ceiling projections and the bottom of the tray shall be as per Engineer's requirements and shall take care of other items of the building such as false ceiling, light fixtures, etc.

5.11.14 **For vertical trays:**

i. A clear gap of atleast 100 mm shall be maintained between the tray and the walls behind.

ii. This shall be achieved by approved spacers.

5.11.15 **General requirements for all types of trays:**

5.11.16 Trays shall not have sharp edges, burrs or projections injurious to cables.

5.11.17 All bolts, nuts and fasteners shall be as approved by the engineer.

5.11.18 Anchor fasteners shall be of 750 kg pull-out class and of approved type.

5.11.19 Trays shall be installed to correct line, level, plumb and alignment and shall present a neat and clean appearance.

5.11.20 Sample stretches of trays of various sizes shall be installed in position, complete in all respects, and got approved by the engineer.

5.12 METALLIC CONDUITS AND FITTINGS:

5.12.1 Metallic conduits shall conform to standards such as IS 9537 Part-II and IS 1653. They shall be treated to prevent corrosion.

5.12.2 The conduits and fittings shall have a wall thickness of not less than 1.6 mm(16SWG)for conduits upto 32mm diameter not less than 2mm(14SWG) for conduit above 32mm diameter.

5.12.3 No conduits less than 20mm in diameters shall be used.

5.12.4 Saddles for surface conduit work on wall shall not be less than 0.55mm (24 gauges) & 19mm width for conduits up to 25mm dia and not less than 0.9mm (20 gauges) & 25mm width for larger diameter.

5.12.5 Matching inspection bends, couplers and draw boxes shall be provided at suitable locations and the sizes shall be in accordance with the respective conduit sizes.

5.13 PVC CONDUITS AND ACCESSORIES:

5.13.1 PVC conduits and fittings shall be of the heavy class conforming to IS 9537 Part III.

5.13.2 No conduits less than 20mm in diameters shall be used.

5.13.3 PVC bends couplers and draw boxes shall be provided at suitable locations and the sizes shall be in accordance with the respective conduits.

5.13.4 Elbows shall not be used.

5.14 FANS

5.14.1 Ceiling Fans

हावड़ा-०२
HOWRAH-02

i. The regulator shall be 2-module static type device with hum-free operation at all speed levels and also shall be energy saving capacitor based design. BLDC type fans shall be used.

ii. Wherever required, downrods made of GI pipes and suitable to hold the particular fan shall be provided.

5.14.2 **Exhaust Fans**

i. The exhaust fans shall be of industrial type designed, manufactured and operating on 240 V single-phase, 50 HZ AC supply system.

ii. The exhaust fan shall be of ring-mounted type and shall be complete with louvers made of aluminium, built into a steel frame.

iii. The louvers shall be designed for opening and closing automatically with airflow velocity.

5.15 TELEPHONE NETWORK SYSTEM:

i. The scope of work shall include supply, fixing of metal box, RJ-11 telephone outlet and supply & laying of CAT-5E & 50/100 pair cabling etc., and it shall also include all attendant and miscellaneous works such as making openings / chasing in the walls / ceilings required for the installation and then making them good in an appropriate manner.

ii. The telephone line network components shall be as per applicable standards and executed as per standards / DOT specifications and directions of the Engineer-in-charge.

iii. The network may comprise items such as Network jack/switch/hub/MDF (Main Distribution Frame), various sizes of Krone-type junction boxes, Jelly-filled cables, unarmoured cables, end points such as telephone sockets, etc.

iv. The locations of the above, mounting heights / routing alignments and cable capacities / sizes shall be as per drawings.

v. The system requires required ports of network jack/switch/patch panel and server which shall be interlinked using 4 pair CAT-5E cable laid in 20mm/25mm diameter 1.6mm/2mm thick PVC conduit (4-pair wires shall have a colour of blue, green, brown and orange with white for each line).

vi. Other ends of the system shall be terminated in RJ-11 Information outlets mounted in suitable Zinc passivated metal boxes.

5.15.1 Telephone Cables (50/100 pair) :

i. It should have solid annealed /tinned copper.

ii. No joints are permitted in the runs of wire.

iii. It should have PVC / PE insulation.

iv. The shielding / armour can be provided as an option.

v. The cables shall confirm the relevant standards.

5.16 DATA NETWORK SYSTEM :

i. The scope of work shall include supply, fixing of metal box, RJ-45 information outlet and supply & laying of CAT-6A/6/5E cabling etc., and it shall also include all attendant and miscellaneous works such as making openings / chasing in the walls / ceilings required for the installation and

then making them good in an appropriate manner.

ii. Data network shall be executed as per standard. The system requires required ports of network jack/switch/patch panel and server which shall be interlinked using 4 pair CAT6 / CAT6A data cable laid in 20mm/25mm diameter 1.6mm/2mm thick PVC conduit (4-pair wires shall have a colour of blue, green, brown and orange with white for each line).

iii. Other ends of the system shall be terminated in RJ-45 Information outlets mounted in suitable Zinc passivated metal boxes.

5.16.1 CAT-6A / CAT-6 / CAT-5E cable :

a) The cable shall be of 4 pair unshielded twisted pair (UTP) category 6/6A/5E LAN cable.

b) It should be insulated by High density poly-ethylene.

c) It operating temperature is under +15°C to 70°C.

d) It should have minimum bending radius of 50mm while installation.

5.17 PA SYSTEM

5.17.1 The scope of work shall include supply, laying of necessary cabling and it shall also include all attendant and miscellaneous works such as making openings / chasing in the walls / ceilings required for the installation and then making them good in an appropriate manner.

5.17.2 Wiring

a) 2 core x 1.0 sq. mm copper conductor armoured PVC insulated cables.

b) Speakers in the same zone are seriously interconnected by using of wires / cables.

c) Speakers in each zone to be connected in parallel and connected to the respective output.

d) Cables from each zone shall be separately routed and terminated in the Panel.

5.18 CCTV SYSTEM

5.18.1 The scope of work shall include supply, laying of CAT-5E / CAT-6 / co-axial TV cabling through PVC conduits and it shall also include all attendant and miscellaneous works such as making openings / chasing in the walls / ceilings required for the installation and then making them good in an appropriate manner.

6. INSTALLATION MATERIALS AND ACCESSORIES

6.1 Wires for electricity

6.1.1 PVC insulated multi-stranded copper FRLS wires of 1.1 KV grade as per IS 694 and ISI certification shall be used.

6.1.2 The type and size of wires to be used shall be as indicated in the drawings.

6.1.3 No joints are permitted in the runs of wires.

6.1.4 The following colour code shall be adopted for the wiring:

Three phase wiring	:	Red, Yellow, Blue

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

Single phase wiring	:	Red
Switched phase / wire from switch to light fan, bell, etc.	:	White
Neutral	:	Black
Earth	:	Green

6.2 Switch and socket Boxes

6.2.1 Boxes for the mounting of switches, sockets and for regulators, etc. shall be made of 1.6 mm (16G) CRCA sheet and shall be hot dip galvanised after fabrication.

6.2.2 The boxes shall have a provision for earthing from inside.

6.2.3 In case of modular system of switch / socket boxes and plate switches / sockets, the plates shall be directly mounted on the switch / socket box such that the joint between the box and the surrounding plaster is covered by the plate. Modular boxes used shall be made of manufacturer's standard.

6.2.4 The size of switch boxes shall be selected so as to accommodate all the switches, sockets and regulators as indicated in the drawings.

6.3 Switches and Sockets

6.3.1 All switches for lighting, ceiling fans and 6A/16A sockets shall be of modular type 240V, 6A/16A rating, suitable for flush mounting, as indicated in the bill of quantities / price schedule or as shown in the drawings.

6.3.2 The 6A socket shall be of universal type, whereas 16A sockets shall be of universal type, having both 16A and 6A, 5 pin outlets.

6.3.3 The sockets shall be flush mounting type. The 16A socket shall have independent indicator.

6.3.4 A separate switch shall control each socket.

6.3.5 Switches / sockets are to be installed at locations and heights that may be indicated in the drawings.

6.3.6 Sockets to be installed at heights less than 1000mm above FFL shall have safety shutters.

6.4 Ceiling Roses

6.4.1 Ceiling roses shall be made of PVC white colour suitable for mounting on junction box / wall surface with three-way connector.

6.5 PVC conduits and accessories

6.5.1 PVC conduits and fittings shall be of the heavy class conforming to IS 9537 Part III.

6.5.2 PVC bends couplers and draw boxes shall be provided at suitable locations and the sizes shall be in accordance with the respective conduits.

6.5.3 Elbows shall not be used.

6.6 Metallic conduits and fittings

6.6.1 Metallic conduits shall conform to standards such as IS 9537 Part-II and IS 1653. They shall be treated to prevent corrosion.

6.6.2 The conduits and fittings shall have a wall thickness of not less than 1.6 mm.

6.6.3 Matching inspection bends, couplers and draw boxes shall be provided at suitable locations and the sizes shall be in accordance with the respective conduit sizes.

6.7 Junction Boxes

6.7.1 Junction boxes for luminaire shall be made of PVC.

6.7.2 The junction boxes to be installed in slabs shall be of 65 mm dia and 65 mm deep. The junction boxes on wall shall be 65 mm dia and 30 mm deep.

6.7.3 They shall have two or four number of knockouts with extension for conduit entry, suitable for particular diameters of the conduits.

6.8 Fan hook boxes

6.8.1 Fan hook boxes shall be 95 mm dia and 60 mm deep and made of 16G CRCA sheet with 10 mm dia MS hook cum lug and 25 mm dia x 25 mm long conduit extension closed at one end, suitable for insertion of bolts with 4 numbers of knockouts for conduit entry, hot-dip galvanised after fabrication.

6.8.2 These shall be painted with two coats of red oxide primer of approved brand.

6.8.3 Fan hook boxes shall be submitted and approved by the Engineer / Consultant / Employer before execution.

6.9 Draw Boxes and Inspection Boxes

6.9.1 Draw boxes of approved sizes shall be made from 1.6mm (16G) CRCA sheets and shall be hot-dip galvanised after fabrication.

6.9.2 The boxes shall be covered with 3 mm thick white hylam sheet fixed to the box with brass cup washers and full threaded brass screws.

6.9.3 In the case of concealed flush mounting, the hylam sheet shall project 6mm beyond the box so that the sheet covers the joint between the box and the surrounding plaster.

6.10 Telephone cables

6.10.1 The telephone cables (50/100 pair) shall be as per relevant ITD specifications.

6.10.2 No joints are permitted in the runs of wires.

6.11 Computer Networking & Data Cables

6.11.1 CAT-6/6A/5E shielded type FRLS cables shall be laid through heavy-duty PVC conduits, taking the shortest route between the patch panel / switch port and various nodes, complete with RJ-45 Information outlet sockets.

7. INSTALLATION

7.1 INSTALLATION OF SWITCH BOARD

7.1.1 Switch Boards shall be mounted in the electrical rooms / any other location as indicated in the drawings, on pre-formed / pre-excavated trenches.

7.1.2 The portion of the trenches not covered by the switchboard shall be covered with 7 mm thick chequered steel plates with proper fastening arrangements.

हावड़ा-०९
HOWRAH-09
Haldia Cochin Shipyard

7.1.3 All unused cable entries shall be closed with suitable blind plugs or plates made from 2 mm hot dip galvanised CRCA sheet steel bolted to the gland plates.

7.2 INSTALLATION OF METER BOARD :

7.2.1 The meter board shall be installed in the meter cupboard in the area earmarked for installing the meters. The board shall be fitted with brass up washers and full threaded brass screws.

7.3 INSTALLATION OF MCB UNIT:

7.3.1 The MCB unit shall be installed in the distribution boards using zinc-passivated bolts and nuts grouted in the wall.

7.4 INSTALLATION OF CHANGE OVER SWITCH:

7.4.1 The change over switch shall be installed in the panels / enclosures are using zinc-passivated bolts and nuts grouted in the wall.

7.5 INSTALLATION OF CABLES

7.5.1 Cable installation shall be properly coordinated at site with the routing of services, utilities and wherever necessary suitable adjustment shall be made in the cable routings with a view to avoid interference with any part of the buildings, structures, equipment, utilities and services.

7.5.2 Wherever cables are required to enter the building, they shall be drawn through hume pipe / GI pipe. Suitable packing / sealing shall be made at both ends of the pipe to make the entry points fully watertight.

7.5.3 Where cables are required to cross the roads or cables and pipes of other services the cable shall be drawn through Hume pipe or GI pipe. Suitable sealing shall be made at both ends of the pipes.

7.5.4 All cables shall be provided with identification tags indicating cables numbers, specification of cable, source and end termination location details in accordance with the cable/circuit schedule at 20Mtr spacing(if laid above ground). Tag shall be fixed at both ends of all cables laid in the ground. In case of cables lay on walls or over the false ceiling tags shall be fixed on both ends and at 20M spacing.

7.5.5 When a cable passes through a wall, tags shall be fixed at both sides of the wall. The tags shall be of durable fiber or aluminium sheet with the numbers punched on them Vertical runs of cables along the wall shall be laid through medium class-B GI pipe of and securely attached to the cables with non-corrosive wire.

7.5.6 For single core cables, wires shall be of non-ferrous materials.

7.5.7 Suitable diameter up to a height of 900 mm above finished floor level. The GI pipe shall be clipped to the wall with brass clamps and brass screws. The distance between the clamps shall not exceed 400 mm.

7.5.8 Standard cable grips and reels shall be utilised for cable pulling. The maximum pulling tension shall not exceed the recommended values.

7.5.9 Sharp bends shall be avoided in the cable runs. The bending radius shall not be less than 12 times the diameter of the cables (12D).

7.5.10 No joints shall be normally permitted in the runs of the cables. In unavoidable situations the same shall be made by means of standard cable joint boxes/kits.

7.5.11 Where more than one cable has to be laid along the same route, the cables shall be laid

horizontally touching each other and not one above the other.

7.5.12 The armour of the cables shall be effectively earthed at all terminations.

7.5.13 Suitable phase identifiers shall be provided at the terminals.

7.5.14 All cables shall be tested for proper insulation prior to laying.

7.5.15 The cable drums shall be transported on wheels to the place of work and the cables shall be laid out in proper direction as indicated on the drum using cable drum stands.

7.5.16 In case of higher size cables, the laid out cables shall run over rollers placed at close intervals and finally transferred carefully onto the trenches and racks.

7.5.17 Care shall be taken so that kinks and twists or any mechanical damage does not occur in the cables. Only approved cable pulling grips or other devices shall be used.

7.5.18 Adequate length of cables shall be pulled inside the switchboards, control panels, terminal boxes, etc., so as to permit neat termination of each core / conductor.

7.5.19 Control cable cores entering switchboard or control panels shall be neatly bunched and strapped with PVC perforated tapes and suitably supported to key them in position at the terminal block. All spares cores shall be neatly dressed and suitably taped at both ends.

7.5.20 Power cable termination shall be carried out in such a manner as to avoid strain on the terminals by providing suitable clamp near the terminals.

7.5.21 All power cable terminations shall be by means of crimping type cable lugs and the torque shall be 2 to 3 N-M.

7.5.22 Control cables shall be terminated by crimping or directly clamped in the terminal blocks by screws.

7.5.23 All cable entry openings in the equipment shall be sealed and made entry-proof against creeping reptiles.

7.5.24 Cables laid in cable trays shall be clamped by means of single or multiple heavy duty nylon ties. The same shall be placed at intervals of 1000 mm in both horizontal and vertical straight runs, at each bends and at turnings from horizontal to vertical direction vice versa.

7.5.25 Fire barrier with glass wool packing or suitable material shall be provided between cable ducts / trays and room.

7.6 CABLE TRENCH:

7.6.1 The underground LT cables outside buildings shall be laid in excavated trenches. The trenches shall be excavated to a depth of not less than 800 mm, and the cables shall be laid at a depth of 750 mm.

7.6.2 The underground HT cables outside buildings shall be laid in excavated trenches. The trenches shall be excavated to a depth of not less than 1100 mm, and the cables shall be laid at a depth of 1050 mm.

7.6.3 The cables shall be laid over a 50 mm thick sand cushion and shall be covered with bricks or precast cement concrete protective cover supported by bricks. The gap between the cables and the cover shall be filled with sand.

7.6.4 The precast concrete protective covers shall be made from cement concrete 1 : 2C : 4/20 (1 cement, 2 coarse sand, 4 graded stone aggregate 20 mm nominal size). The dimension of the

हावड़ा-०९
HOWRAH-09

covers shall as shown in the drawing.

7.6.5 The cable trench shall be backfilled with selected soil, free from stones, pointed objects, organic matter, etc.

7.6.6 The backfilling shall be carried out in layers not exceeding 200mm, each layer rammed without damaging the cables.

7.6.7 Cable markers shall be installed at every 30m intervals along all straight lines and at bends. The cable markers shall be of cast iron and shall have a clear and legible inscription "1100V Grade LT CABLE" and "11KV HT CABLE".

7.6.8 Wherever cables are required to enter the building, they shall be drawn through Hume pipe/ GI pipe. Suitable packing shall be made at both ends of the pipes.

7.7 EARTHING

a. The metallic enclosures of single-phase equipment shall be earthed at one point while those of three-phase equipment shall be earthed at two points.

b. GI plate earth stations conforming to IS: 3043 specifications of shall be installed to obtain an effective earthing system. The earth stations shall be provided with heavy duty CI/RCC covers of appropriate size.

c. Copper plate earth stations conforming to IS: 3043 specifications of shall be installed to obtain an effective earthing system. The earth stations shall be provided with heavy duty CI/RCC covers of appropriate size.

d. The distance between two earth electrodes shall not be less than 3 meters. A minimum clearance of 1.5 meters shall be ensured from buildings.

e. Joints in the GI strips shall be welded with a lap weld of 20 mm length while those in copper shall be be tinned at joints, bolted/rivetted. The welded joints shall be painted with bituminous paint and covered with bituminous gunny tape. All wires shall be terminated with tinned copper crimping type lugs.

f. The sizes of the earthing conductors shall be as indicated in the Bill of quantities.

g. The armour of the cables shall be effectively earthed at the cable gland by earthing the gland using copper earth clips.

h. All copper earthing conductors to the earth stations shall be laid at a depth of not less than 600mm from formed ground level.

i. All the metal conduits / enclosures shall be earthed at one point.

j. The earthing conductor wires unless otherwise specified shall be as follows :

   i. Main earthing conductor from Main switch board to the earth electrode: 2 runs of 25 x 3mm copper strip.

   ii. Earth conductor inside the MSB and between MSB and all sub-switch boards: 1 run of 25 x 3mm copper strip.

7.7.1 EARTH STATIONS:

a. The distance between two earth electrodes shall not be less than 3 M. A minimum clearance of 1.5 M shall be ensured from the external face of the buildings / 1.0 M from edge of foundations, as per site conditions and as shown in the drawings / approved by the Engineer.

b. Maintenance-free single-electrode stations comprising individual electrode lengths coupled together, with artificial material packed around, considering the soil and rock conditions.

7.7.2 EARTH ELECTRODES:

a. The earth electrode shall be 23 mm dia copper-bonded steel-core rod, 5M long and with pointed end [OR] The earth electrode shall be 50 mm outer dia copper pipe, 3M long and with welded (copper bracing) at both the end.

b. The core shall be of low carbon steel of grade 080A20 of BS970 with a high tensile strength of at least 600 N/sq.mm.

c. Threads are to be rolled onto the rod to ensure that an even copper covering is maintained at the roots of the threads also.

d. Outer of the earth rod shall be of 99.9 % pure electrolytic copper, molecularly bonded onto the steel core in accordance with national and international standards to a thickness of 0.25 mm. Rods are not to be of the sheathed type.

e. Threaded couplers shall be used to join sections of the rod lengths

f. The accessories such as clamps for terminating the earth strip to the earth rod shall be of copper.

g. The electrode rods shall carry manufacturer's name and details of the item such as the length and diameter, stamped on each individual length as supplied.

h. The life expectancy of the electrode rods shall be atleast twenty years. Manufacturer's guarantee and warranty documents shall be furnished.

i. Samples of all items shall be furnished for approval of the Engineer, prior to actual supply.

7.7.3 BACKFILL COMPOUND:

a. The backfill compound shall be:

i. Electrically conductive.

ii. High conductivity in the electrode – ground contact area.

iii. Typical resistivity in 1 to 18 Ohm range.

iv. Non-corrosive in nature.

v. Highly hygroscopic, with humidity retention capability.

vi. Low water solubility (0.2% max).

vii. Not be eliminated by continuous treatments with water.

viii. Thermally stable between –60 degC to +60 degC temperatures.

ix. Elements shall interact in homogeneous way when applied to the earth and shall produce compounds with high conductive power and decrease the resistance of the earth, mainly in those with salts deficiency.

x. Non-leaching.

xi. Environment-friendly.

xii. Suitable for the type of earth electrodes employed.

b. Samples of backfill compound shall be furnished for approval of the Engineer, prior to actual supply. Resistivity tests on the samples shall be conducted in the presence of the Engineer.

c. Preferred makes: Ash brand of Structure India; Recons of Planet Electric; JMV Earthing.

7.7.4 Screen pipes:

HOWRAH-09

a. The PVC ribbed screen pipes shall be shallow well class, conforming to IS 12818 (with Amendment no. 1 of 1995).

b. The nominal diameter shall be 150 mm, with a mean outer diameter of atleast 169 mm.

c. Jointing and all other accessories shall be as recommended by the manufacturer.

d. Preferred makes: Finolex Industries; Supreme Industries; Jain Irrigation.

7.7.5 Installation:

a. The earth rod shall be installed in 150 mm or higher dia borehole, lined with a 150 mm inner dia tubewell ribbed screen pipe throughout its depth.

b. The void in the tubewell, around the earthing rod, shall be filled with a hygroscopic material, such as Ash brand backfill compound of Structure India or approved equivalent.

c. The mixing and installation shall be carried out in accordance with the manufacturer's instructions and as per directions of the Engineer.

d. Where recommended by the manufacturer, water shall be added to this hygroscopic material during installation.

e. The quantity of backfill material used shall be as recommended by the manufacturer or as directed by the Engineer.

f. A PCC / brick masonry chamber, suitably plastered and with approved heavy-duty CI / RCC cover, shall be provided for each earth station.

g. Care shall be taken to ensure that the connector is not too deep in the masonry or projecting out of it and the top cover matches with the adjoining paved surface.

7.7.6 Labelling:

a. The various components of the earthing system shall be labelled suitably and as approved by the Engineer.

b. Aluminium tags shall be secured to the earth conductors at all important points along their alignment.

c. Embossed lettering shall indicate the alphanumeric code assigned to the conductor and the identity of its earth station.

d. Earth stations shall be marked with raised / sunk lettering in the top plaster of the chamber (not on the cover).

7.8 LIGHTNING PROTECTION:

7.8.1 General

i. Functional components

Air termination(s), mechanical support(s), low impedance insulated down conductor(s), performance recording equipment, and a low impedance earthing system.

ii. Type of air terminal

Designed to minimise corona emissions and optimise streamer inception when optimum pre-determined conditions are meet.

iii. Mounting

Adequately rated for wind shear loading, using guying kits shall be provided as appropriate to local environmental conditions, or based on mast arrangement selected.

iv. Installation

Strictly to the manufacturer's instructions.

7.8.2 Air Termination

a) Function

Respond dynamically to the appearance of a lightning down-leader, shall be designed to trigger in relation to the optimum pre-determined conditions for upward leader inception, the triggering conditions must dynamically adjust to reflect the down leader intensity, building height above ground and the other factors that effect the electric field intensification above the air terminal.

b) Key components

Curved conductive surface spaced from a permanently earthed central finial.

c) Working

Curved conductive surface shall be temporarily earthed during triggering of the air terminal, thereby producing a "snap" increase in electric field directly above the air terminal.

d) Finial tip

To match the different electric field conditions for optimum performance.

e) Arcing at the finial tip

Not to be continuous and shall only occur during the process of lightning leader approach.

f) Precaution

Arcing shall not occur solely due to electro-static field build-up created by the presence of charged overhead thunderclouds.

g) Material

Non-corroding in hostile environments.

h) Curved conductive surface

Conductive material of minimum thickness for air terminations as defined in IEC61024.

i) Isolating material

Glass / mineral reinforced polypropylene, with high impact strength, UV stabilised, high electrical dielectric, high comparative tracking index and operating heat capability up to 120°C continuous.

j) Size of earthed electrode tip

At least 20mm diameter.

k) Installation

Strictly to the manufacturer's instructions.

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

l) Design basis

Size of the collection volume and attractive radius of the air termination shall be traceable to known and acceptable lightning research and statistics.

m) Protective zone, as created

Shall become the preferred strike point for all discharges exceeding a peak amplitude return strike current of X kA according to the statistical level Y per IEC61024:

Strike Current (X)	/	Levels of Protection (Y)	/	Exceedance Probability
2.9 kA	/	Protection Level-I : Very High	/	99%
5.4 kA	/	Protection Level-II : High	/	97%
10.1 kA	/	Protection Level-III : Medium	/	91%
15.7 kA	/	Protection Level IV : Standard	/	84%

n) Special attention

The design shall take account of upward leader competing projections on the structure.

7.8.3 Air Termination Support

a) Construction

The air terminal support shall consist of a minimum of 2M of insulating reinforced fibreglass cylindrical mast. The conductor shall pass through the centre of the mast, with the high voltage termination contained to the upper 1m of the mast.

b) Support

The support shall be securely bolted to other mast materials with guy wires used where necessary to enable the air termination and mast system to withstand maximum locally recorded wind velocities.

7.8.4 Downconductor

a. Construction

The downconductor shall consist of a plastic filler, copper conductor, inner insulation, outer copper conductor, conductive sheath, all concentrically arranged.

7.8.5 Performance recording equipment

i) Type : Lightning event counter.
ii) Registration: To activate one count for every discharge where the peak current exceeds 1500A.
iii) Test wave shape : 8/20μs standard as defined by ANSI C62.41
iv) Construction : Robust, easy to install.
v) Enclosure protection class : IP67
vi) Operating energy: Energy of the lightning discharge only (not to rely on external or battery power).
vii) Location : Readily accessible manner so that readings can be taken regularly.
viii) Positioning: Such that operating temperature is within the range -10°C to +50°C.

ix) Installation : As per manufacturer's instructions.

7.8.6 TESTING

a) Insulation resistance tests
b) Earth continuity tests
c) Earth resistance of individual earth electrodes and complete earthing system.

7.9 Wires for electricity

i. PVC insulated multi-stranded copper FRLS wires of 1.1 KV grade as per IS 694 and ISI certification shall be used.

ii. The type and size of wires to be used shall be as indicated in the drawings.

iii. No joints are permitted in the runs of wires.

iv. The following colour code shall be adopted for the wiring:

Three phase wiring	Red, Yellow, Blue
Single phase wiring	Red
Switched phase / wire from switch to light fan, bell, etc.	White
Neutral	Black
Earth	Green

7.10 SWITCH AND SOCKET BOXES

7.10.1 Boxes for the mounting of switches, sockets and for regulators, etc. shall be made of 1.6 mm (16G) CRCA sheet and shall be hot dip galvanised after fabrication.

7.10.2 The boxes shall have a provision for earthing from inside.

7.10.3 In case of modular system of switch / socket boxes and plate switches / sockets, the plates shall be directly mounted on the switch / socket box such that the joint between the box and the surrounding plaster is covered by the plate. Modular boxes used shall be made of manufacturer's standard.

7.10.4 The size of switch boxes shall be selected so as to accommodate all the switches, sockets and regulators as indicated in the drawings.

7.10.5 Switch / Socket Boxes shall be concealed in the wall and the mounting height of the boxes shall be as indicated in the drawings.

7.10.6 The switch and socket cover plates shall project 6 mm beyond the switch/socket box. In the case of concealed conduit wiring, the joint between the box and the surrounding plaster is covered by the cover plate. The cover plate shall be fixed with brass cup washers and full threaded brass screws.

7.10.7 Switch boxes are required to be mounted in partition walls also. Suitable fixing accessories shall be included for such requirements.

हावरा-०९
HOWRAH-09

7.10.8 Where more than one Switch / Socket Box is required to be provided at close proximity, they shall be positioned in a convenient fashion.

7.10.9 Switchboxes shall be fixed in position using cement mortar. Cement concrete with small size aggregates shall be used where the gap exceeds 20mm. The front lips shall be flush with the face of wall plaster.

7.11 SWITCHES AND SOCKETS

7.11.1 All switches for lighting, ceiling fans and 6A/16A sockets shall be of modular type 240V, 6A/16A rating, suitable for flush mounting, as indicated in the bill of quantities / price schedule or as shown in the drawings.

7.11.2 The 6A socket shall be of universal type, whereas 16A sockets shall be of universal type, having both 16A and 6A, 5 pin outlets.

7.11.3 The sockets shall be flush mounting type. The 16A socket shall have independent and indicator.

7.11.4 A separate switch shall control each socket.

7.11.5 Switches / sockets are to be installed at locations and heights that may be indicated in the drawings.

7.11.6 Sockets to be installed at heights less than 1000mm above FFL shall have safety shutters.

7.12 CEILING ROSES

7.12.1 Ceiling roses shall be made of PVC white colour suitable for mounting on junction box / wall surface with three-way connector.

7.13 MCB DISTRIBUTION BOARD:

7.13.1 MCB Distribution Board shall be fixed with bolts and nuts grouted to the wall in the cupboards / niches provided by civil agency and as shown in the drawings.

7.14 MCB UNIT:

7.14.1 The installation shall be carried out in accordance with the Indian Electricity Rules, the Codes of Practice of the Bureau of Indian Standards and other relevant regulations.

7.14.2 The MCB unit shall be installed in the distribution boards using zinc-passivated bolts and nuts grouted in the wall.

7.15 CIRCUIT BREAKERS:

7.15.1 The installation shall be carried out in accordance with the Indian Electricity Rules, the Codes of Practice.

7.16 WIRING

7.16.1 PVC insulated wires shall be drawn through concealed PVC conduits and / or surface mounted PVC conduits.

7.16.2 The wires of a circuit shall not run through the conduits, junction boxes, and switch / socket boxes of another circuit. Common draw boxes with hylam barriers separating individual circuit wires may be adopted to minimise the number of draw boxes.

7.16.3 The maximum number of PVC insulated wires which can be drawn in conduits of various sizes shall be as given below :

Nominal cross-sectional area of wire (sq.mm.)	Sizes of conduit			
	20 mm	25 mm	32 mm	40 mm
1.5	5	10	12	-
2.5	5	8	12	-
4.0	3	6	8	-
6.0	2	5	7	-
10.0	2	4	5	8
16.0	-	2	3	6

7.16.4 Wires shall be terminated at the switch boxes with suitable crimping type tinned copper lugs.

7.16.5 Wiring shall be carried out by looping the phase conductors at the switch box and the neutral conductors at the lights, fans and sockets.

7.16.6 For looping of wires in switch boxes, shrouded type multi-way 10A/20A rated connectors shall be used.

7.16.7 The circuit wiring shall be in accordance with the drawings.

7.17 CIRCUIT WIRING

7.17.1 Circuit wiring shall mean wiring from the MCB distribution board to first switch box and subsequent switch boxes of the circuit and shall include necessary length of wires in the circuit, draw box connectors, ferrules, lugs, etc.

7.17.2 Circuit chart shall be prepared and fixed inside the distribution board doors.

7.17.3 Circuit wiring shall be terminated with copper lugs, sockets and ferruling has to be carried out as per circuit chart.

7.18 POINT WIRING

7.18.1 Point wiring shall include all work necessary to complete wiring of a switch / socket circuit of any length from the tapping point of the distribution circuit to socket / light / fan / call bell / starter, etc. points. The point wiring shall include all the materials as indicated in the Point Wiring Chart forming part of this specification.

7.19 CEILING FANS

7.19.1 Concealed type fan hook boxes shall be used for mounting of the ceiling fans.

7.19.2 The fan shall be fixed to the hook in such a way that the canopy covers the opening of the fan hook box. The down rod shall be exactly in the centre of the box.

7.20 EXHAUST FANS

7.20.1 Exhaust fans shall be mounted on a galvanised MS ring, which, in turn shall be fitted in the openings provided for the purpose.

7.21 CONDUITS:

7.21.1 Conduiting shall comprise the conduits and necessary bends and couplers for vertical dropping and for joining together conduits respectively.

7.21.2 The diameter and routes of the conduits shall be as indicated in the drawings, which are to be prepared and furnished by the contractor, based on the fittings layout & single line diagram and such other drawings made available by the Engineer-in-charge.

हावड़ा-०९
HOWRAH-09

7.21.3 Draw boxes shall be provided as required in of conduiting meant for wiring, in stretches involving more than two bends and where the alignment passes through ceiling slabs which are at different levels as well as at points where specifically called for as per drawings or as directed by the Engineer. Elbows shall not be used. Top of the box 100mm to 300 mm below the ceiling level, unless indicated to the contrary by the Engineer-in-charge.

7.21.4 The draw boxes and junction boxes shall be covered with 3 mm thick hylam sheet of approved colour fixed to the box with brass cup washers and full threaded brass screws.

7.21.5 In case of concealed flush mounting, the hylam sheet shall project 6mm beyond the box so that the sheet covers the joint between the box and the surrounding plaster.

7.21.6 GI fish wires shall be provided in the conduits.

7.21.7 All openings shall be sealed to prevent entry of concrete or creatures.

7.21.8 Conduits, draw boxes, junction boxes, fan hook boxes, etc., which would be concealed, shall be secured in position by tying to the reinforcement bars using binding wire or appropriate check nails in case of masonry.

7.21.9 Conduits, accessories, junction boxes and fan hook boxes to be concealed in masonry shall be set into necessary chases, secured in position and the chase patched up using cement mortar. The dimensions of the chases shall be appropriate for the sizes of the concealed items and as approved.

7.21.10 PVC items shall be jointed together using approved adhesive only.

7.21.11 The conduits, accessories, junction boxes and fan hook boxes fixed in position shall be inspected thoroughly during concreting and concealing, for any displacements, damages, etc. Sufficient stock of materials and workmen shall be deployed to immediately attend to any rectifications. A thorough check for any damages or chokages shall also be carried out after concealment. All such measures and rectifications shall be at the Contractor's own cost.

7.21.12 Conduits and sleeves meant for passage of cables, etc. shall be fixed on / through masonry / RCC members or laid in excavated / pre-formed trenches, all as approved by the Engineer. Curves in the alignment of metallic conduits shall be achieved by bending to profile using non-heat methods only, without the use of elbows.

7.21.13 Wherever the masonry walls are chased for concealing the conduits and switch boxes, it shall be plaster using cement mortar until get good finish.

7.22 LUMINAIRES

7.22.1 The installation of luminaires shall be at locations indicated in the drawings with necessary fixing accessories and down rods wherever required, etc.

7.23 CONTROL CABLES

7.23.1 Control cable cores entering switchboard or control panels shall be neatly bunched and strapped with PVC tapes and suitably supported to key them in position at the terminal block. All spares cores shall be neatly dressed and suitably taped at both ends.

7.23.2 Control cables shall be terminated by crimping or directly clamped in the terminal blocks by screws.

7.24 DATA NETWORKING / TELEPHONE / PA / CCTV SYSTEM CONDUITS

7.24.1 Separate conduits shall be provided for each wiring/cabling.

7.24.2 Conduits shall be laid from the communication room/shaft to respective outlet box, made of 1.6mm Zinc passivated CRCA sheet steel and of size 100x100x50mm.

7.24.3 The height of the telephone/data outlet box shall be as per the drawings/or directed by the Engineer.

7.24.4 The outlet box shall be covered with 3 mm thick hylam sheet of approved colour on which the telephone/data socket pin will be fixed.

7.24.5 The covers of outlet box shall be provided with designation label with inscription "Telephone/Data" as the case may be.

7.24.6 The label tags shall be engraved plastic type with white lettering on black background. The size of the labels shall not exceed 60 x 20mm.

8. TESTING

8.1 Routine tests as per relevant Indian Standards shall be conducted on HT and LT switchboards, transformers and other parts of the installation.

8.2 Any tests required to be done in response to the requirement of statutory authorities shall also be carried out.

8.3 Six copies of test certificates shall be submitted to the Engineer.

8.4 The following tests shall be carried out by the Contractor at site in the presence of the Engineer:

a) Insulation resistance tests

b) Continuity tests

c) Polarity test of switches.

9. PREFERRED MAKES

9.1 The following list of preferred makes is contractually binding.

9.2 The relevant conditions are specified in "Technical Specifications" under the head "Quality", sub-head "Preferred Makes":

Sl.No.	DESCRIPTION	PREFERRED MAKES
1	ACB	Siemens / Legrand/ABB/Schneider/ Lauritz Knudsen
2	MCCB	ABB / Siemens / Legrand/ Lauritz Knudsen /ABB/Schneider
3	MCB	Legrand / Lauritz Knudsen / ABB / Schneider
4	RCCB	Legrand / ABB / Schneider/ Lauritz Knudsen
5	SDF / Change over switch	Lauritz Knudsen / C&S / HAVELLS/L&T/

		Siemens/ABB. For RFPs and FCs Siemens and L&T shall be used
6	MCB Distribution Board	Legrand / ABB / Schneider/ Lauritz Knudsen / Siemens
7	Current Transformers	AE / KAPPA
8	Voltage Transformers	AE / KAPPA
9	Capacitors	EPCOS/ ABB / Lauritz Knudsen
10	Contactors & Starters	Lauritz Knudsen / C&S / HAVELLS/L&T/ Siemens
11	Fuses & Fuse Bases	Lauritz Knudsen / C&S / HAVELLS/L&T/ Siemens/ABB. For RFPs and FCs Siemens and L&T shall be used
12	Selector switches & Rotary switches	Kaycee / Salzer
13	Push buttons	Siemens / Salzer
14	Relays	ABB / TM /seimens/schneider
15	Timers	Legrand / Telmech/seimens/schneider
16	Indication lamps	L&T / Salzer / RAAS / RISHAB
17	Battery	Exide / Amaron/ Amar raja
18	Indication instruments	AE / Conserve / HPL
19	KWHR meters	Conserve / HPL / BHEL / Siemens / Lauritz Knudsen /Schneider
20	Decorative Light Fixtures	Philips / Wipro / OSRAM / Crompton
21	Decorative switches & sockets	Legrand – Myrius/Mylink, CRABTREE(PLATINUN)
22	Aviation Light	Supernova / Binay / Ganapati / Matador (ISI Marked)
23	Piano type switches & sockets	Anchor / Vinay / Lisha/Legrand/schneider
24	Metal boxes – Switch & socket	Amp / Legrand/ CRABTREE
25	Metal boxes – data & telephone	Amp / Legrand
26	TV Outlets	Legrand – Mylinc / Myrius
27	Telephone outlet	Amp / Legrand
28	Data Outlet	Amp / Legrand
29	Ceiling Fans & Exhaust Fans	Crompton / GEC /USHA / Orient
30	Change over switches	L&T / Siemens
31	Automatic source transfer switch	L&T / Socomac / Havells
32	Ceiling rose with three pin termination	Anchor / Lisha
33	Crimping type lugs	Dowells / Jainson
34	HT Cable termination kits	3M / Raychem
35	PVC Insulated copper wires	RR/Polycab / Finolex
36	PVC Rigid conduits	Aeroplast / Avonplast
37	MS Conduits	Supreme / Bharat / Gupta / Precision

HOWRAH-09

38	Industrial socket s with MCB	Legrand / Hensel / CG
39	Telephone cables	Delton / Finolex
40	Television / CCTV co-axial cable	Delton / MX
41	CAT 5e / CAT 6 / CAT 6a cable	AMP
42	GI Pipes	Tata / Jindal
43	Panels	CPRI approved panel builders as per specification
44	Bus Duct	CPRI approved panel builders
45	Digital meters	Elmeasure / IMP / AE
46	HT & LT Cables	Polycab / Finolex / Havells / Universal
47	Terminal blocks	Elmex / Connectwell / Wago
48	Cable Glands	Dowells / Jainson
49	Lightning Arresters	Erico / LPI / OBO / ABB/CAPE
50	Diesel Generator	Cummins / Stamford / Cater pillar / Kirloskar/ Perkins
51	UPS	Numeric / Emerson / APC / Luminous / Socomec
53	Fire Barrier	Legrand

10. ABBREVIATIONS

10.1 The abbreviations mentioned below, wherever they appear in the Specifications and Bill of Quantities or elsewhere shall have the meaning or implication thereby assigned to them.

Abbreviation	Meaning	Abbreviation	Meaning
%	Percent	M.S. / MS	Mild Steel
°C	Degrees Celsius	mm	Millimetre
A	Ampere	MSB	Main switch board
AC	Alternating current / air conditioning	MVA	Mega volt ampere
BIS	Bureau of Indian Standards	OD	Outer dimension
C.I. / CI	Cast Iron	P.C.C. / PCC	Plain Cement Concrete
CEIG	Chief Electrical Inspector to Government	PVC	Polyvinyl chloride
Cm	Centimetre	R.C.C. / RCC	Reinforced Cement Concrete
CPCB	Central Pollution Control Board	Rm / RM	Running metre or Linear metre
CRCA	Cold rolled cold annealed	RMC	Ready-mixed concrete
cu.m.	Cubic metre	RR	Random rubble
Dia	Diameter	Rs.	Rupees
ELCB	Earth Leakage Circuit breaker	Specification	Technical Specification
etc.	Etcetera	sq.mm.	Square millimetre
ϕ	Diameter	SS	Stainless steel
G.I. / GI	Galvanised Iron	SWG / G	Gauge
kV	Kilo volt	V	Volts
m or M	Metre	IE	Indian Electricity
HRC	High rupture capacity	IP	Ingress protection
Hz	Hertz	IS	Indian Standards

हावड़ा-०९
HOWRAH-09

Abbreviation	Meaning	Abbreviation	Meaning
APDCL	Assam Power Distribution Corporation Limited		

11. MATERIALS FOR POINT WIRING

11.1 The following "Point Wiring Chart" indicates the scope of materials to be covered in point wiring supply and installation:

Sl. no.	Legend : ✓ Included X Not included Description	Fluorescent luminaire	Wall mounting luminaire	Ceiling mounting luminaire	Bulkhead luminaire	Ceiling Fan with regulator	6A Socket dependent / independent	16A socket independent	Chandilier	Wall-mounting fan & exhaust fan
1	Switch / socket box.	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	6 / 16 Amps flush type switches.	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Ceiling roses (three pin connectors).	✓	✓	✓	✓	✓	X	X	✓	✓
4	Universal type socket, 6 Amps, 5-pin.	X	X	X	X	X	✓	X	X	X
5	Universal type socket, 16 Amps, 5-pin.	X	X	X	X	X	X	✓	X	X
6	1.5 sq.mm. PVC insulated FRLS multistranded copper wire three runs (phase, earth & neutral).	✓	✓	✓	✓	✓	X	X	✓	✓
7	2.5 sq.mm. PVC insulated FRLS multistranded copper wire two runs (phase & neutral) and 1.5 sq.mm. PVC insulated FRLS multistranded copper wire one run (earth)	X	X	X	X	X	✓	X	X	X
8	4 sq.mm. PVC insulated FRLS multistranded copper wire two runs (phase & neutral) and 2.5 sq.mm. PVC insulated FRLS multistranded copper wire one run (earth)	X	X	X	X	X	X	✓	X	X
9	Bakelite connectors, crimping type ferrules copper lugs, draw boxes, and cover plates (3mm thick hylam sheet of approved colour shade), brass cup washers, and brass screws.	✓	✓	✓	✓	✓	✓	✓	✓	✓
10	Fan hook with boxes & round sheet	X	X	X	X	✓	X	X	✓	X
11	Conduits.	✓	✓	✓	✓	✓	✓	✓	✓	✓
12	Batten holder.	X	X	✓	X	X	X	X	X	X
13	Angle holder.	X	✓	X	X	X	X	X	X	X

हावड़ा-०९ HOWRAH-09 Cochin Shipyard Limited

14	Ceiling / wall plate	✓	✓	✓	✓	X	X	X	X	✓
15	Ceiling rose (with three-way connector)	✓	✓	✓	✓	✓	X	X	✓	✓
16	Conduits & Junction boxes	✓	✓	✓	✓	✓	✓	✓	✓	✓
17	2M Stepped regulator	X	X	X	X	✓	X	X	X	X

SPECIFICATION OF RFPS AND FCS

630A & 250A 415V RFPs and FCs with KIOSK

Details of incomers and outgoings required are indicated in single line diagram, The switchboard shall be dust and vermin proof, factory assembled, compartmentalized, floor mounting, pedestal type consisting of SDF units, plug sockets etc. The switchboard shall be fabricated with 14 SWG/2 mm CRCA sheet. The main bus bar shall be insulated, high conductivity Aluminium flat bar of cross sectional area for 630A.Current density shall not exceed 0.8A/sq mm. The neutral section may be half of the size of main bus bar. All switch disconnector fuse units and its fuses shall be of L & T or Siemens make only and shall be provided with outside operating handle. Terminal spreaders or extended busbars shall be provided for the switches for terminating the cables. FRLS 650/1100V grade copper cables shall be used for internal wiring.Labelling of all incoming/outgoing SDFU cubicles shall be done with suitable PVC sheet by engraving. Danager caution board shall be fixed at both sides of kiosk and inside switchboad. Voltage, current, frequency and identification number of switchboard shall be painted on front and rear side of KIOSK and inside switchboard.

All fasteners(bolts, nuts,washers, etc) used must be stainless steel for panel and kiosk. The kiosk shall have suitable eyebolts for lifting purpose.

Body of each switches shall be joined using copper earth strip) and further the same shall be taken out for earthing at both ends. Copper earth size shall be 25x3mm for RFPs connecting to main grid using 25x6mm GI and 25x6mm Cu for RFPs connecting to main grid using higher size GI strips as indicated in the earthing schedule. An additional earth strip of 25x3mm copper shall also be provided at bottom side of 415V RFPs & FCs and shall be further connected to switchboard earth, which is also considered as an integral part of switchboard.

The switch board shall be cleaned thoroughly and powder coated in battle ship grey/Siemens grey color. Incoming and outgoing SDFUs and combination plug board shall be as per single line diagram.Combination Plug board for connecting 3 Phase and single phase portable plug boards, portable drilling machine etc. The MCBs shall be of 10KA. Industrial pug socket shall be as follows.
(a) 3 phase, 4Pin (3P+1E), 30A, 415V –BCH make (type SS, Cat No.2413 B along with its plug top). Plug shall be mounted in the door.
(b) Single phase, 3Pin (1P+1N+1E), 20/30A, 230V –BCH make ((type SS, Cat No.2415 B along with its plug top). Plug shall be mounted in the door.

Pin orientation shall be as per IS. All the plugs shall be independently controlled by MCBs. All MCBs and RCCB shall be mounted on channel and wired with required capacity copper cable and links as per single line diagram. The Plug board is to be provided with an earth bus bar (copper) and individual plug socket units are to be earthed to the earth bus. The plug board shall be front open type with hinged door and plug tops shall be suitable for connection with plug top without opening the cover.

Kiosk for Switchboard:

Rain protection kiosk covering the switchboard shall be fabricated with 16SWG GI sheet. Kiosk shall be front open type with hinged doors (with door handle, locking arrangement, etc.), rear with

हावड़ा-०९
HOWRAH-09

bolted cover. The angle iron frame work used shall be of 50x50x6mm. The unit shall be cleaned thoroughly and powder coated in aluminium color. The base of KIOSK shall be using channel which shall be further installed on another base channel of minimum size 100x50mm.The channel shall be welded to corner angle of cable trench or shall be anchored to the deck. Both the base channels shall be concreted wherever RFPs and FCs are located over the floor

One sample 415V RFP shall be fabricated after approval of drawings and offered for CSL inspection. Defects pointed out shall be attended without any price implication to Employer and further switchboards shall be fabricated. Single line diagram and GA drawings shall be submitted for approval. Minimum cubicle dimensions has been indicated in the drawing. Higher dimensions, if required shall be provided without any price implications to Employer. Other dimensions shall be followed as far as possible

I) TECHNICAL SPECIFICATIONS:

1.0 INTENT OF SPECIFICATION:

1.1 This specification covers the design, manufacture, assembly, shop testing, packing, dispatch, transportation, Loading / Un-Loading, supply, erection, testing, commissioning, performance and guarantee testing of **Radiator cooled Diesel Gen-Sets with Acoustic Enclosure**, complete in all respects with all equipment, fitting and accessories for efficient and trouble free operation as specified here under.

1.2 SCOPE OF WORK:

1.2.1 Scope of Supply & Services:

General Scope of work shall include design, manufacture, shop testing, packing, dispatch, transportation to site, supply, erection, testing and commissioning of the following:

a) Diesel engine complete with all accessories, an Alternator directly coupled to the engine through flexible/ rigid coupling complete with all accessories for starting, regulation and control, including base frame etc, interconnecting piping and accessories, power and control cable glands and lugs. DG set shall be provided with the Isolation microprocessor based ACB(with over current, short circuit , earth fault and undervoltage protection) and shall be suitable for termination of 4Rx3.5C x 400Sq.mm. XLPE AL. armoured cables.

b) Interfacing between DGs control (Engine mounted) panel and Main LT panel, including Control cables between bidders local equipments and special cables.

c) Equipments necessary for cooling system of Radiator cooled DG Set.

d) Equipments necessary for fuel storing and distribution, day oil tank, pipings, valves, level indicators calibration of tank etc.

e) Flexible connections, Residential type silencer and related exhaust piping (as per MOEF/CPCB Norms) for exhaust system.

f) Batteries with battery stand (Painted with anti corrosion & Acid resistant paint and battery charging equipment as required, including their connections as necessary along with tools & accessories for battery maintenance.

g) Anti Vibration Mounting pads etc.

h) CTs and protection devices

i) Acoustic enclosure /canopy, lined with suitable acoustic material to reduce the noise as per MOEF / CPCB norms. The enclosure shall have suitable provision for ventilation air supply and discharge, as per site conditions and as per layout plan.

j) Preparation of all related shop drawings with required sections and details for approval from client/consultant and statutory bodies.

k) Preparation of the Foundation / Pedestal Drawings for DG sets, structure for exhaust piping etc. and get it approved by structural consultants, before get it executed. Structural support and piping including thermal insulation shall be provided by the Contractor.

l) Obtaining approval of the installation of Diesel Generators from the Electrical Inspectorate, Pollution Control bodies and any other statutory bodies for operation of DG Sets as applicable.

m) Carrying out performance and guarantee test including making suitable arrangement as required. In this regard load test and interlock tests shall be carried out at site.

n) Submission of Two (2) sets of Hard Copies and One (1) set of Soft Copy of the following:

- All test certificates and reports carried at factory and at site.
- As built Drawings.
- Manual for Operation, Maintenance & Repair.

1.2.2 Specific Exclusions:

Following items of works are excluded from the scope of works under this specification:

a) All cables between contractors and owners equipment other than special cables/control cables required for interfacing external to the equipment.

1.3 CODES AND STANDARDS:

1.3.1 The equipment furnished under this specification shall conform to the following latest standards, except where modified or supplemented by this specification.

IS: 5	:	Colours for ready mixed paints and enamels.
IS: 1239 (Part-I & II)	:	Mild steel tubes and fittings.
IS: 13875	:	Specification for Digital measuring instruments for measurement & control
IS: 1651	:	Stationary cells and batteries lead acid type (with tubular positive plates).
IS/IEC: 61947, Part-I	:	Degree of protection provided by enclosure for low voltage switchgear and control gear.
IS: 3231	:	Specification for Electrical relays for power system protection.
IS: 4540	:	Mono-crystalline semi-conductor rectifier assemblies and equipment.
IS: 4722	:	Rotating electrical machines.
IS: 7372	:	Lead acid storage batteries for motor vehicles Specifications.
IS: 10000 (Part 1 to 13)	:	Methods of tests for internal combustion engines.
IS: 10002	:	Specifications for performance requirements for constant speed compression ignition (Diesel) engine for general purposes (above 20 KW)

IS: 12065	:	Permissible limits of noise level for rotating electrical machines.
IS: 12075	:	Mechanical vibration of rotating electrical machines.
IS: 13703	:	Low voltage fuses for voltage not exceeding 100V AC or 1500V DC.
IS/IEC: 61947	:	Low voltage switchgear & control gear.
ISO: 3046 (Part 1 to 3)	:	Reciprocating internal combustion engines – Performance.
BS: 5000 (Part –3)	:	Rotating electrical machines of particular type or for particular applications.
BS: 5514 (Part 1 to 6)	:	Specification for reciprocating internal combustion engine.
IS: 62305	:	Code of practice for the protection of Buildings and allied structures against lightning.
ASME Power Test Code PTC-17	:	Internal combustion engines.

1.3.2 The installation work shall conform to Indian Electricity act and Indian Electricity Rules as amended upto the date of installation.

The fuel oil installation shall meet all statutory requirements of Govt. of India as amended up to the date of installation. Any approval required from statutory authorities shall be obtained by the contractor. Nothing in this specification shall be construed to relieve the contractor of these responsibilities.

1.3.3 The Indian standards mentioned above are available from:

Indian Standards Institution
Manak Bhavan
9, Bahadur Shah Zafar Marg,
New Delhi- 11 002, INDIA.

1.3.4 The Indian Electricity Rules and the Electricity act mentioned above can be obtained from:

Kitab Mahal
State Emporium Building
Baba Kharak Singh Marg
New Delhi - 11 001, INDIA

1.3.5 Equipment conforming to any other National/International Standard which ensures equal or better quality may be accepted. In such case the bidder shall furnish copies of the standards in English along with his bid and shall clearly bring out the salient features of comparison with corresponding listed standards.

1.4 PERIOD OF OPERATION/DUTY CYCLE:

हावड़ा-०९ HOWRAH-09

The sets are intended to supply power only during an emergency for essential services and may be idle for long periods except for periodic routine checks once in a day. When there is a total failure of main power supply, the sets shall be required to operate continuously at full load for a period which at times may exceed even 24 hours.

1.4.1 The equipments furnished under this specification have to operate in a tropical climate and shall be given tropical and fungicidal treatment as per relevant specification.

1.5 ENGINE:

1.5.1 Type:

The diesel engine shall be of stationary type four stroke with vertical in line or (V) type cylinder arrangement, Turbocharged, water cooled.

1.5.2 Rating:

a) Prime Power BHP rating of the engine shall be such that the DG set can continuously deliver the specified net electrical output while supplying power/driving all electrical and mechanical auxiliaries connected to alternator terminals and engine shaft at specified site conditions and ambient temperature of 50 deg C.

b) It shall also be capable of satisfactorily driving the alternator at 10% over load at the rated speed for one hour in any period of 12 hours of continuous running.

The successful bidder shall have to furnish:-

i) Supporting calculations to arrive at diesel engine rating.
ii) Back Pressure calculation.
iii) Foundation details drawings.
iv) Exhaust pipe layout from DG set to Terrace.
v) Fuel Piping Layout from day Oil Tanks to the DG sets.

1.5.3 Speed and Vibration Level:

a) Speed shall be 1500 revolutions per minute. Speed governer / overspeed protection shall be provided.

b) At due running conditions, speed shall be stabilized at plus or minus 2% nominal speed, regardless of load. At transient condition, engine speed shall vary not more than 1% plus or minus.

c) The engine vibration level shall not exceed the limits specified in relevant specifications.

1.5.4 Engine Starting:

a) Engine starting shall be by electric starting motor complete with manual/automatic starting arrangement. The starter motor shall conform to IS-4722 and IS-325 and shall be of adequate power for its duty and be of inertia or pre- engaged type. The engine cranking shall be only from the panel both for AMF & DG sets (Manual) and any engine starting devices etc, that are given as original fitment on the engine by engine manufacturers shall be either removed or padlocking arrangement given for this so that all normal start/stop operations could be done only from panel whether the set is AMF or manual. Battery

Hooghly Cochin Shipyard Limited HOWRAH-09

system shall be 24V. AVR shall be used for voltage control.

The engine wiring shall be appropriately modified, ferruled to totally match with schematic drawings of the panel.

1.5.5 Engine Governor

- It shall be 100% Electronic/Digital fuel controller with electronic fuel injection system confirming to class A1 to BS:649 and shall be a self contained unit capable of monitoring speed.

1.5.6 Quietness of Operation:

a) The engine shall be designed to achieve maximum quietness of operation.

b) Efficient residential silencer shall be provided for the exhaust as well as the air intake.

c) Noise level of the set shall be within the limits specified in relevant specifications and as recommended by CPCB / MOEF.

1.5.7 Fuel System:

a) The engine shall be capable of running on all types of diesel fuel oil normally available in India.

b) The fuel consumption of the engine at full, three quarters and half of its rated power output shall be indicated by the Contractor in the bid.

c) Inbuilt fuel tank with piping shall be provided as per OEM standard.

1.5.8 Engine Exhaust System:

a) Exhaust system should create minimum back pressure.

b) The exhaust back pressure should be within the limits suggested by engine manufacturers to suit performance of the engine.

c) Exhaust piping should be insulated with mineral wool as required along-with aluminium sheet cladding.

हावड़ा-०९
HOWRAH-09

d) The exhaust outlet should be in the direction of prevailing winds & should not allow exhaust gases to enter air inlet/windows etc.

e) There should be rain cap to avoid rain water entry. If rain cap is used the distance between exhaust pipe & rain cap should be higher than diameter of pipe.

f) Residential type silencer should be provided in the engine exhaust pipe. The location of the silencer should be such that it meets the requirement of back pressure.

g) The flue gases from silencer shall be taken out to atmosphere through metallic insulated pipe. These pipes shall be made from M S class 'B' piping system conforming to IS 3589. Flexible bellows, bends, load support etc. shall be provided as required.

h) The exhaust chimney shall be insulated with thermal insulated mineral wool up to the top including silencer. The insulation should be held in position using wire chicken mesh. Aluminium cladding sheet should be wrapped over exhaust pipe starting from engine upto the chimney top.

1.5.9 Engine Safeguards:

Safeguards shall be provided and arranged when necessary to stop the engine automatically

The operation of the safeguard shall at the same time give individual warning of the failure by illuminating an appropriate local visual indicator and remote alarm at generator panel.

The contactors, relays and other devices necessary for signal and control, for above purposes shall be provided at Generator panel.

An "EMERGENCY STOP" mushroom head stay put type
P.B shall be provided to stop the set in emergency mode.

The safe guards to "STOP THE SET" shall stop the set irrespective of mode selection of the set viz Auto, Manual or test for following cases, with simultaneous isolation of alternator ckt.

a) Emergency stop P.B's operation.

b) Overspeed.

c) Low lub oil pressure.

d) Earth fault or restricted earth fault or differential faults of Alternator.

1.5.10 Cooling System:

The engine shall be water cooled. A cooling radiator shall be provided which shall be mounted on the combined under base of DG Set and arranged to cool the engine jacket water, lubricating oil and charge air as required. Circulation of cooling water through the engine and radiator shall be by means of engine driven pump. The water circuits shall be fitted with an easily accessible drain point. The cooling fan shall be arranged to drive directly by the engine.

1.6 ELECTRICAL WORKS:

HOWRAH-09
Cochin Shipyard Limited

1.6.1 Scope :

The scope of this section comprises of design, manufacturing / fabrication, supply, installation, testing and commissioning of followings: -

a) DG Set of required capacities, complete with all components and accessories on a common base frame.

b) DG Set Control and AMF Panel to achieve required operations, controls, display and indications.

c) Wiring and control cabling from Control panel to the LT Panel and other equipment as required for successful operations.

d) Co–ordination with the Main LT panel vendor for required inputs/outputs to achieve necessary operational logistic, control & display as required and as defined in other clauses.

1.6.2 Generator Set

The generating set shall be so designed that it is capable of reaching its full voltage and frequency and shall be ready to take full load within 30 seconds of a remote starting impulse being received. It shall be capable of starting the base load & starting load over & above base load as given below.

Rating (KVA)	Base load (KW)	Starting load over & above base load (KW)
500	280	120

Successful bidder shall submit calculation to prove above requirements.

1.6.3 ALTERNATOR:

- The alternator shall be brushless type with rotating field and static excitation circuit controlled by field control unit suitably compounded for voltage and load current for a self excited self regulated system.
- The alternator shall be in SP-DP enclosure, foot mounted with ball and roller bearings on end shields as required.
- The alternator shall conform to IS:4722/BS:2613 and shall be suitable for tropical conditions. The rating of the alternator shall be designed on the basis of 50°C Ambient inside the DG Enclosure.
- The alternator shall comply with the following specifications:
- Rating 1 No. 500 (shall be capable of 10% over loading at the rated speed for one hour of 12 hours continuous running).

Voltage	415 V
Speed	1500 RPM.
Frequency	50 Hz.
P. F.	0.8 lag

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard

Enclosure	IP: 23.
Insulation	Class 'H' (shall be of glass bonded epoxy thermosetting type but Temperature rise. limited to class `F'.
Excitation	Self excited, self regulated with brushless system and static Voltage control unit suitably compounded for voltage and current to maintain terminal voltage constant at ± 5% at all load for p.f. not less than 0.8. AVR shall be provided for voltage control.
Protections	: Over current, short circuit and earth fault protection and Standby earth fault protection, Under and over voltage, reverse power and frequency, Low and high lube oil pressure, High engine water temperature, Loss of AC sensing voltage, Cranking lock out and fails to start/stop shutdown. Apart from the above, any other protections required for engine and alternator as per statutory norms and as per munufacturer"s recommendation shall also be provided

Terminal Box shall be suitable for terminating 4Rx3.5C x 400Sq.mm. XLPE AL. armoured cables.

1.6.3.1 Terminal box and Connection:

The alternator output terminals shall be enclosed in a terminal box mounted in an accessible position on the alternator frame. As far as possible, connections between the exciter and alternator shall be contained within the machine frame and connections carrying A.C. and D.C. shall be segregated from each other. Alternator shall be provided with the suitable rating isolator (MCCB / ACB) within the canopy. The isolator terminal box shall be of sufficient size to conveniently terminate the 4Rx 3.5C x 400Sq.mm. XLPE AL. armoured cables. In case terminal box is not suitable for cables, suitable adapter box with bus bar links shall be provided so as to terminate the LT power cables to alternator. Also space suitable for mounting the CT of Class PS to be provided in the terminal box.

The generator shall be complete with voltage transformers necessary for AVR reverse power protection. The VT turn ratio shall be 415/ $\sqrt{3}$ /110/ $\sqrt{3}$, as required.

Suitable space heaters shall be provided for alternators. 1.6.4 Battery Charger / Battery Charging System:

1.6.4 Suitable battery charger and battery charging system shall be provided.Starter Battery :

a) The battery shall conform to the requirement of IS-7372. Starting battery sets of preferably 24 V, heavy duty high performance approved make'/quality shall be provided to enable crank & start the engine even in cold/winter morning conditions.

1.6.5 DIESEL GENERATOR SET CONTROL PANEL :

1. Integrated Engine & Alternator Control Panel including Auto START/STOP, and protection of DG Set.AMF facility shall be included.

1.6.5.1 General:

a) The control panel shall be sheet steel enclosed and shall be dust, weather and vermin proof providing a degree of protection of IP-52. Sheet steel used shall be cold rolled ,and properly braced and stiffened. Required push buttons, hour meter, Auto/off/Manual selector switche, meters, indication lamps, relays, etc shall be provided

b) Two number of earthing terminals shall be provided.

1.6.6 Operations of Diesel Generating Sets:

a) Diesel Generator shall be capable of being stopped manually from remote as well as local. However, interlock shall be provided in the DG local control panel to prevent shutting down operations as long as DG circuit breaker is closed.

b) Auto Operation

When mains power is available, the healthiness of this power will be monitored through a mains voltage monitor. If voltage on the 3 phases are within limits, the monitor will send a closing signal to the mains breaker and mains power will be connected to the load.

If the voltage drops on any phase or on all phases, the monitor will sense this drop through a timer, and if this drop persists for more than a pre-adjusted period of time (say 1 to 20 secs.) a signal is sent to the engine starting circuit while at the same time opening the mains supply

Hooghly Cochin Shipyard Limited हावड़ा-०९ HOWRAH-09

breaker and disconnecting load from mains as voltage is below acceptable limits.

The engine starting control monitor will send a signal to the D.C. battery supply for starting the engine through the starting solenoid. When the engine is healthy, it starts up in a few seconds and the generator develops voltage. The generator voltage monitor, monitors the voltage and when the voltage is developed, this give a signal to the generator breaker which closes and connects the diesel generator to the load. Simultaneously, it sends a signal to de-energise the engine starting circuit and the starter motor is disengaged. The engine protection circuits for high water temperature and low lubricating oil pressure are also energised.

c) Resumption of Supply:

If voltage from mains is resumed, the main voltage monitor will sense this voltage for healthiness, i.e. for maintained correct voltage for a period of time (adjustable upto three minutes) and then send a signal to trip the DG breaker and stop the engine and to change over the breakers from generator to mains and normal supply is resumed to the load. The solenoid operation and closing and tripping of breakers should be done through control voltage 24 V.D.C. The DG shall run in a idling mode for some predetermined period (say 1 - 3 minutes) before fuel solenoid is put-off.

d) Failure to Start:

A three attempt starting facility using two impulse timers and a summation timer for engine shall be provided and if voltage fails to develop within 30 seconds from receiving the first start impulse, the set shall lockout automatically and a visual and audible alarm shall be given in the control panel. The remote panel shall receive "DG Set fails to start".

1.7 SPARE PARTS:

1.7.1 Spares:

Contractor shall indicate the recommended/ optional spares with unit and total prices for 1 year of normal operation of the equipment. The owner reserves the right to buy any or all recommended spares.

The price of these spares shall remain valid upto 6 months from the date of commissioning for the main equipment. However the contractor shall be liable to provide necessary justification for the quoted prices for these spares as desired by Owner.

Scope of the test above include all tests on material or plant right from inspection at works. After erection of the equipment, each system of the

HOWRAH-09 Hooghly Cochin Shipyard Limited

plant must be tested for conformity with requirements, specifications and standards. The responsibility for carrying out these tests shall be of the contractor. All guaranteed parameters, technical specifications and requirements shall be tested at site, wherever such tets are applicable. Testing including load testing, over load testing, load throw test, impact load test shall be carried out as per relevant IS before dispatching the machine from Manufacturer"s works. CSL or any other third party agency appointed by CSL, shall have the right to inspect the progress of work, quality of materials used/ workmanship and to witness the Routine tests at the premises of the manufacturer. The contractor shall give at least 15 days advance information to client about the manufacturing and tests plan so that CSL can attend the same. Cost of testing is on contractor"s account. Contractor shall arrange at their cost necessary electrical loads and consumables including diesel for the testing. Inspection cost of CSL personnel is on CSL account. Tests reports shall be submitted for review and records. In the case of engine and alternator, test reports of OEM shall also be submitted.

On site testing: Following tests are to be conducted during testing at site

Load test
10% overload capability have to be demonstrated during load test
Load throw test at 100% load
AMF panel control and power circuit testing including engine safety and interlocks.
Other tests (if any) as per standards, rules and regulations and accepted practices.
Cost of testing is on contractor"s account. Contractor shall arrange at their cost necessary electrical loads and consumables including diesel for the testing.
Necessary testing kits, instruments, meters, accessories, cables, etc. for testing and proving carious

1.8 **parameters & capabilities of machine should be arranged by the contractor. The above should have the necessary accuracy and shall be calibrated.ERECTION, TESTING, COMMISSIONING AT SITE:**

1.8.1 Installation of DG Set.

The entire work of erection, testing and commissioning of equipment supplied under this package shall be carried out by contractor at site under the scope of this specification. For this purpose the contractor shall depute suitable qualified technical supervisor to site on advance intimation to the Owner along with all special testing equipment required for testing and commissioning of DG Set System. The supervisor(s) shall be responsible for the installation, testing, commissioning checks as mentioned in relevant clauses of this volume and the checks recommended by the contractor. The contractor shall provide all tools, equipments and instruments required for installation, testing and commissioning.

हावड़ा-०९
HOWRAH-09

All special tools and tackles and spares required for erection, testing and commissioning of equipment and system, shall be supplied by the contractor.

Erection, testing and commissioning manuals and procedures shall be supplied, prior to despatch of the equipment.

The contractor shall ensure that the drawings, instruction and recommendations are correctly followed while handling, setting, testing and commissioning the equipment and DG Set System.

1.8.2 Testing & Commissioning at site.

1.8.2.1 Commissioning checks / Tests for DG Set:

- Foundation Levels to be checked.
- Proper Mounting & Hose Tightness of Lub Oil Filter.
- Proper Mounting & Hose Tightness of Fuel Filter.
- Proper Mounting & Hose Tightness of Fuel Water Separator.
- Proper Mounting of Vacuum Indicator near Air Filters.
- Checking the Healthiness of Battery and Battery Charger.
- Checking of Lub Oil level in sump.
- Ensure Air filter of engine cleaned.
- Proper contact & tightnes, of termination of Alternator Body earthings.
- Proper contact & tightnes, of termination of Neutral Earthing.
- Proper termination of Bus Duct / Cable connection on Alternators.
- Axials, redial alignment reading of Engine & Alternator.
- Alternator Meggor Results, phase to phase, phase to Netural, phase to earth Earth Pit resistance.Scope of the test above include all tests on material or plant right from inspection at works. After erection of the equipment, each system of the plant must be tested for conformity with requirements, specifications and standards. The responsibility for carrying out these tests shall be of the contractor. All guaranteed parameters, technical specifications and requirements shall be tested at site, wherever such tets are applicable.
Testing including load testing, over load testing, load throw test, impact load test shall be carried out as per relevant IS before dispatching the machine from Manufacturer"s works. CSL or any other third party agency appointed by CSL, shall have the right to inspect the progress of work, quality of materials used/ workmanship and to witness the Routine tests at the premises of the manufacturer. The contractor shall give at least 15 days advance information to client about the manufacturing and tests plan so that CSL can attend the same. Cost of testing is on contractor"s

account. Contractor shall arrange at their cost necessary electrical loads and consumables including diesel for the testing. Inspection cost of CSL personnel is on CSL account. Tests reports shall be submitted for review and records. In the case of engine and alternator, test reports of OEM shall also be submitted.

On site testing: Following tests are to be conducted during testing at site

Load test
10% overload capability have to be demonstrated during load test
Load throw test at 100% load
AMF panel control and power circuit testing including engine safety and interlocks.
Other tests (if any) as per standards, rules and regulations and accepted practices.
Cost of testing is on contractor"s account. Contractor shall arrange at their cost necessary electrical loads and consumables including diesel for the testing.
Necessary testing kits, instruments, meters, accessories, cables, etc. for testing and proving carious

- parameters & capabilities of machine should be arranged by the contractor. The above should have the necessary accuracy and shall be calibrated.
- .

1.9 Canopy

Accoustic enclosure shall be provided as per CPCB norms

2.0 EARTHING:

2.1 SCOPE:

2.1.1 All the non-current carrying metal parts of electrical installation shall be earthed as per IS: 3043. All equipment, metal conduits, rising main cable armour, switch gear, distribution boards, meters, all other metal parts forming part of the work shall be bonded together and connected by two separate and distinct conductors to earth electrodes. Earthing shall be in conformity with the provisions of Rules 32, 61, 62, 67 and 68 of IER 1956. 2nos of earth pit for body and 2nos of earth pit for neutral shall be provided for DG set. Alternator and Engine shall be bonded, Required copper eath strips , copper plate earthing using 600x600x3.15mm size is under the scope of Contractor.**TESTING:**

On the completion of the entire installation, the following tests shall be conducted :

i) Earth resistance measurement

ii) Impedance of earth continuity conductors.

iii) Effectiveness of earthing.

All meters, instruments and labour required for the tests shall be provided by the contractor. The test results shall be submitted in the prescribed tabulated form in triplicate to the consultants for approval.

TECHNICAL SPECIFICATIONS FOR DISTRIBUTION TRANSFORMER

A. SPECIFIC REQUIREMENT- DISTRIBUTION TRANSFORMER

1.0 SCOPE:

1.1 This specification includes following –

Covers the complete design, manufacture, testing and inspection at manufacturer's works, supply, packing, forwarding and delivery from place of storage/ manufacturer's works to erection site, unloading, storage at site, assembly, erection, testing, installation, commissioning, and performance demonstration of transformers

Two winding, three phase, 50 Hz, Indoor, with sheet metal enclosure, Cast resin dry type Distribution transformers with ratings, percentage impedance & quantity as given in Table-1, , AN cooled with arrangement for, connected in Dyn11 with enclosure & OFFLOAD taps having +7.5 to –7.5 % taps in steps of 2.5 % on HV winding & other accessories as specified.

TABLE-1 Sr. No.	Transformer Rating (KVA)	Voltage (KV)	Qty. (Nos.)	Total Loss at 50% Load-ing(with no positive tolerance) kW	Percentage imped-ance (With no negative tolerance) (%)
1	500	11/0.400	1	2.8	4

2.0 SPECIFIC REQUIREMENT

2.1 Transformers shall be supplied complete with all necessary accessories complying with latest applicable standards. All drawings shall be necessarily approved by Purchaser before execution.

2.2 The Bidder shall guarantee the performance data applicable for dry type transformer as required in the specification of Distribution transformer.

2.3 The losses figures shall be as indicated in Table-1. Transformers meeting with mentioned losses and % impedance in Table-1 would be only accepted. The transformer shall be as per IS 11171 and IS 2026. The reference ambient temperature for design shall be considered as 40 Deg C.

2.4 The temperature rise shall be restricted to 90 degrees above ambient temperature.

2.5 Highest system voltage to be considered is 12KV

2.6 One minute power frequency voltage shall be 28KV at HT and 3KV at LT.

2.7 Lightning impulse withstand voltage (HV winding) shall be 75KV. **2.8** Transformer is to be used for high inductive loads (high current, short time, unbalanced loads).

2.9 The transformer shall be provided with enclosure having IP23 degree of protection. The enclosure shall be provided with:

(a) Rating and diagram plate stainless steel

(b) Neutral CTs for 51 NS

(c) cable terminal boxes for transformer

(d) marshalling box,

(e) WTI -Scanner and sensors

(f) Bus bar support insulators,

(g) Lifting lugs

(h) Necessary accessories like door switch etc

(i) All other standard fittings and accessories conforming to IS 2026/11171

(j) Note: If CTs of 51NS, are separately procured by the contractor, the transformer vendor shall ensure that the CTs can be accommodated in busbars of transformer and CT housing boxes. CT housing boxes as applicable shall be supplied by the contractor.

2.10 Windings shall be of copper only.

2.11 The transformer shall be of copper wound with CRGO M4 mitred Core, cast resin HV/LV windings. The insulation class shall be epoxy resin class'F' with temperature rise of 90 degree Celsius. Winding connection shall be delta at primary side & star with neutral at secondary side.

2.12 Use of flammable materials/components shall be avoided.

2.13 Protections for transformer are as given below –

a)	Winding temperature indica-tor (WTI-49W)	Alarm + Trip (11kV breaker)
b)	Stand by Earth fault protec-tion (with CT in transformer neutral) (51NS) #	Trip (LT breaker & 11kV breaker)
c)	Transformer enclosure door	Trip (11kV breaker)

2.15 The transformer shall be provided with OFF load tap changer having range of + 7.5 % to – 7.5 % taps in steps of 2.5 %. The transformer shall be rated to deliver the rated kVA continuously even at the lowest tap without exceeding the specified temperature rise.

2.16 Noise level of transformers shall be as per NEMA standard.

2.17 HV Phase terminals shall be brought out through resin cast terminals and connected to the bus bars provided in a separate chamber for HT termination .Transformer HV Termination box shall be suitable for connecting 11kV, E grade, 1 run of 3C x 300 sq. mm, Aluminium conductor; XLPE insulated armoured cable.

2.18 Undrilled Gland plate of minimum 3 mm thick CRCA shall be provided for termination of power cables on HV Cable termination box.

LV side Terminal box shall be suitable for connecting 4 Pole sandwich type Aluminium Bus duct / 1.1 kV Cables with minimum ratings as indicated in the single line diagram. Neutral of

the transformer shall be 100% rated similar to phases. Requirements of secondary terminations are indicated in the single line diagram.

2.19 Dust-proof marshalling box or arrangement, housing the winding temperature indicators and other marshalling facilities for electrical devices shall be mounted on the transformer enclosure. It shall be mounted at a height deemed convenient for viewing and operating by a person of average height.

2.20 Suitable digital type instruments/ indicator with alarm and trip contacts shall be provided for monitoring of Winding Temperature for the transformer. The settings shall be site adjustable.

2.21 In all transformers neutral shall be taken out for earthing and to the LV terminal box. Two body earthing terminals shall be brought out for earthing. All interconnection cables, cable accessories for connection between the transformer marshalling box & other devices mounted on the transformer shall be included in the VENDOR's scope. Such wiring shall be carried out by multistranded copper FRLS PVC sheath cables.

2.22 All digital outputs for control/ remote annunciation shall be provided for alarm and trip. Auxiliary relays, if required, to provide change-over contacts suitable for Purchaser's equipment are deemed to be included in the VENDOR's scope.

3.0 MAINTENANCE REQUIREMENT

3.1 The construction of the transformer & location of the accessories like CTs, lower ends of bushings, terminals, tap-changers etc., shall be such as to afford easy access.

3.2 Instruments & wiring in the local marshalling box (cabinet) shall be completely accessible & sufficient working space shall be made available in the cabinet. Instruments, wiring & accessories in the cabinet shall be accessible .

3.3 The rating plate of the transformer shall be supplied as per latest version of IS.

4.0 PERFORMANCE TESTS

4.1 All the routine tests specified in the latest edition of IS: 2026 / IS 11171:1985 shall be carried out by the bidder and quoted price shall include the same.

4.2 The bidder shall carry out temperature rise test(heat run test) on each of the transformers and prove the result.

4.3 Vendor/Contractor shall carry all site tests but not limited to,

(i) operational & interlock test for operations, tripping, interlocks.

(ii) Insulation resistance test and parameter settings

5.0 SPARES REQUIRED

Following spares shall be supplied along with the panel/equipment and hence equipment cost is inclusive of spares

i) Temperature sensors- 2 no's

ii) Temperature controller-1 no

6.0 DOCUMENTATION

6.1 Documents to be submitted.

After the Placement of work order (for approval prior to manufacturing)

a) General arrangement of Transformer with enclosure.

HOWRAH-09

b) General Arrangement of Core coil Assembly

c) Rating & diagram plate

d) General arrangement of HV cable box.

e) General arrangement of LV termination box for LV cable box / LV busduct arrangement.

f) General arrangement of marshalling box & wiring diagram.

6.2 Upon satisfactory completion of the testing and review of test results, despatch clearance would be issued. The Vendor shall furnish As-Built drawings in hard as well as in soft copies.

6.3 Purchaser shall reserve the right to comment on drawings and documents and supplier shall do necessary modifications in this regard.

Note: Not withstanding any testing and / or drawing approvals and/or despatch clearance by the Employer / Consultant, the contractor shall be fully responsible for the quality and functioning of the unit and entire work in accordance with the contract.

7.0 SUPERVISION OF ERECTION, TESTING & COMMISSIONING OF THE EQUIPMENT BY VENDOR AND BIDDER

7.1 The scope includes supervision of erection, testing & commissioning at site for the supplied transformers

DATA SHEET A1 Sr.No.	**Description**	**Unit**	**Technical Requirement**
1.0		**GENERAL**	
1.1	Application/Designation		Step Down Cast Resin Dry Type Distribution Trans-former
1.2	Quantity required		Refer **SCHEDULE OF RATES** /Specific require-ment
1.3	Installation (Indoor/Outdoor)		Indoor
1.4	Degree of protection of Enclosure		With enclosure IP23
2.0		**RATINGS**	
2.1	Rating	kVA	500
2.2	Number of phases & Frequency		3 Phase, 50 Hz
2.3	Type of cooling		AN
2.4	No load voltage HV	V	11000
LV	V		400

2.5	Vector Group	Dyn11	
2.6	Percentage Impedance	%	Refer Table No.1 of Specification re-quirement
3.0	**WINDING**		
3.1	Material of conductor	Copper Conductor	
3.2	Class of insulation (LV/HV)	Class F / Class F	
3.3	Method of connection- HV	Delta	
3.4	Method of connection- LV	Star	
4.0	**SYSTEM VOLTAGE**		
4.1	Nominal system voltage HV	V	11000
LV	V	380 (for 500kVA)	
4.2	Highest system voltage HV	V	12000
5.1	System Neutral (Effectively earthed–		
a) HV	-		
b) LV	Effectively earthed		
5.2	Transformer Neutral (Effectively earthed		
a) HV	NA (Primary Delta connected)		
b) LV	Effectively earthed		
6.0	**INSULATION WITHSTAND**		
6.1	Impulse (1.2/50 micro sec/wave)	HV	75 kVP
6.2	Power Frequency HV	kV	28
(Dry & Wet) LV	kV	3	
7.0	**TEMPERATURE RISE**		
7.1	Reference Ambient	0C	40

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

7.2	Winding temp rise	0C	90 above ambient temp.
8.0		**TAP CHANGING LINKS**	
8.1	Taps required	Yes/No	Yes-Off Load
8.2	Tappings on windings	HV/LV	HV
8.3	Total tapping range	+7.5% - 7.5 %	
8.4	Steps	%	2.5
9.0		**EARTHING TERMINAL**	
9.1	Material of Conductor	Copper	
9.2	Size of conductor	to withstand the short circuit current	
10.0		**PAINTING**	
10.1	Paint Type	Epoxy Powder coated	
10.2		Paint Shade:	
External			
Internal			
11.0	**HV Cable Box- Cable Entry** (Top/Bottom)	Bottom	
12.0	**LV termination arrangement**(Bus duct/ cable box)	Cable box for 500 kVA	
12.1	If cable box - cable entry (Top/ bottom)	Bottom	
12.2	If Bus duct- entry type (Top/side)	NA	
13.0		**Neutral & Phase CTs**	
13.1	Quantity	Bidder shall select the no. of CTs and location suitably for satisfactory operation of 51NS. Additional CTs if required shall be added during detailed design stage without, any cost	

		implication to Employer/CSL.
13.3	VA Burden	11kV HT Refer SLD and specification
13.4	Accuracy Class	11kV HT Refer SLD and specification
13.5	Knee point voltage	By Bidder
13.6	Magnetizing current at knee-point voltage	By Bidder

C TEST REPORTS

Test results shall be corrected to a reference temperature as per IS11171.

1.0 Two copies of test results shall be submitted for PURCHASER's approval before dispatch of transformer.

2.0 Additional bound copies, as required by the PURCHASER's contract, of complete test results including all tests on transformer, current transformer (if provided) , shall be furnished with the transformer

हालड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

OIL COOLED DISTRIBUTION TRANSFORMER

1.0 GENERAL :

This specification covers the requirements of supply, testing and commissioning of indoor type oil cooled distribution transformer.

1.1 SCOPE OF WORK :

1.2 The scope of work covered by this specification shall include but not be limited to the supply, testing and commissioning of all mechanical, electrical and auxiliary equipment associated with the distribution Transformer.

1.3 Any equipment, device, component or work not specifically mentioned in this specification but considered essential for proper design and operation shall be included by the tenderer in his offer.

1.4 The scope of work shall generally be as follows in as much as it is applicable but not be limited to the supply, transportation, unloading, testing and commissioning of the following :

1.4.1 Supply, testing and commissioning of the assembled transformer along with all necessary fixing accessories.
1.4.2 Supply of safety and other accessories.
1.4.3 Supply of all special tools for operation and maintenance.
1.4.4 Supply of all drawings and documentation as called for and passing on the guarantees / warranties issued by the manufactures.
1.4.5 Supply of spares for two years operation and maintenance.
1.4.6 The system shall include all reasonable safeties for operation and maintenance.

1.5 All equipment to be supplied shall be subject to the inspection of the owner. Such inspection shall however not relieve the contractor of his obligations under the contract.

1.6 The tenderer shall be responsible for timely delivery, off loading the equipment at site, testing and commissioning of all the equipment and materials that are included in his scope of work.

1.7 All necessary hardware and consumables required for the entire installation, trials preliminary acceptance / final acceptance testing and commissioning shall be supplied by the contractor.

1.8 Quality:

a) The technical requirements, for various types of work, are indicated in these Specifications.

b) The requirements in regard to materials, procedures and workmanship and their sampling and testing as specified herein shall be strictly adhered to, failing which a Defect, in terms of the Contract, shall be deemed to have occurred.

c) All work shall be in conformity with the requirements of codes, guidelines

and specifications of applicable standards such as those of Bureau of Indian Standards, whether or not indicated as such in these Specifications.

d) In the absence of applicable Indian Standards as above, the work shall be in line with IEC or as may be directed by the Engineer.

e) Where any material / system of construction is not covered herein, the guidelines of the manufacturer / system-provider of such material / system in respect of storage, application, use, procedures, installation, testing, etc. shall be strictly adhered to.

f) In all the aforesaid cases, it is the responsibility of the supplier/contractor to submit the details thereof in time and obtain approval of the Engineer.

g) Materials and manufactured items are to be carefully selected, to meet the requirements of these specifications, the applicable Standards, the drawings and instructions of the Engineer.

h) Makes and brands of certain manufactured materials and items that are to be chosen in preference to others may be listed in these specifications.

i) All items / components / equipments, etc. supplied shall be new. Refurbished, refabricated, or recycled items are expressly prohibited. An undertaking to this effect shall be furnished to the Engineer, wherever and whenever he deems it necessary.

1.9 Field Training:

a) A field training course shall be provided by the Supplier/contractor, free of cost, for designated operating and maintenance staff members of the Owner.

b) Training shall be provided on normal working time and shall start after the system is functionally complete but prior to final acceptance tests.

c) Field training shall cover all of the items contained in the Operating and Maintenance Instructions.

i)

1.10 Manufacturer's services:

a) Services of a manufacturer's representative who is experienced in the installation, adjustment, and operation of the equipment specified shall be provided by the supplier/contractor during the installation, testing and commissioning stages.

b) The representative shall supervise the installation, adjustment, and testing of the equipment.

2.0 DESIGN & DRAWINGS

2.1 The basis for design and the technical parameters are specified herein. The design and preparation of detailed drawings, as well as careful selection of the equipment and components, is in the scope of the supplier/contractor.

2.2 The drawings and documents to be prepared by the supplier/contractor for the scope of work under this contract shall be as below:

2.2.1 In case of award of the work:

2.2.1.1 Design calculations and selection of equipment, in the form of a Design Manual comprising, in three copies:

2.2.1.2 Detailed identification of the operational requirements for the system.

2.2.1.3 Explanation of the theory of operation, design philosophy and specific functions.

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

2.2.1.4 Schematic of the overall system.

2.2.1.5 Manufacturer's standard literature.

2.2.1.6 Description of various functions and interfaces.

2.2.1.7 Description of all equipment provided and their specifications.

2.2.1.8 Complete list of equipment and material, including manufacturer's descriptive data and technical literature, nameplate details and working parameters, performance charts and curves, catalog cuts, and installation instructions.

2.2.1.9 Overall dimensions of the units, position of all fittings thereof.

2.2.1.10 Details of mounting arrangements and civil works.

2.2.1.11 System diagrams, showing GA of the system showing clearances in all the three axes, earthing layout and details, air flow circuit and control, annunciation schematic

2.2.1.12 Spare parts data for each different item of materials and equipment specified, indicating sources and current unit prices.

2.2.1.13 Lists and details of warranties / guarantees and details thereof.

2.2.2 At pre-commissioning stage, in three copies:

2.2.2.1 GA drawings showing proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including dimensional clearances for maintenance and operation.

2.2.2.2 Vendor drawings for all other fabricated items.

2.2.2.3 Mounting / foundation details of all items, where not detailed in the other drawings.

2.2.2.4 General Assembly of remote tap change control panel (RTCC) including plan view showing foundation details showing all audio / visual indications.

2.2.2.5 Wiring diagram

2.2.2.6 Electrical circuit diagrams and earthing system.

2.2.2.7 Control schematics and details.

2.2.2.8 Sequence of supply and installation.

2.2.3 At post-installation stage, in three copies, in addition to those specified above at "award of work stage":

2.2.3.1 Operating and Maintenance Instructions in the form of an O & M manual covering:

2.2.3.2 Step-by-step procedures required for startup, operation, and shutdown.

2.2.3.3 Manufacturer's name, model number, service manual, parts list, and brief description of all equipment and their basic operating features.

2.2.3.4 Routine maintenance procedures, possible breakdowns and repairs and troubleshooting guide.

2.2.3.5 Diagrams, instructions, and other sheets proposed as permanent exhibits at various points of the system.

2.2.3.6 Test regimens for PAT and FAT describing:

2.2.3.7 Test plan and procedures

2.2.3.8 Step-by-step actions and expected results to demonstrate compliance with the requirements of this specification

2.2.3.9 Methods for simulating the necessary conditions of operation to demonstrate performance of the system.

2.2.3.10 Test logging proformas.

3.0 TRANSFORMER:

3.1.1 Data sheet for transformer, to be read in conjunction with the clauses following it:

1	Continuous Output	As mentioned in BOQ
2	No load voltage ratio	11000 V / 433 V
3	No. of phases	3
4	Frequency	50 Hz ± 3%
5	Duty	Continuous
6	Rated power with natural cooling	As mentioned in BOQ
7	load	High inductive loads (high current, short time, unbalanced loads)
8	Vector group reference	Dyn 11
9	Winding material	Copper
10	Connections	Primary : Delta
		Secondary : Star
11	Insulation class	Solids: Class A as per IS 1271, Oil: As per IS 335
12	Type of cooling	ONAN (Oil Natural and Air Natural)
13	Installation	Outdoor
14	Electrically exposed / non exposed	Non exposed
15	Insulation level HV winding	Power frequency withstand voltage: 28 KV RMS for 11KV
		Lightning impulse withstand voltage:75 KV peak for 11KV
16	Terminal details	HV side: Suitable for cable end box
		LV side: Suitable for LT bus duct /Cable Box as specified
17	**Star point**	
	HV winding	HV Cable Box

हावड़ा-०९ HOWRAH-09

	LV winding	LV Cable Box / Bus Duct. Neutral shall be taken out in LV terminal box and additional one for neutral earthing
18	Core lamination material	Cold rolled grain oriented core
19	Voltage tapping on HV side	+10% to -10% for On-load
20	Tap changing	On Load (Through RTCC): in steps of 2.5%
21		
	Losses:	
	No Load Loss	As per energy efficiency requirements/standards. (Level 2-Latest amendment)
	100% Load Loss	As per energy efficiency requirements/standards(Level 2-Latest amendment)
22	Parallel Operation	Does not Arise
23	Painting	Polyurethane paint
24	Fittings & accessories	Drain valve with plug
		Filter valve
		Two earthing terminals
		Thermometer pocket
		Magnetic type oil level indicator
		Lifting lugs
		Anodized and engraved rating plate and terminal marking plate
		Oil conservator
		Dehydrating breather with silica gel
		Air release plug
		Oil filling hole and cap
		Jacking lugs and pads
		Explosion vent
		Buchholz relay
		Dial type thermometer
		On-load tap changing switch (for On-load)
		Bi-directional rollers
		Pressure release valve

		Winding temperature with suitable indication.
25	Neutral terminal for grounding	Suitable arrangements on the Secondary side of transformer

3.2 Description and basic requirements:

3.2.1 The detailed description and basic requirements of the distribution transformer are given in this specification.

3.2.2 Transformer required is intended for use in HT outdoor substation. As such, reliability of performance and safety of operation is of prime importance.

3.2.3 Only designs with proven track records in respect of long service and well known for high efficiency and reliable performance, good voltage regulation, characteristics and low operational and maintenance costs shall be considered.

3.3 Design Features:

3.3.1 The transformer shall be properly designed and effectively cooled to ensure its working under full load conditions continuously and under short time over load conditions.

3.3.2 Adequate safety devices shall be incorporated to prevent damage to transformer winding or tank due to overheating or system electrical disturbances.

3.3.3 The transformer shall be designed to meet guaranteed impulse levels as per IS 2026.

3.4 Standards:

3.4.1 Except where modified by these specifications, the transformer shall comply with the requirements of latest revision of IS 2026.

3.5 Rating:

3.5.1 The transformer shall have a minimum continuous rating (as defined in IS 2026) at the secondary terminals at specified output at specified normal pressures ratio, frequency, altitude and temperature rise.

3.6 Type:

3.6.1 Unless specified or otherwise herein or in the order, the transformer shall be of double wound, 3 phase oil immersed naturally cooled, suitable for outdoor installation and suitable for operation in prevailing climatic conditions at the intended place of installation.

3.7 Type of load:

3.7.1 The transformer is intended to be used for supplying linear, non linear, inductive, power, lighting and UPS loads continuously.

3.8 Temperature rise:

3.8.1 Maximum temperature rise at the specified maximum continuous output, pressure, ratio and frequency, shall not exceed the limit specified in IS 2026.

3.9 Oil:

3.9.1 The insulating oil used in the transformer shall comply with the requirements specified in IS 335 Specifications for insulating oil for transformer and switchgear. The transformer shall be supplied with necessary oil for first filling including 10% additional quantity.

3.10 Tank:

3.10.1 The tank shall be built to withstand electrical, mechanical and thermal stresses, which are likely to be set up when the transformer is put in normal service as well as short circuit conditions.

3.10.2 The transformer tank shall be built of electrically welded steel plate of suitable thickness without any scaling. All joints of the transformer tank and fittings shall be oil tight and no bulging shall occur during service.

3.10.3 The interior surface of tank shall be coated with insulating paint and the external surfaces shall be suitably painted with enamel paint and has to withstand the adverse external atmospheric conditions.

3.11 Fittings:

3.11.1 Standard fittings as per specific technical requirements shall be provided on each transformer. The relative positions of fittings shall be in accordance with IS 2026.

3.12 Connections and vector groups:

3.12.1 Suitable terminals for termination of cables/busduct on to the HT and LT cable end boxes shall be provided from the inner side of the transformer windings respectively. The vector group shall be Dyn 11.

3.13 Terminal lead and marking:

3.13.1 All leads including tappings shall be insulated and rigidly supported and shall be easily accessible without the need for removing the winding from the tank. The physical positions of terminals relating to one another shall be as per IS 2026.

3.14 On Load Tap Changer:

3.14.1 The on load tap changer shall include the following:

3.14.2 An oil immersed tap selector and arching switch or arc suppressing tap selector, provided with reactor or resistor for reduction of make and break arcing voltages and short circuits.

3.14.3 Motor driven mechanism.

3.14.4 Control and protection devices.

3.14.5 Local/Remote tap changer position indicator.

3.14.6 Manual/Electrical operating device.

3.14.7 Voltage tapping range on H.V. side will be (+10%) to (-10%) in steps of 2.5%.

3.14.8 The on-load tap changer shall be designed so that the contacts do not interrupt arc within the main tank of the transformer. The tap selector and arcing switch or arc suppressing tap selector switch shall be located in one or more oil filled compartments, the compartment shall be provided with oil surge relay. Those compartments shall be designed so as to prevent the oil in tap selector compartments from mixing with the oil in the transformer tank.

3.14.9 A suitable pressure relieving arrangement should be provided to take care of sudden pressure rise in the compartment. But this should, in no way, affect the performance of the Oil Surge relay provided for this compartment. Oil surge relay (0.49 kg/cm2.) with trip float arrangement shall be provided for OLTC compartment.

3.14.10 The tap changer shall be capable of permitting parallel operation with either existing or future transformers of the same type as Master or Follower.

3.14.11 The manual operating device shall be so located on the transformer that it can be operated by a man standing at the level of the transformer track. It shall be strong and robust in construction.

3.14.12 The control scheme for the tap changer shall be provided for independent control of the tap changers.

3.14.13 The contactors and associated gear for the tap change driving motors shall be housed in a local kiosk mounted on the transformer. The motors shall be suitable for operation with 3- phase 415 volts, 50 cycle external power supply.

3.15 Remote Tap Changer Control Panel

3.15.1 The tenderer shall furnish, in addition to the equipment above, the following accessories mounted on a separate Remote Tap Changer Control (RTCC) panel to be installed in the main power room.

3.15.2 Raise and Lower Push Button Switch

3.15.3 Remote tap position indicator and other required devices. One chart showing the voltage corresponding to tap position indicator shall be engraved on a metal sheet and the same shall be fixed near the tap position indicator on the RTCC (panel).

3.15.4 An indication lamp showing tap changing in a progress

3.15.5 Master, Follower and Independent selecting switch and other accessories required for complete operation of tap changer.

3.15.6 Name plate of each component

3.15.7 Winding & Oil temperature (O degree –150 degree) repeaters, to be connected to winding and oil temperatures meters housed in the main Transformer Marshalling Box at indoor.

3.15.8 An under voltage relay shall be incorporated to monitor the 110 Volt AC control circuit voltage circuit supply Similarly audible and visual indication shall be provided in RTCC panel.

3.15.9 The OLTC should have been Type Tested.

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

3.16 Efficiency:

3.16.1 The transformer shall be so designed that the maximum efficiency occurs above 70% of the full load capacity. The core losses shall be kept low for transformer to obtain high efficiency and shall be indicated in the quote.

3.17 Regulation:

3.17.1 The inherent regulation at normal balanced load at unity and 0.85, 0.90 and 0.95 power factors at a temperature of 75°C. The tenderer shall guarantee the performance to meet the figures.

3.17.2 The reactance of the transformer shall be as low as possible and in accordance with IS 2026.

3.18 Fluctuation in Voltage and Frequency:

3.18.1 The transformer shall be subject to variation of voltage up to +10% to -10% on the primary side and frequency ± 5% during routine operations.

3.19 Protection:

3.19.1 The following protection in the form of visual indications only shall be provided for the transformer. Detecting or actuating devices and indicator devices required, which form part of the transformer construction shall be incorporated in the transformer.

3.19.2 Buchholz alarm and trip.

3.19.3 Thermal alarm and trip (winding temperature and oil temperature).

3.19.4 Low oil level alarms for the conservators.

3.19.5 In addition to the above, standby earth fault protection and restricted earth fault protection shall be provided which could be interconnected with breaker for tripping and annunciation for 1600KVA transformer. In the case of 315KVA transformer, the additional requirement is standby earth fault protection.

3.20 Transformer as unit:

3.20.1 The transformer shall be supplied complete with all fittings and accessories, etc. which are normally considered part of transformer as a unit and are necessary for its efficient operation, regardless of whether all the items have been specifically mentioned in this specifications or not.

3.21 Transformer tests:

3.21.1 Transformer shall be subjected to following routine and supplementary tests at the manufacturer's works as per IS 2026 and client's representative will witness the tests on the transformer. Successful tenderer shall make all arrangements for witnessing the test by the representatives of the client.

3.21.1.1 Measurement of winding resistance.
3.21.1.2 Ratio, polarity and phase relationship.
3.21.1.3 Impedance Voltage.
3.21.1.4 Load losses.
3.21.1.5 No-load losses and No-load currents.
3.21.1.6 Insulation resistance test.
3.21.1.7 Induced over voltage withstand test.
3.21.1.8 Separate source voltage withstand test.
3.21.1.9 Zero phase sequence impedance measurement.
3.21.1.10 Power frequency high voltage test.
3.21.1.11 Temperature rise test.
3.21.1.12 Dielectric test on oil.

3.21.2 Test Certificates shall be furnished for all type tests, actual measurements in tabular form and also for derived values of losses, impedance voltage, and regulation for stated loading condition. Copies of all test results, inspection and guarantee certificates shall be furnished in duplicate to the client / consultant for approval.

3.21.3 The insulation resistance of the HV & LV windings shall be measured by a 1000 Volts megger of specified voltage and duly calibrated. The value of insulation resistance shall be in accordance with the specifications and IS 2026.

3.21.4 Transformers not meeting with the guaranteed parameters will be rejected.

3.22 Drawings and documents:

3.22.1 The contractor shall obtain from the manufacturer, and furnish to the Engineer, all technical literature and drawings considered necessary for the installation, operation and maintenance of the transformer and its fittings.

3.22.2 These shall essentially include in hard and / or soft copies as desired by the Engineer:

a) Detailed foundation drawings.

b) Drawings showing overall dimensions of the transformer.

c) Drawings showing position of fittings.

d) Winding diagram and terminal markings.

e) List of parts with reference number.

f) Instruction for the installation and commissioning of transformer.

g) Any other relevant data, which would be assistance for efficient operation, maintenance and repair of fittings and accessories.

हावड़ा-०९
HOWRAH-09
Hooghly Cochin Shipyard Limited

h) Manual of instructions for the operation & maintenance of fittings.

3.23 Technical and guaranteed particulars:

3.23.1 The tenderer shall furnish all guaranteed technical particulars as called for in schedule particulars. Parameters subject to guarantee shall be clearly marked as such.

3.23.2 Tenders lacking information in this respect may not be considered.

3.24 Instruction Manuals:

3.24.1 Three (3) copies of operation, maintenance and erection manuals shall be supplied three weeks prior to the arrival of the transformer at site. The manuals shall be bound volumes and shall contain all the drawings as described in the clauses hereinabove and information required for erection, operation and maintenance of the transformer. The manual shall include the following particulars, amongst others:

3.24.2 Marked erection points, identifying the component parts of the transformer as despatched, with the assembly drawings.

3.24.3 Detailed dimensions, assembly and description of all the components and catalogues for operation of the transformer and accessories.

3.24.4 List of spare parts.

3.25 Deviations from the Specification:

3.25.1 All deviations from this specification shall be separately listed in schedule, in the absence of which it will be presumed that the provisions of the specifications are complied with.

3.26 Supplier's Guideline to the contractor for Erection & commissioning:

3.26.1 Immediately on arrival, the transformer shall be carefully examined for any damage, during transit, paying particular attention to the terminals and cooling tubes / radiator fins, etc.

3.26.2 The presence of rust, condensation anywhere within the tank the pink color of silica gel breathers provided with transformer filled with dry air or a considerable drop in the pressure of nitrogen or other inert gas filled in transformers suggests absorption of moisture by the transformer windings. In such cases, the transformer shall be dried out before being commissioned.

3.26.3 The transformer shall be filled with oil as soon as possible after satisfactory inspection and set up in their permanent locations even though not expected to be energised for some time.

3.26.4 Before moving the transformer, the bi-directional rollers shall be fixed in the required direction. The transformer may then be moved to its permanent position.

3.26.5 Care shall be taken when using any levers, etc. that they do not touch the tank or cooling tubes / radiator fins and only the skids or rollers shall be used for this purpose.

3.26.6 The transformer shall be lifted by lugs provided for the purpose and using all lifting lugs simultaneously to avoid any imbalance and it shall be ensured that all cover bolts are tightened. Where it is necessary to use jacks for lifting, the projections / lugs provided for the purpose of jacking shall be used. Jacks shall never be placed under valve or cooling tubes. In certain circumstances, jacks may be placed under stiffening curbs on the tank base.

3.26.7 Care shall be taken that spanners or other tools used in connection with work are not dropped into or left inside the tank.

3.26.8 The transformer shall be placed on suitable rollers or tracks on level concrete plinth with bearing plates of sufficient size and strength where the transformer is in the final position; the wheels shall be locked to prevent accidental movement of the transformer.

3.26.9 After positioning of transformer, all electrical power and control connections shall be done in a clean and approved manner.

3.26.10 The transformer shall be installed on suitable pedestal and foundation.

3.26.11 Contractor should provide all the hardware that is necessary for erection. The drawings, layout, etc. Should be got approved by Engineer.

3.26.12 The transformer shall be installed, tested, commissioned and integrated with the power distribution (substation) network in all respects.

3.26.13 After the transformer has been installed at the place of operation and before connecting it to supply, the outer body of the transformer shall be earthed by two separate and distinct connections through two separate lines and the two earthing terminals provided on the transformer. Gas or water pipes shall not be used for such connections.

3.26.14 All connections of the earthing system shall be of solid type and visible for periodical inspection.

3.26.15 Following tests shall be conducted on the transformer prior to its commissioning.

a) Insulation resistance of the winding between phases and between individual phases and earth on both HV and LV sides and also between HV and LV windings.

b) Winding resistance.

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

c) Dielectric strength of transformer oil.

d) Voltage ratio test at all tap positions.

e) Polarity test.

f) Operation of Buchholz relay.

g) Proper functioning of all protective relays.

h) After commissioning of the transformer, the LV side voltage shall be measured at different tap positions.

i) The transformer shall be kept on no load for 24 hours, and shall be ascertained that there is no undue temperature rise before loading the transformer.

3.27 General:

3.27.1 The work shall be carried out according to these Specifications and also according to any other instructions issued by the Engineer. No claim on account of the ignorance of specifications shall be entertained. In their own interest, the tenderers are advised to submit their offers after a thorough study of the requirements of the specifications and site conditions.

TECHNICAL SPECIFICATIONS FOR HT PANEL

1.0 Scope:

1.1 This specification covers the design, fabrication, painting and supply of metal cabinet, supply of components, wiring, testing at works, packing and supply on destination basis and performance testing of 11KV standalone floor mounted metering cubicle.

1.2 It is not the intent to specify completely herein all details of the design and construction of equipments. However, the equipment shall conform in all respects to high standards of engineering, design and workmanship mentioned in clause 4.0 and shall be capable of performing in continuous commercial operation upto the supplier's guarantee in a manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which in this judgment, is not in accordance therewith.

1.3 The equipments offered shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of supplier's supply, irrespective of whether those are specifically brought out in this specification and / or the commercial order or not.

2.0 Spares:

2.1 Anticipated requirement of spares shall be submitted. The tenderer shall quote unit rates for these spares. The purchaser reserves the right of selection of items and quantities of these spares to be ordered. The costs of such spares shall not be considered for tender evaluation.

3.0 Service Conditions:

a) Maximum ambient average temp. - 50 Degree C.
b) Maximum temperature in shade - 40 Degree C.
c) Minimum air temperature in shade - 3.5 Degree C.
d) Relative humidity (%)- 10 to 100%
e) The highest temperature in the cubicle may go up to 85 Degree C.

4.0 Standards:

a) IS – 2071 Method Of High Voltage Testing
b) IEC- 185 Current Transformers
c) IEC- 270 Partial Discharge Measurement
d) IEC – 60 High Voltage Test Techniques
e) IEC – 8263 Method of RIV test on high voltage insulators
f) IEC – 186 Voltage Transformers

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

g) IS – 2705 Current Transformers
h) IS – 3156 Voltage Transformers
i) IS – 3427 HT switchgear and control gear.

5.0 General Technical Requirements:

5.1 General Arrangement:

The metering cubicle shall be installed electrically in between the incoming supply point and H T breaker/switch gear of consumers' installation. The metering cubicle shall be provided with following components suitably mounted:

a) 3 Nos. 11KV class current transformer (CTs).
b) 3 Nos. 11KV class Potential transformer (PTs).
c) Tinned copper busbars /connecting links totally covered by resin casting.
d) The secondary wires from the terminals of CTs & PTs in the CT/PT compartment shall be covered by resin cast blocks and the secondary wires shall be brought in the metering compartment through rubber bush and shall be left open duly crimped with suitable pin type copper lugs.
e) Resin cast bushing boards with arrangement to receive
f) Reychem or equivalent type of cable terminations for incoming and outgoing supply points.
g) Adequate number of PVC cable glands to receive purchaser's incoming and / or outgoing cables.
h) Electronic safety lock (optional).
i) The principal parameters of all the above said components are listed in Annexure II and the General technical requirements are described hereinafter.

5.2 Constructional Features:

The metering cubicle shall consist of the following metal enclosed compartments:-

C.T. / P.T. Compartment	-	1 No.
Cable termination compartment	-	2 Nos.
Meter compartment	-	1 No.

5.2.1 CT / PT Compartment :

Three numbers of CT's & three numbers of PT's shall be mounted in this compartment. Resin cast boards shall be provided on the two sides leading to two cable compartments.

5.2.2 The inside terminals of the resin cast bushings, the primary terminals of CTs and primary terminals of PTs shall be connected by 25 mm X 6mm size links of electrolytic grade tinned copper. All the terminals and links shall be covered by resin casting in rectangular blocks so that no HT part is accessible.

5.2.3 The secondary wiring of CTs & PTs shall be carried out by 1100 V grade multi-stranded single core copper cable. Size of copper cable shall be 4 sq. mm. for CTs &

2.5 sq. mm. for PTs. Other end of these wires shall be brought to the meter compartment, crimped with suitable pin type of copper lugs. Entire wiring of cubicle except in the meter compartment shall be covered by resin casting in rectangular block so as not to have easy access without breaking of resin casting.

5.2.4 The CTs & PTs shall be firmly mounted on bottom plate of this compartment. Additional support if necessary may be provided for mounting CT/PT so that the bushing terminals, CT primary terminals & PT primary terminals are at same horizontal level.

5.2.5 The CT/PT Compartment shall be provided with detachable top cover having 5 to 10 degree slope from the front to rear side with the canopy on front side.

5.2.6 The detachable top cover shall be provided with suitable interlock so that the same cannot be opened without opening the door of the meter compartment.

5.2.7 As the CT/PTs incorporated in the cubicles are of resin cast type, ventilation for sufficient air circulation will have to be provided.

5.2.8 Cable compartments:

5.2.8.1 Cable compartments for housing purchaser's cable/ cable terminations shall be provided on both sides.

5.2.8.2 Detachable gland-plates shall be provided, at the bottom side of this compartment, for accommodating 11KV XLPE, 3 core cables (50 Sq.mm. to 300 Sq.mm.).

5.2.8.3 Detachable covers shall be provided on sides of these compartments and the roof shall be sloping 5 to 10 degrees towards the ends with canopy.

5.2.8.4 Two Nos. of danger boards of M.S. plate shall be provided as per enclosed drawing.

5.2.9 Meter Compartment :

Meter compartment with front door shall be provided on front side of the CT/PT compartment.

5.2.10 The rubber gaskets shall be provided on stationary part of the compartment so that edges of door shall rest on it.

5.2.11 The door shall be provided with lock.

5.2.12 The door shall be provided with non-resettable mechanical impulse counter to monitor the number of times the door has been opened.

5.2.13 The door shall be supported by strong, heavy duty concealed type (hinges shall not be accessible from outside) hinges.

5.2.14 Toughened glass window of size preferably 150 X 100 X 5 mm for easily viewing the energy meter should be provided. The glass should be provided with suitable weather proof seal to prevent ingress of rain water and any screws, bolts and

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

nuts for fixing the glass should not be accessible from outside . Hinged metal cover to the glass window shall be provided to shield the glass from sun rays and mechanical damages.

5.2.15 Roof of the metering component shall be slopping 5 to 10 degrees towards front side with canopy.

5.2.16 The words 'APDCL' of 100mm height shall be punched / embossed on front side door.

5.2.17 General Features:

The metering cubicle shall comprise of rigid welded structural frame enclosed completely by M.S sheets of not less than 2 mm thickness. Structural frame and supporting angles should be of M.S angle of size 50x50x6 mm minimum. All the compartments of the cubicle shall be welded from inside and detachable covers/components should be bolted. Bolts with hole shall be provided for sealing purpose at opposite corners of the top cover. The fabrication of the cubicle should be such that there is no ingress of water.

5.2.18 All doors and removable covers shall be gasketed all around with neoprene gaskets and the metering cubicle shall meet the requirements of IP – 55 protection as per IS-12063, if the air –vents are closed. Additional rain protection enclosure covering all sides and top of panel shall be provided.

5.2.19 The metering cubicle shall be mounted on concrete plinth of 2 feet height so as to bring the meter window at normal eye level. A bottom frame of M.S. angles shall be provided, duly welded, for mounting the cubicle on the plinth.

5.2.20 4 lifting hooks of suitable size shall be provided at the top for lifting the cubicle.

5.2.21 The metering cubicle shall be painted by powder coating after proper cleaning. The colour shall be 'Siemens grey / RAL 7032'. Finished painted appearance of equipment shall present an aesthetically pleasing appearance, free from dents and uneven surfaces.

6.0 Earthing:

6.1 G.I. earthing bolts of at least M 10 size should be provided on sides so that the inside and outside earthing can be done. It should be firmly welded to the sides.

6.2 An earthling bus of copper strip of size 50 x 3 mm shall be provided and extended throughout the length of the metering cubicle. It shall be bolted / brazed to the framework at two points. PT primarily earthing may be made at 2 locations by 50x 3 mm copper strips.

6.3 All non-current carrying metal work of the switchboard shall be efficiently bonded to the earth bus.

6.4 Hinged doors shall be earthed through flexible earthing braid.

7.0 Cable Glands:

7.1 The sizes of 11KV power cable being arranged by the purchaser for incoming and / or outgoing supply shall be 185 sq. mm XLPE CABLES.

7.2 The bidder shall provide connecting leads of adequate size with terminal clamps for connecting cable terminals to busbars. The arrangements shall be suitable for double bolt connection as required. Two sets of one plain washer and one cup washer and two nuts and one bolt shall be provided for the purchasers.

7.3 Incoming / outgoing cable connections: The bidder's scope shall also include necessary number of heavy duty PVC cable glands for terminating 11KV power cables.

8.0 Instrument Transformers:

8.1 The current transformers (CTs) and potential transformers (PTs) shall conform to the requirement stipulated in relevant standards.

8.2 The CTs & PTs shall be of cast resin type (Insulation Class 'E') and shall be able to withstand the thermal and mechanical stresses resulting from the maximum short circuit & momentary current ratings specified. These shall be completely encapsulated.

8.3 The resin used for manufacturing of CT/PT and Bushing Board shall be of reputed make and resin casting shall be carried out under vacuum by hot setting process only. Cold setting epoxy resin of reputed make should be used for casting over complete inside wiring, connecting strips on HV side.

8.4 CTs /PTs shall have polarity marks indelibly marked on each transformer and at the associated terminal block.

8.5 CTs/PTs shall be of the single phase type Core lamination shall be of high grade steel or other equivalent alloy.

8.6 Name plate showing particulars and connection diagram shall be provided. They shall be made of non-corrosive material, shall be indelibly punched / painted and shall be firmly fixed on the body of instrument transformer.

8.7 The CTs & PTs shall be suitable for floor mounting in the cubicle.

9.0 Testes & Test Certificate:

9.1 Acceptance and Routine Test:
Following tests shall be carried out as acceptance and routine tests.

9.1.1 For Current Transformers.
All tests as per clause No.9.1.2 of IS – 2705 (Part-I) 1992.

9.1.2 For Potential Transformer.
All tests as per clause No. 9.1.2 of IS-3156 (Part-I) 1992

9.1.3 For Complete Unit:

a) Temperature rise test on complete unit at rated current of cubicle.
b) Power frequency withstand test at 28 kv for 11 kv.
c) Overall dimension:

d) For CTs and PTs required tested shall be carried out at the original manufacturer's works in the presence of purchaser's representative.

9.2 Type Tests:-

9.2.1 For the CTs and PTs, the type tests shall be carried out for each voltage class and for each rating of short time withstand current with lowest CT ratio.

9.2.2 For Current Transformer:

All testes (Except High Voltage power frequency wet withstand test), considering outdoor application of CTs.

a) Short time current tests.
b) Temperature rise test.
c) Lightning impulse test for CT for service in electrically exposed installation.
d) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class.

9.2.3 For Potential Transformer:

All testes (Except High Voltage power frequency wet withstand test) considering outdoor application of PTs.

a) Temperature rise test.
b) Lightning impulse test for PT for service in electrically exposed installation.
c) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class.

9.2.4 For Complete Unit:

a) Temperature rise test on complete unit at the rated current of cubicle of each voltage class with highest C.T. ratio (IS 3427(1997).
b) Power Frequency Withstand Test at 28 kV for 11kV cubicle.

9.2.5 Impulse Wave Withstand test at 75 kV for 11kV cubicle.

9.2.6 Short time withstand current test, shall be performed on the cubicle by passing a current of 13.1 KA for 1 Sec. for 11kV with CT/PT bypassed. (IS 3427-1997).

9.3 Type Test Reports:

9.3.1 The HT Metering cubicles, CTs and PTs shall be fully type tested as per relevant IS and this specification. The tenderer shall furnish detailed type test reports of all the type tests for offered CTs, PTs and HT Metering Cubicles. For these CTs & PTs, the type tests shall be for each voltage class and for each rating of short time current. These tests should have been carried within 5 years prior to the date of submission of type test reports.

9.3.2 All above type tests shall be carried out at NABL or approved Laboratories to prove that the complete HT Metering Cubicles, CTs and PTs offered meet the requirements of specification.

10.0 Drawing:

10.1 The successful bidder will have to submit the drawings and get it approved from consultants / Client's Engineer before manufacturing

11.0 Inspection:

11.1 The inspection may be carried out by the purchaser at any stage of manufacture. The successful tenderer shall grant free access to the purchaser's representative at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by the purchaser shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective.

12.0 Documentation:

12.1 The tenderer shall furnish two sets of following drawings and documents along with his offer.

12.2 Complete assembly drawings of the metering cubicle showing plan, elevation and typical sectional views and locations of cable boxes, busbars, metering compartment and tri vector meter.

12.3 Foundation plan showing location of foundation channels, anchor bolts and anchors, floor plan and openings for cables etc.

12.4 Type test certificates for type testing of bought out items, if already carried out.

12.5 Descriptive pamphlets and literature of bought out items including CT characteristic curves etc.

12.6 All drawings and data shall be annotated in English.

12.7 Successful tenderer shall be required to furnish four sets of final versions of all the above said drawings and documents within for approval.

12.8 Approval of drawings/work by purchaser shall not relieve supplier of his responsibility and liability for ensuring correctness and correct interpretation of the drawings for meeting the requirement of the latest revision of applicable standards, rules and codes for practices. The equipment shall conform in all respects to high standards of engineering, design, workmanship and latest revisions of relevant standards at the time of ordering and purchaser shall have power to reject any work or materials which, in his judgment, is not in full accordance therewith.

13.0 Packing & Forwarding:

13.1 The equipments shall be packed in crates suitable for vertical/horizontal transport, as the case may be, and suitable to withstand handling during transport and outdoor storage during transit. The supplier shall be responsible for any damage to the equipment during transit due to improper and inadequate packing. The easily damageable material shall be carefully packed and marked

HOWRAH-09

with appropriate caution symbols. Wherever necessary, proper arrangement for lifting, such as lifting hooks etc. shall be provided.

13.2 Any material found short inside the packing cases shall be supplied by supplier without any extra cost.

13.3 Each consignment shall be accompanied by a detailed packing list containing the following information.

a) Name of the consignee
b) Details of consignment
c) Destination
d) Sign showing upper/lower side of the crate
e) Handling and unpacking instructions
f) Bill of material indicating contents of each package.

13.4 The supplier shall ensure that the packing list and bill of material are approved by the purchaser before dispatch.

ANNEXURE – I

TECHNICAL PARAMETERS OF VACCUM CIRCUIT BREAKER

Sl. no.	Unit / parameter	Specifications
A.	**GENERAL**	
A.1	Type	Vacuum Circuit Breaker
A.2	Service	Totally enclosed, indoor type, horizontal drawout, vertical / horizontal isolation panel for installation in 11 KV 3-phase 3-wire system
A.3	Nominal system voltage	11 KV RMS
A.4	Rated continuous current	630Amps
A.5	No. of poles	Three
A.6	Rated frequency	50 Hz

A.7	Rated short circuit breaking current (3-phase)	25 KA for 3 sec
A.8	System Earthing	Solidly
A.9	Power frequency withstand voltage dry	28 KV RMS for 11KV
A.10	Impulse withstand voltage	75 KV Peak for 11KV
A.11	Operating voltage : Trip coil	110 / 230V AC
A.12	Number and type of spare auxiliary contacts rotary	4NO + 4NC
A.13	Busbar Normal current rating	630Amps
A.14	Degree of protection	Enclosure: IP 55; Within switchgear: IP25
A.15	System maximum short time rating	25 kA for 3 sec & 500 MVA for 3 sec
A.16	Interlocks and locking	Mechanical Interlock and Automatic Safety Shutters or gear including padlocking arrangement.
A.17	Racking device	Integral racking in device for insertion and withdrawal of VCB complete in all respects.
A.18	Operating mechanism	Electrically and hand operated / charged independent spring closing / spring tripping, trip-free operating mechanism with manual closing and tripping push buttons and mechanical breaker closed / open spring charged / discharged indication.
A.19	Counter	Mechanical operation counter
A.20	Electrical release coil	Electrical release coil of 24/30 Volt DC
A.21	Shunt trip coil	Shunt trip coil suitable for 24V/30V DC / 230V AC.

A.22	Power pack	Power pack suitable for 24V/30V DC from 230 V AC for operating the tripping and indication system.
A.23	Cable termination	Rear & bottom entry
B.	**ENCLOSURE**	
B.1	Body	2 mm thick CRCA sheet steel and base frame ISMC 75 minimum.
B.2	Protection class	IP55.
B.3	Gaskets	All openings, covers, doors, etc., shall be provided with neoprene rubber gaskets to ensure the switchboard as dust and vermin proof.
B.4	Barriers	Suitable barriers between live parts and auxiliary control circuits to permit the operation and maintenance personnel to work safely.
B.5	Hardware	Hot dip galvanized / zinc passivated
B.6	Lifting lugs	For each shipping section.
B.7	Accessories	All as per standards and as necessary for ease of operation, maintenance and safety.
C.	**CIRCUIT BREAKER**	
C.1	Type	Vacuum type suitable for operation at a system voltage of 11000V +/-10%, 50Hz +/-3%, 3-phase, 3-wire, AC system.
C.2	Rated current	630Amps
C.3	Configuration	Horizontal draw-out, floor / plinth-mounted.
C.4	Closing mechanism	Manual spring charged and electrically spring charged.
C.5	Shunt trip coil	Suitable for 24V or 30V DC / 230V AC.
C.6	Temperature rise	Not to exceed permissible value while carrying the specified current continuously.

C.7	Withstanding fault level	500 MVA for 3 second(26.3kA for 3Sec).
C.8	Accessories	Mechanical indication for open, closed, service, test, isolated.
		Control switch / push buttons.
		Indication lamps for off, on, auto trip, trip healthy, etc
		Operation counter.
		Additional opening release (shunt or under voltage type).
		Low energy release as actuator for a self powered relay associated to the circuit breaker.
C.9	Safety devices / interlocks	Interlocking between the LV plug connections and connected and disconnected positions, in order to prevent the closing of the circuit breaker unless the auxiliary circuits are connected, and to prevent disconnection of the auxiliary circuit with the circuit breaker closed in the service position.
		Foolproof protection to avoid mismatch between cradle and circuit breaker.
		Padlocking of the safety shutters to lock the shutters in closed position.
		Anti-drop function in the cradle in order to prevent involuntary drop of the circuit breaker when extracting out of the cradle.
		Padlocking in the racked-out position.
		Interlocking between the cubicle door and the racking in / out of the circuit breaker. (The racking in shall be possible only when the door is closed, and the opening of the door shall be possible only when the circuit breaker is racked out).

D.	**PROTECTIVE RELAYS**	
D.1	Type	Draw-out type, suitable for flush mounting on the panel.
D.2	Inspection ease	Provision for inspection of test plug, without disconnecting the permanent wiring.
D.3	Mounting	Preferably on the front side of the switch board.
D.4	Flagging	Built-in for all relays, to indicate their operation.
D.5	Reset	Manually, without opening the relay case.
D.6	Protection relay	Triple-pole IDMTL type, having two elements for over-current protection and one element for earth fault protection, on outgoing control panel.
D.7	Current setting range of the over-current elements	From 50% to 200% in steps of 25%
D.8	Current setting range of the earth fault elements	From 20% to 80% in steps of 10%.
D.9	Auxiliary relays and contacts	For breakers / protective relays: for protection of transformers from high winding temperature, high oil level temperature and low oil level.
D.10	Rating	Not less than 5A at 230V AC.
E.	**CABLE COMPARTMENT**	
E.1	Barriers	Barriers, to avoid accidental contacts.
E.2	Cable entries	Rear bottom side.
E.3	Gland plates	Drilled type of adequate size suitable for XLPE cables
E.4	Cable connection type, incoming / outgoing	Suitable for XLPE cables, 3C x 95 sq.mm to 3C x 240 sq.mm for incoming cable. Cable/bus duct as outgoing.
E.5	Cable support	Suitable for clamping

F.	**CONTROL WIRING :**	
F.1	Type	1100V grade multi-stranded copper conductor PVC insulated wiring enclosed in plastic channels or bunched together.
F.2	Wire sizes	Signal wiring: 1.5 Sq.mm. CT wiring: 2.5 Sq.mm. Control power supply & space heater wiring: 6 sq.mm.
F.3	Colour code	Phases: Red, Yellow, Blue; Neutral: Black; Earth: Green; Control: Grey.
F.4	Identification	All wires identified at both ends by PVC ferrules.
F.5	Spare contacts	All spare contacts of auxiliary contactors, relays, timers, etc., to be wired upto terminal block.
F.6	Inter-panel wiring between different shipping sections	Terminated in terminal blocks of respective panels, with suitable jumpers for connection.
F.7	Terminations	'Elmex' type terminals, with a minimum of 10% spare terminals.
F.8	Shorting links	For all CT terminals.
G.	**METERS**	
G.1	Type	Square typesuitable for flush mounting on the panel.
G.2	Rating	Suitable for the rated secondary current / voltage of CT / VT respectively.
G.3	Amp & voltmeters	Moving iron type and accuracy class 1.0 as per IS.
G.4	Amp meter	One 3-phase digital Amp Meter with selector suitable for 50 / 5 Amp.
G.5	Voltmeter	One 3-phase digital Voltmeter with selector 0-15 KV
H.	**CONTROL SWITCHES:**	

H.1	Type	Rotary back connected type, cam-operated contact mechanism.
H.2	Contact material	Phosphor bronze.
H.3	Shrouding of contacts	To protect from dust and accidental contact.
H.4	Feature	'Make-before-break', for Ammeter selector switch contacts
I.	**PUSH BUTTONS:**	
I.1	Type	Self-resetting type having at least 2 NO + 2 NC contacts mounted inside an enclosure.
J.	**INDICATION LAMPS:**	
J.1	Type	LED 30 V lamps: Red for ON, Green for OFF, Blue for Spring Charged, Amber for Trip and White for CAS.
J.2	Mechanical position indicator	At the front of circuit breaker compartment door, for connected / disconnected position.
J.3	Control fuses	HRC link type mounted in front connected type bakelite fuse carriers.
K.	**CURRENT TRANSFORMERS**	
K.1	Type	Single-phase cast resin insulated, with two cores one each for protection and metering.
K.2	Ratio	As required for system.
K.3	VA burden	Suitable
K.4	Accuracy class of core for protection	5P.
K.5	Accuracy class of core for metering	As per requirement
K.6	Positioning	CT chamber
K.7	Nos.	Three

L.	**VOLTAGE TRANSFORMERS**	
L.1	Type	3-phase, draw-out type, cast resin insulated.
L.2	Ratio and burden	As required for system.
L.3	Secondary winding	As per requirement
L.4	Potential transformers	One set of dry type 11 KV / 110 V, suitable burden with HT and LT fuses.
M.	**EARTHING**	
M.1	Earth bus	50 x 3mm copper
M.2	All metallic parts of the switchboard other than current carrying parts	By connection to the earth bus of size 50 x 3mm copper or by means of suitable size of copper, PVC insulated wires.
M.3	For all movable parts like instruments, doors, gland plates	By connection to the earth bus through flexible copper wires.
M.4	For circuit breaker trolley	By connection to the earth bus through a plug & socket type arrangement.
M.5	Plug contact for trolley	Long enough to allow the safety shutters to close before disengaging from its socket while trolley is being withdrawn.
N.	**PAINTING**	
N.1	Preparation	Metal surfaces to be thoroughly cleaned and degreased to remove scale, grease, rust and dirt and then phosphatised prior to painting.
N.2	Finish coats	Powder coated to thickness as per IS.
N.3	Finish coat colour	Light grey as per 631 of IS:5 / RAL:7032
N.4	Unpainted metal parts	Treated to prevent rust formation: zinc passivated or cadmium coated.

O.	LABEL AND NAME PLATES	
O.1	Nameplate location	Top of the center panel at the front.
O.2	Feeder description name plates	Both at the front and rear sides.
P.3	Material	Perspex sheet 3 mm thick, with the white letters engraved on black background with reverse engraving.
O.4	Anodised aluminium tags	All lamps, relays, contactors , etc.
O.5	Warning / danger labels	On all doors / covers that give access to HV bus bars / cable connections.
O.6	Fixity	By countersunk screws.

P.	TESTS	
P.1	Routine tests	At manufacturer's works, in accordance with relevant IS, including but not limited to:
		Power frequency voltage dry test on the main circuit
		Voltage test on control and auxiliary circuits.
		Measurement of resistance of the main circuit
		Mechanical operating test
P.2	Type test certificates	All as specified in the relevant IS, including but not limited to:
		Mechanical performance
		Mechanical operation
		Temperature rise of all parts
		Insulation complies with specified limits
		Short-circuit making and breaking performance.

		Short-time current performance.
		Performance when breaking line charging current
		Performance when breaking cable charging current
		Performance when breaking single capacitor bank currents
		Performance when breaking small inductive currents.

Enclosure Type:

- Outdoor
- Floor mounted, Free standing extensible, sheet steel enclosure, front door operated integrated cubicle system.

Sheet steel metal thickness:

- Structure - Bottom Base : 3.0 mm (HR)
- Load Bearing Members : 2.5 mm (HR)
- External (doors and covers) : 2.0 mm (CR)
- Gland Plate : 3.0 mm (HR)
- Base Frame : 2.5 mm (Height 50mm)

Finish

- Powder coated to RAL 7032
- The thickness of powder coating should be more than 60 microns.
- The painting process should under go pre treatment a 7 tanks process.
- All metal surface shall be thoroughly cleaned and degreased to remove mill scale, rust, greased and dirt.
- Fabricated structures shall be pickled and then rinsed to remove any trace of acid.
- The under surface shall be prepared by applying a coat of phosphate paint and coat of yellow zinc chromed primer. The under surface shall be made free from all imperfections before undertaking the finishing coat.
- All unpainted steel parts shall be cadmium plated or suitably treated to prevent rust formation. If these parts are moving elements then they shall be greased.

System Voltage: 11,000Volts, 3 Phases, 50Hz

Design ambient temperature: 50Deg. C

Feeders:

- Incomer – Load break switch : 630Amps, 11,000Volts, 500mVA – 2Nos.
- Outgoing – Vacuum Circuit Breaker VCB : 630Amps, 11,000Volts, 500mVA – 1No.

The following chambers are to be provided.

- Incoming Feeders – Load break switch - 2 Chambers.
- Outgoing Feeder - HT Vacuum Circuit Breaker - 1 Chamber
- Bus bar chamber, a set of 3 Nos. – Copper bus bar - 1 Chamber
- Provision suitable for terminating 11kV XLPE-(E) Grade 3Core 185 to 300 Sq.mm
- Aluminium cable using heat shrinkable type termination kit
  Incoming - 2 Chambers
  Outgoing - 1 Chamber
- Potential transformer - 1 Chamber
- Current transformer - 1 Chamber
- Instruments and Control Panel - 1 Chamber

High Tension Vacuum Circuit Breaker

Specifications:

Type	:	Horizontal Draw out / isolation
Voltage- normal	:	11,000 Volts
Voltage-High	:	11,000 Volts
No. of poles	:	3
Capacity	:	500 MVA
Rated current	:	630 Amps
Rated Frequency	:	50 Hz
Short circuit rating symmetric	:	26.2KA at 11 KV
Short circuit duration	:	1 second
Rated making capacity- normal	:	20 KA rms
Rated making capacity-peak	:	50 KA peak
High voltage with standing capacity	:	28 KV rms for 1 minute.
Impulse voltage withstand	:	75 KV peak

Vacuum Breaker details:

• Number of breaks per phase	:	1- (3 breakers as one set)
• Type of contact	:	Butt
• Materials	:	Copper chromium composite
• Length of break	:	8 mm
• Opening time	:	2 cycles max.
• Arc duration	:	1 cycle
• Total break time	:	3 cycles max.
• Make time	:	3 cycles max.
• TRV details	:	As per IEC 56 1987

Operating Mechanism:

- Type of charging: Manually operated and Motorized spring charging system.
- Self-aligned plug in contacts.
- Closing coil voltage: 110Volts DC – Power Supply from power pack.
- The closing release shall operate correctly at voltage between 85% and 110% of rated voltage.
- Tripping coil voltage: 110Volts DC – Power Supply from power pack
- Trip / Close coil power: 250Watts
- Motor operating voltage: 230Volts AC.
- Breaker ON/OFF indications.
- Mechanical ON/OFF flag indications.
- Breaker position indicators
- Automatic safety shutter to close the HT termination / bushing.
- Anti-pumping protection
- Auxiliary switch 8NO+8NC with breaking capacity of 2Amps 230Volts Ac/Dc
- TNC Switch – 1No.
- Push Button for checking circuit health condition.
- Test terminal block.
- Adequate view glasses to be provided to view the mechanism ON/OFF status and spring charge/discharge condition.
- Power pack rating of 110Volts DC, the input power is 230Volts UPS/suitable power supply

The following safety interlocks to be provided:

- Front door cannot be opened, when the VCB is in Service position.
- VCB cannot be with drawn from the service position when it is in "ON" condition.
- VCB can be switch "ON", only either in test or service position.
- In service position both power and secondary contacts are engaged.
- In test position power contacts are isolated and secondary contacts are engaged.
- The breaker carriage shall be earthed before the Main Circuit Breaker controls and plugged in the Stationary contacts. Positive earthing of circuit breaker frame truck shall be maintained in connected position.
- Caution name plate: "Caution live terminals" shall be provided at all points where terminals are likely to remain live and isolation should be possible only at remote end.
- Bus bar shall not be accessible after opening bus bar channel door. A separate wire mesh cover shall be provided between bus bar and channel door.
- Test position to be provided inside the panel.
- Secondary contacts to be engaged by manually engaging the multi pin plug & socket.

Mechanical Operation Counter: Required.

Fault Operation Counter: Required.

Current Transformers for Energy Meters

Epoxy Resin Cast Twin Core – */5/5Amps, Metering Class 0.2S, Protection Class 5P10 Burden: 5VA

Potential Transformer: Epoxy Resin Cast Draw out type.
Ratio: 11,000 / 110Volts
Class: 0.2, Burden: 50VA

Instruments:

a. Protective relay:

- CDG 61 with IDMT relays.
  - 2Nos Over Current and 1No Earth Fault relay with instantaneous high setting.
  - CDG 61 relay shall be of draw out type with built-in facilities. Test plug shall also be provided.
  - Push buttons shall be adequate rating with two 'ON' and 'NC' contact points.
- High speed tripping relay type VAJH13

b. Trivector Meter:

- Make : ABB/Schneider
- Model No. : ERP 300 or Secure
- Wiring to be done for the above instrument
- Cut out to be provided for fixing the above instrument.
- The above points are to be check up with APDCL MRT & Employer and modify the same as per their requirement / standards without any additional cost implications to Employer.

c. ABT Meter

- Make : ABB/Schneider
- Wiring to be done for the above instrument
- Cut out to be providing for supply and fixing the above instrument.
- The above points are to be check up with APDCL MRT and modify the same as per their requirement / standards without any additional cost implications to Employer.

Bus bars

- Electrolytic grade copper bus bar should have purity more than 99.99%.
  - Phase Bus bar: 1Run 50x10mm.
  - Earth Bus bar: 1Run 50x3mm.
- The insulators made of non-hygroscopes, non-inflammable materials.
- Fault level withstanding capacity shall be more than 26.3 KA for 1 sec.
- Bolt and nuts: zinc passivated or cadmium plated high tensile strength steel bolts, nuts and washers.
- The maximum operating temperature of bus bars at maximum design temperature shall not exceed 85 Deg. C for normal condition and 200 Deg. C for short circuit condition.
- All bus bars shall be colour-coded by means of identifying colour rings at every power. Red, Yellow and blue colour should be used for phase bus bars.
- All the Bus bars are to be provided with heat shrinkable PVC Sleeve at straight runs and proper HT insulation tape at the tapping points.

Bus bars Supports

- Cast epoxy support insulators
- Bolts and nuts are to be zinc passivated or cadmium plated high tensile type only.

Panel Board Details:

a. **Cable Entry:**

Bottom with proper neoprene gasket (minimum 3mm thickness)

b. **Dimensions:**

Height Approximately 2200mm

c. **Clearance:**

Phase to Earth: Minimum air clearance: 100mm or as per statutory norms
Phase to Phase: Through HT insulation: 150mm or as per statutory norms

d. **Shrouding:**

Inter panel bus bar barriers should be Glass fiber type with proper fixations.

e. **Panel board chambers:**

- Each feeder chambers to be separate compartment.
- The joints to be fixed with weather proof gaskets.
- Top chamber covers are to be pressure relief type only.

f. **Chamber heater and Socket Point:**

- Space heater shall be provided complete with switch fuse unit. (240Volts, 50Hz)
- Plug point of 240Volts, 1Phase metal clad be provided for hand lamps.
- Cubicle illumination lamp 110Volts Ac (LED) with wiring and control switch.

g. **Panel board Chamber / Feeder:**

- The doors to be provided fasteners with sealing holes.
- Inside Panel chamber one number of incandescent lighting fitting to be provided with control switch.
- It should be operated by 110 V supply from Potential Transformer
- One 230Volts Ac 5Amps Metal clad plug and socket to be provided with control switch / MCB. Terminal blocks to be provided for external supply.
- The doors are to be fitted with weather proof rubber beadings.

h. **Control wiring**

- Terminal blocks shall be of suitable rating, one piece moulded, completed with insulated barriers, terminal pressure clamp type, washers, nuts and identification strips.
- CT and PT secondary lead terminal blocks shall have test links and isolating facilities.
- CT secondary leads shall be provided with short-circuiting and earthing facilities.

i. **Cable chamber**



- Incoming and outgoing cable chamber cable termination should match for 11kV XLPE-(E) Grade 3Core 185Sq.mm Aluminium Cable.
- Door to be with hinges and cable clamping bracket to be provided.
- The door-locking fasteners are to be with APDCL seal provision.

j. **Indicators**

- All indicators to be **Tamper Proof LED** type only.
    - Indicators for 3 phase Indication / ON / OFF / TRIP / Trip circuit healthy / Motorized spring charging indication.
    - All indicators to be protected with control fuse of rating 2 Amps.

Earthing

- As per standard procedure, all doors, chamber and instruments are to be earthed with Green colour multi strand wires only.
- Both side of the panel board to be provided lugs for earth flat for general panel earthing.
- HT VCB body is to earthed with panel earthing using copper bus and Braided copper wire.
- All the flange joints are to be earthed by suitable SWG copper wire.

Drawings for Approval:

The following drawings and details are to be given to us for approval.

- Complete assembly drawings of switch gears showing plan, elevation, typical sectional views, and location of cable boxes, bus bar chamber design, metering and relay, compartment and terminal blocks.
- The Single Line Drawing of entire electrical circuit and control wiring inclusive of external control/ outputs termination details.
- All the instrument technical specification and cataloes.

Statutory Requirements:

- The Breaker and Panel Board shall be as approved by the Chief Electrical Inspector to Government of Assam.
- Current transformer, Potential transformer and digital tri-vector meter should satisfy the APDCL-MRT specification and conditions.
- Feeder control gear operating handle should have mechanical interlocking mechanism with the chamber doors.
- Adequate size weather proof view glasses to be provided in HT VCB to view the mechanism ON / OFF status have mechanical interlocking system.
- The 2 incoming should have mechanical interlocking system.
- Adequate size and number of danger indication stickers to be provided on all the live panel chambers.
- The sizes of the bus bar, feeder identification number/name, cable entry details are to be marked on the panel in permanent manner.
- All bus bars chambers and cable chambers are to be clearly identified by name plates of suitable size.

Test and Test Reports:

- Test certificates of Load break switch, HT VCB, CTs, PTs, Relays, instruments, bus bars, random test report of bus bar, control circuit, enclosure etc.,

- Operating, maintenance, installation and testing manuals, technical specifications of relays and circuit breakers shall also be furnished before dispatch of panel



Scope of Supply

24V DC power supply system shall comprise of the following

Sl no	Item	Qty
1	1x100% capacity microprocessor controlled, intelligent, modular rectifier banks & controller (incoming for charger shall be through MCCB of suitable rating)	1 set
2	1x 100 % battery (Ni-Cad type) with accessories for **30minutes duty cycle** at 100% load	1 set
3	DCDB with bus-coupler or cable arrangement (DCDB and Charger Panel to be joined together with Busbar arrangement). For smaller charger, integral DCDB is acceptable	1 set
5	Battery Isolation comprising of MCCB mounted in charger panel	1 set
7	Erection, supervision, commissioning & handing over of (a) Chargers and DCDB and of complete system after batteries shall be commissioned by it's vendor	1 set
8	Erection, supervision, commissioning & handing over of complete Battery system inclusive of necessary support to Charger vendor for commissioning the complete system	1 set

हावड़ा-०९
HOWRAH-09

GENERAL REQUIREMENTS

This specification covers the requirement of a Microprocessor based, Intelligent ,Modular 24V DC Power Supply System comprising of microprocessor controlled, Intelligent, Modular rectifier banks, battery banks and DC distribution boards. The vendor shall be responsible for engineering and manufacturing complete system fully meeting the intent and requirement of this specification. All the equipment and sub-system offered shall be from reputed experienced manufacturers. All system, cabinet, enclosure and distribution boards shall be manufactured, assembled, wired and fully tested as a complete assembly as per requirements of this specification.

The equipment covered under this specification shall meet the requirements of latest edition of all applicable codes and standards like ANSI, NEMA, IEEE, and IEC. NEC & IS. The 24 V DC equipment. The requirements of 24 V DC System are specified herein on system basis. The bidder shall be responsible for engineering and furnishing a complete and operational system fully meeting the intent and requirements of this specification and Consultant/Customer approved drawings. All equipment and accessories required for completeness of this system shall be furnished by the Bidder within the quoted price whether these are specifically mentioned herein or not.

All non interrupting components of 24 V DC system shall be capable of withstanding all available short circuit currents without damage. Additionally, all circuits interrupting components shall be capable of withstanding and interrupting all encountered short circuit currents without damage.

24 V DC provided with fuse free circuit breaker shall be preferred. However In case, it is the standard practice of manufacturer to use fast current limiting fuses at inverter output etc. to protect its power semiconductors devices, the same shall be acceptable. However, in AC distribution board either fuse-free circuit breakers shall be employed same shall be of HRC type only. In any case selective fuse(fuse free circuit breaker) coordination shall be provided by Bidder to ensure that only the fuse (fuse free circuit breaker) nearest to the fault will open and isolate the faulted circuit. Other branches of the distribution system will be unaffected and the fault will not cause more than one fuse to open .

General technical requirements to be complied

1 The charger equipment should have circuits to prevent malfunctioning of control panels & ensure protection of the same, in case of variations in the AC mains, which, among others include sudden voltage spikes in the input 3- phase AC supply, irregular waveform and phase imbalances. In such cases, the charger should respond in shortest

हावड़ा-०९ HOWRAH-09 Hooghly Cochin Shipyard Limited

possible time to trip itself and switch panel load to battery equipment.

2 The earthing scheme for the charger equipment and DCDB, including description of the ground terminals will be provided by the vendor.

3 The cable termination points in the DCDB should be sufficiently distanced to ensure flexibility to have a minor change (increase) in the cable size if site conditions require the same.

2.00 DC POWER SUPPLY SYSTEM (24V)

2.1. Microprocessor based, Intelligent, Modular Power Supply

Microprocessor based, Intelligent, Modular Power Supply shall be sized **for continuous duty** to meet connected 100% load requirements and keep the connected battery full charged in Float. A provision of design margin shall be kept over and above load requirement. Either of the banks of rectifier modules shall be able to re-charge the fully discharged battery within 8 hours. It shall also be possible to discharge batteries periodically manually.

2.1.1 The rectifier module shall be microprocessor controlled, IGBT/Power MOSFET based, high frequency with active load sharing, designed for single and parallel operation with battery and shall have automatic voltage regulators for a close voltage stability even when AC supply voltage and DC load fluctuates, effective current limiting features, front access design, programmable temperature compensation feature for battery charging and filters on both input and output to minimize harmonics. The rectifier module output regulation shall be ±1% or better from no load to full load with an input power supply variation of ±10% in voltage and ±5% in frequency. In addition to indication/display on rectifier panel, required alarms shall be provided

2.1.2 "Float/Boost" charge functions shall be provided with alarm/indications.

2.1.3 Each rectifier bank shall be rated for 100% load requirement and keep the connected
battery full charged and one spare rectifier module.

2.1.5 The rectifier module circuitry shall be of fail-safe design and failure of any component should not result in any rectifier bank output voltage to increase beyond acceptable limits of the C & I system being fed from it.

2.1.6 The rectifier module shall be current limited for circuit protection and protection of battery from overcharge. The current limit shall be continuously adjustable.

हावड़ा-०९
HOWRAH-09

2.1.7 The rectifier module shall have slow walk-in circuit which shall prevent application of full load DC current in less than 10 seconds after AC power is energized.

2.1.8 The rectifier module shall be fed from 415V AC, 50 HZ; 3 phase, 3 wire or four wire system.

2.1.9 The ripple content shall be limited to ±0.5 % of Charger output voltage.

2.1.10 The rectifier module design shall ensure that there is no component failure due to fluctuations of input supply or loss of supply and restoration. This feature shall be demonstrated during factory testing and various loads.

2.1.11 Bidder shall furnish the equipment complete in all respects along with rectifier module rating & voltage drop calculations, supporting curves/data etc.

2.1.12 The controller shall be intelligent, microprocessor controlled for monitoring & control of rectifier modules with features .

3.0 BATTERIES

3.1.0 The batteries shall be heavy duty Nickel-cadmium type and shall be sized for one hour of full load operation during non-availability of AC supply/chargers. The Ni-CD batteries shall conform to IS: 10918. Sizing calculations shall be as per IEEE-1115 standard which also mentions Float-charging correction factor. For sizing calculation, an aging factor of 0.8 and a temperature correction factor as per manufacturer's standard at 4 deg. C electrolyte temperature (based on temperature characteristics curve to be submitted by the vendor at a temperature of 4 deg. C), capacity factor shall be taken into consideration (if applicable) and ambient temperature shall be considered as the electrolyte temperature. The sizing of the battery shall be as approved by employer during detailed engineering. **The system shall also be suitably designed to overcome any over voltage that may arise during low-load operation of the rectifier modules.**

3.1.1 Bidder shall furnish battery sizing calculations, supporting curves/data etc. with the proposal to demonstrate to Consultant/Client that the proposed battery capacity meets the above specification requirements at maximum temperature as well as minimum ambient temperature condition of 4°C.

3.1.2 Cells shall be Ni-Cd, vented type assembled in heat resistance, shock absorbent, Polypylene type containers with cover fused or cemented in place to form a permanent leak-proof seal. Each cover shall be fitted with vent plugs.

3.1.3 The plate structure shall be provided with adequate separators, suspensions and supports so that all plates are permanently aligned and protected from breakage.

3.1.4 Sufficient sediment space shall be provided below the plates to eliminate the necessity of sediment removal during normal battery life.

3.1.5 Each cell container shall be clearly marked for low and high electrolyte level limits on two sides.

3.1.6 Vent plug shall be of such a design to allow escape of gases but not of acid spray and shall be explosion proof.

3.1.7 All cell terminals shall have adequate current carrying capacity and shall be nickel plated copper terminal or approved equal material.

3.1.8 Cell terminals posts shall be suitable for bolted connection and shall be equipped with complete connector bolts and nuts. Cell posts shall be sealed against creepage of electrolyte either by burned ring seals or by SS nuts or equivalent.

3.1.9 Each cell shall be assigned an identification number. Identification numbers shall be clearly marked on the front of the rack structure so that individual cells are easily identifiable. In addition, the polarity markers shall be furnished for the end cells.

3.1.10 Battery racks: Two/single tier battery racks of mild steel construction in accordance with applicable codes and standard shall be provided. ASIC specification shall apply in the absence of another design specification.
Suitable termination with isolation/DCDB shall be provided at battery set output for proper isolation of battery set at battery end. This Battery isolating switch shall be wall-mounting type in IP55 enclosure.

4.0 DCDB

DCDB with incomer and outgoing MCBs shall be provided

5.0 AUXILIARY EQUIPMENT

All required auxiliary equipment / materials as finalized during detailed engineering shall be furnished with each charger / battery bank and shall include as a minimum various meters such as **AC / DC voltage / current, etc., circuit breakers, selector switches, push buttons, indicating lights/ Lamps, ground detector system.**
Each charger shall have the necessary control switches, push buttons and indicating lamps on the front panel door for its independent start up and shut down. It should be possible to isolate each charger on the input as well as the output side by means of DC and AC MCCBs.

हावड़ा-०९
HOWRAH-09

8.0 CABINETS/ENCLOSURES

The construction details for Power supply system cabinets/Enclosure/Racks shall conform to the following requirements:

8.1 Equipment enclosures shall match and line up in assemblies of freestanding floor mounted cabinets designed for indoor service. The cabinets shall be of IP-22 class. Mounting plate 3mm, Gland plate = 3mm

8.2 The charger panels shall be ventilated switchboard type fabricated from not less than1.6mm thick sheet steel. Panels shall be furnished with concealed hinges. Panel shall be designed to permit easy access to all components for maintenance or replacement. The enclosures shall be reinforced with formed steel members as required to form a rigid self-supporting structure. Doors shall have three point latches.

8.3 Required ventilating louvers and enclosure top panels shall be included. All vent openings shall be covered with corrosion resistant fine screen coverings.

8.4 The colour shade of panels exterior/interior shall be as per RAL9002, end panel colour shall be as per RAL 5012.

9.0 COOLING SYSTEM

If the equipment supplied requires forced air cooling, the same shall be provided

(a)

10. Routine/Acceptance Tests:

10.1 The complete charger and battery system, including all instruments and devices shall be subjected to standard factory tests (i.e. Type Tests and Routine Tests) as per IS, NEMA, IEEE, IEC-146 standards wherever applicable. All shop tests shall be performed prior to shipment and Client shall be notified 15 days before the scheduled dates to give an opportunity to witness the test.

10.3 Routine Test:

i) All routine tests and interlock tests shall be conducted

11.Functional test

On completion of installation and commissioning of the equipment the following tests/checks shall be carried out with the max. available load, which does not exceed the rated continuous load.

13. A. C_ Input Failure Test

The test is performed with a fully charged battery and is carried out by tripping input circuit breakers or may be simulated by switching off all Power supply system rectifiers and bypass feeder as at the same time. Output voltage variations are to be checked for specified limits with an oscilloscope or equivalent. Frequency variation is defined as the steady state frequency of the Power supply system with and without AC input. The rate of change of frequency is measured by the time it takes to reach steady-state values.

14.A. C Input Return Test

AC input return test is performed by closing AC input circuit breakers, or is simulated by energizing rectifiers and bypass feeders. Proper operation of rectifier starting and voltage and frequency variations are to be observed.
Note: This test is normally performed with a fully or partially charged battery.

17. Actual Load Test

Conditions under actual load may differ from those with dummy load. Steady-state generation of current & voltage harmonics & transients a load switching conditions should be observed.

26. Site-tests:

The vendor shall also carry out the site-tests. In case any other site tests are required to be conducted as a standard practice of the vendor or deemed necessary by Client, the same shall also be carried out.

27. TYPE TEST REQUIREMENTS

The contractor shall furnish type test reports as per relevant codes and standards

ELECTRIFICATION WORKS
FOR
SHIP REPAIRING FACILITY AT PANDU, GUWAHATI

Tender Document No.: **HCSL/PANDU/TEN/2026/238 Dtd. 06.11.2026**

PREAMBLE TO BILL OF QUANTITIES

1. The scope of work covered in this Bill of Quantities (BOQ) pertains to the Electrification works for Ship Repairing Facility At Pandu, Guwahati, complete in all respects as shown drawings enclosed wih the tender and vendor drawings to be prepared and furnished by the contractor and as indicated in the specifications and BOQ and as directed by the Engineer.

2. The following materials will be issued by the Employer to the Contractor (successful Tenderer) on free-issue basis:
   a) Tenderer to quote against all relevant Items in the Bill of Quantities accordingly.

   a) No separate charges for unloading, loading / re - loading, handling, conveyance, transport, storage, testing, guarantee cover, statutory approvals, preparation of drawings & approvals, accommodation of the Contractors staff and labour and owner's site engineers office, care and precautions against damage to equipment, if any, supplied by the Owner and / or by other contractors, towards supervision, book-keeping, overheads, profit, taxes, duties, octroi, insurance, testing and any statutory payments/contributions in connection with labour and personnel deployed, Testing, inspections, statutory inspections and cost of all modifications to comply with directions of the statutory authorities, any other requirements mentioned in other documents are payable to the Contractor, the various Bill of Quantities Item-rates being deemed to cover all such costs.

2. All the stipulations and procedures in submitting the tender, as elaborated in the Invitation to Tender, shall be adhered to. Rates for all items of works are to be filled in by the tenderer in figures, in ink, in English language and corrections, if any, must be initialled by the tenderer.

3. The tenderer shall carefully go through all the parts of the Tender Document, more particularly the clauses in the Invitation to Tender, Articles of Agreement, General and Special Conditions of Contract, Specifications, Bill of Quantities and Drawings, and shall include in his rates any sum he may consider necessary to cover his fulfillment of the requirements, provisions, obligations and duties against various clauses contained therein, taking into account all aspects and factors incidental thereupon.

4. Where any provision of the specification, drawing, BOQ and other documents contradicts, Engineer/Employer decision will be final and Contractor shall follow the same without any cost implication to the Employer.

5. The items of works and the unit prices stated in the Bill of Quantities shall be inclusive of everything necessary to complete the said items of work within the

contemplation of the Contract and beyond the unit prices no extra payment will be allowed for any incidental or contingent work, labour, materials and plant, subsidiary and enabling operations required, whether or not enumerated in the items or in the Preamble or Specifications.

6. The rate indicated against each item shall be for the finished works in all floors and at all levels and will be deemed to include the cost of all materials, labour, tools and tackles, plant and equipment where needed, implied and allied items, etc. involved in the work as actually executed.

7. The quantities of the items of work indicated in the Bill of Quantities are probable quantities only, indicated for the guidance of the tenderer and it must be clearly understood that the Contract is not a lumpsum contract, that neither the probable quantities nor the value of the individual items of work nor the aggregate value of the entire tender will form part of the contract and the Employer does not in any way assure the tenderer or guarantee that the probable quantities are correct or that the work should correspond thereto.

8. No change in the unit rate will be admissible for any variation in quantities.

9. Mode of measurement for all the items in Bill of Quantities shall be as per standard practice. Unless otherwise specified, all measurements will be in metric units.

10. All items shall be quoted by the bidder. Items identified as **QRO (Quoted Rate Only)** shall be procured only as and when required. The prices quoted for QRO items shall not be considered for price bid evaluation or for determining the final evaluated bid price..

11. Items and materials of the specified brands / makes mentioned in the Specifications, Bill of Quantities and drawings are to be provided in the concerned works against the relevant BOQ items. In the event that the make specified in the contract is unavailable, supporting documents from all vendors shall be submitted before proposing an alternate make.**Tenderers are advised to quote self-standing rates and avoid irrational rates, either on the higher side or on the lower side. The Employer may, during evaluation of the tender or anytime thereafter, call for detailed analysis of the Tenderer in respect of any rate against any particular Item in the BOQ.**

12. **Payment**

(i) BOQ items

- 85% of supply value would be paid on supply of respective materials mentioned in BOQ/Schedule of Rates along with required documents, certification by Consultant upon delivery at Project site
- 10% of supply value mentioned in BOQ/Schedule of Rates and 70% of installation charges mentioned in BOQ/Schedule of Rates would be paid on completion of installation of equipments/items in all respects on pro-rata basis and certification by Consultant.
- 30% of installation charges mentioned in BOQ/Schedule of Rates would be paid system wise/area wise / building wise as applicable on successful commissioning and certification by consultant
- 5% of supply value mentioned in BOQ/Schedule of Rates would be paid system wise/area wise / building wise as applicable after getting statutory approvals as required and on compliance of all contractual requirements

and certification by consultant. Examples of system wise /area wise/ building wise commissioning are as Below.

(a)Substation wise commissioning in all respects (b) MRS commissioning in all respects (c) RFPs and FCs commissioning area wise in all respects

(d) cabling commissioning area wise in all respects

(e) earthing works area wise in all respects (f) lighting works area wise and building wise in all respects

(ii) Lumpsum works (Mentioned as Lot in BOQ /Schedule of rates) In the case of lumpsum works 90% payments (cumulative of supply and installation charges) would be released on satisfactory installation of the system as per specification and drawings and on certification by consultant. Balance 10% (cumulative of supply and installation charges) would be released on successful commissioning, getting statutory approvals as required and on compliance of all contractual requirements and on certification by consultant.

14. Measuements

The quantities set out in the Schedule of quantities (Price Bid) are the estimated quantities of the work, but they are not to be taken as the actual and exact quantities of the Work to be executed by the Contractor in fulfilment of his obligations under the Contract. The payment shall be made for actual measured quantity both for supply and installation. In this case

the quantity shall be taken after installation, i.e. only installed portion of the work after completing the work would be measured. Scrap and balance materials would not be measured and hence no payment would be made for

the same. It may be noted that payment against the supply of items, in any case shall not exceed the final measured quantity. However Electrical works related to mechanical works is treated as a package and the

amount is on lump sum basis for the successful completion of the work. Additional payment, if any released during the supply of items more than the final measured quantity, corresponding payment shall be adjusted later, while processing subsequent bills after the final measurement.

15. Price adjustment is not applicable for this work. Contractor shall supply and undertake installation works as per unit rates mentioned in the Schedule of Rates/BOQ irrespective of the quantity variations, price changes

in the market.

15. Payment for items which are not covered in the contract In the case of electrical works the contractor shall

carryout the works as per BOQ rates irrespective of the quantity variations. In case of extra works, if supplied which are not covered in the contract, payment shall be as follows:

i) Market rates of items from OEM and labour supplied, hire charges

of equipment and machinery if used, plus 15% for overheads and profits of Contractor.

Make

Sl.No.	DESCRIPTION	PREFERRED MAKES
1	Transformer	A proven APDCL -approved make Transformer, preferably with more than Three years of usage. experience, shall be used.
2	DG Set	Cummins / Stamford / Cater pillar / Kirloskar/ Perkins
3	HT Panel	ABB / Siemens / Schneider
4	ACB	Siemens / Legrand/ABB/Schneider/ Lauritz Knudsen
5	MCCB	ABB / Siemens / Legrand/ Lauritz Knudsen /ABB/Schneider
6	MCB	Legrand / Lauritz Knudsen / ABB / Schneider
7	RCCB	Legrand / ABB / Schneider/ Lauritz Knudsen
8	SDF / Change over switch	Lauritz Knudsen / C&S / HAVELLS/L&T/ Siemens/ABB. For RFPs and FCs Siemens and L&T shall be used
9	MCB Distribution Board	Legrand / ABB / Schneider/ Lauritz Knudsen / Siemens
10	Current Transformers	KAPPA / KALPA
11	Voltage Transformers	KAPPA / KALPA
12	Capacitors	EPCOS/ ABB / Lauritz Knudsen
13	Contactors & Starters	Lauritz Knudsen / C&S / HAVELLS/L&T/ Siemens
14	Fuses & Fuse Bases	Lauritz Knudsen / C&S / HAVELLS/L&T/ Siemens/ABB. For RFPs and FCs Siemens and L&T shall be used
15	Selector switches & Rotary switches	Kaycee / Salzer
16	Push buttons	Siemens / Salzer
17	Relays	ABB / TM /seimens/schneider
18	Timers	Legrand / Telmech/seimens/schneider
19	Indication lamps	L&T / Salzer / RAAS / RISHAB
20	Battery	Exide / Amaron/ Amar raja
21	Digital Instruments	Elmeasure / IMP / AE
22	KWHR meters	Conserve / HPL / BHEL / Siemens / Lauritz Knudsen /Schneider
23	Decorative Light Fixtures	Philips / Wipro / Havells/OSRAM
24	Decorative switches & sockets	Legrand – Myrius/Mylink, CRABTREE(PLATINUN)
25	Aviation Light	Supernova / Binay / Ganapati / Matador (ISI Marked)
26	Piano type switches & sockets	Anchor / Vinay / Lisha/Legrand/schneider
27	Metal boxes – Switch & socket	Amp / Legrand/ CRABTREE
28	Metal boxes – data & telephone	Amp / Legrand
29	TV Outlets	Legrand – Mylinc / Myrius
30	Telephone outlet	Amp / Legrand
31	Data Outlet	Amp / Legrand
32	Ceiling Fans & Exhaust Fans	Crompton / GEC /USHA / Orient
33	Automatic source transfer switch	L&T / Socomac / Havells
34	Ceiling rose with three pin termination	Anchor / Lisha
35	Crimping type lugs	Dowells / Jainson
36	HT Cable termination kits	3M / Raychem
37	PVC Insulated copper wires	RR/Polycab / Finolex
38	PVC Rigid conduits	Aeroplast / Avonplast
39	MS Conduits	Supreme / Bharat / Gupta / Precision / Javeri
40	Industrial sockets with MCB	Legrand / Hensel / CG
41	Telephone cables	Delton / Finolex /
42	Television / CCTV co-axial cable	Delton / MX
43	CAT 5e / CAT 6 / CAT 6a cable	Delton / AMP
44	GI Pipes	Tata / Jindal
45	LT Panels	CPRI approved panel builders as per specification
46	Bus Duct	CPRI approved panel builders
47	Cable Tray	CPRI approved panel builders and as mentioned in technical specification
48	LT Cables	Polycab / Finolex / Havells / RR/ KEI
49	Terminal blocks	Elmex / Connectwell / Wago
50	Cable Glands	Dowells / Jainson
51	Lightning Arresters	Erico / LPI / OBO / ABB/CAPE
52	CCTV Camera	Honeywell/CP Plus/Hikivision

Hooghly Cochin Shipyard Limited
हावड़ा-०९
HOWRAH-09

Sl.No.	DESCRIPTION	PREFERRED MAKES
53	Monitors	Hp/Dell/Samsung
54	Network Switch	Cisco/ D-Link / Netgear /Digisol
55	Passive Components	Tyco / Systimax / R&M / Belden
56	Cable	Amp / D Link / Digi Link / Molux
57	EPBAX system	Panasonic / Matrix / NEC
58	Speakers	Bosch /Ahuja / Heinrich
59	Microphone	Bosch /Ahuja / Heinrich
60	Amplifier	Bosch /Ahuja / Heinrich
61	U-Rack	Apw / Netfox / Mass rack
62	UPS / Inverter	Numeric / Emerson / APC / Luminous / Socomec

SUMMARY FOR HT & LT ELECTRIFICATION WORKS				
SHIP REPAIRING FACILITY (SRF) AT PANDU, GUWAHATI				
Sl. No.	Part	Description	Supply Amount in Rs.	Installation Amount in Rs.
1	PART - A	WIRING		
2	PART - B	DISTRIBUTION BOARD		
3	PART - C	LUMINAIRES AND FIXTURES		
4	PART - D	LT PANELS		
5	PART - E	BUS DUCT		
6	PART - F	HT & LT CABLING		
7	PART - G	DIESEL GENERATOR		
8	PART - H	TRANSFORMER		
9	PART - I	HT PANELS WITH BREAKERS		
10	PART - J	UPS/INVERTER		
11	PART - K	EARTHING		
12	PART - L	SAFETY ACCESSORIES		
13	PART - M	TELEPHONE SYSTEM		
14	PART - N	DATA NETWORKING SYSTEM		
15	PART - O	COMPUTERS/PRINTERS & SCANNERS		
16	PART - P	AUDIO-VIDEO SYSTEMS		
17	PART - Q	TELEVISION SYSTEM		
18	PART - R	CLOSED CIRCUIT TELEVISION SYSTEM		
19	PART - S	PUBLIC ADDRESS SYSTEM		
20	PART - T	LIGHTNING PROTECTION SYSTEM		
21	PART - U	MISCELLANEOUS		
22	PART - V	ADDITIONAL ITEMS		
		SUB TOTAL AMOUNT IN RS.		
		TOTAL in Rs. (SUPPLY + INSTALLATION)		
		GST 18%		
		GRAND TOTAL in Rs.		
		In Word		

Note:
L1 will be arrived based on the total amount quoted for works excluding GST.

Un-Price bid: Price bid without price & with percentage of taxes & duties and details like quoted/Nil/Included, shall be submitted along with the technical bid.

BILL OF QUANTITIES OF HT & LT ELECTRIFICATION WORKS								
SHIP REPAIRING FACILITY (SRF) AT PANDU, GUWAHATI								
Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
PART - A		WIRING						
A1		Supply, installation, testing and commissioning of surface/concealed type of **point wiring** with **modular type switches**, sockets and all materials as per the point wiring chart. The item including cost of supply and installation of 25mm **PVC conduits**, couplers, junction boxes, bends, ceiling/wall plates, metal boxes, switches, sockets, draw boxes & top cover plate (3mm hylam sheet), 3 run of 1.5sq.mm FRLS copper wires, bakelite connectors, crimping type ferrules, copper lugs, brass cup washers & brass screws, clamps & screws and bolt & nuts etc. All the points shall be terminated with 300mm length of additional wires along with connector terminal blocks. The item including necessary chipping/cutting the wall and making good the same in case of recessed conduit as required. All complete as per specifications, drawings and / or as directed by the Engineer.						
	a)	One light / exhaust fan / wall mounting fan point controlled by one No. 1-way 6 Amps switch. (upto 4m)	Nos.	10				
	b)	One light / exhaust fan / wall mounting fan point controlled by one No. 1-way 6 Amps switch. (upto 6m)	Nos.	20				
	c)	One light / exhaust fan / wall mounting fan point controlled by one No. 1-way 6 Amps switch. (upto 9m)	Nos.	15				
	d)	One light / exhaust fan / wall mounting fan point controlled by one No. 1-way 6 Amps switch. (upto 12m)	Nos.	20				
	e)	One fan point (with regulator) controlled by one No. 1-way 6 Amps switch. The item including cost of fan hook with metal box, top round sheet/plate and 2M stepped regulator etc. (upto 6m)	Nos.	5				
	f)	One fan point (with regulator) controlled by one No. 1-way 6 Amps switch. The item including cost of fan hook with metal box, top round sheet/plate and 2M stepped regulator etc. (upto 9m)	Nos.	12				
	g)	One fan point (with regulator) controlled by one No. 1-way 6 Amps switch. The item including cost of fan hook with metal box, top round sheet/plate and 2M stepped regulator etc. (upto 12m)	Nos.	13				
	h)	One light / exhaust fan / wall mounting point controlled by two Nos. 2-way 6 Amps switch. (upto 12m)	Nos.	6				
	i)	Two light / wall mounting point controlled by two Nos. 2-way 6 Amps switch. (upto 12m)	Nos.	QRO				
	j)	One additional light point extended from the existing light point and controlled by existing switch. (all items are as similar to (A1.a) but excluding of switch boxes, switches and sockets) (upto 3m length)	Nos.	25				
	k)	One additional light point extended from the existing light point and controlled by existing switch. (all items are as similar to (A1.a) but excluding of switch boxes, switches and sockets) (upto 4m length)	Nos.	5				
	l)	One additional light point extended from the existing light point and controlled by existing switch. (all items are as similar to (A1.a) but excluding of switch boxes, switches and sockets) (upto 6m length)	Nos.	70				
	m)	One additional light point extended from the existing light point and controlled by existing switch. (all items are as similar to (A1.a) but excluding of switch boxes, switches and sockets) (upto 9m length)	Nos.	45				
	n)	One additional light point extended from the existing light point and controlled by existing switch. (all items are as similar to (A1.a) but excluding of switch boxes, switches and sockets) (upto 12m length)	Nos.	5				
A2		Supply, installation, testing and commissioning of surface/concealed type of **point wiring** with **modular type switches**, sockets and all materials as per the point wiring chart. The item including cost of supply and installation of 25mm **MS conduits**, couplers, junction boxes, bends, ceiling/wall plates, metal boxes, switches, sockets, draw boxes & top cover plate (3mm hylam sheet), 3 run of 1.5sq.mm FRLS copper wires, bakelite connectors, crimping type ferrules, copper lugs, brass cup washers & brass screws, clamps & screws and bolt & nuts etc. All the points shall be terminated with 300mm length of additional wires along with connector terminal blocks. The item including necessary chipping/cutting the wall and making good the same in case of recessed conduit as required. All complete as per specifications, drawings and / or as directed by the Engineer.						
	a)	One light / exhaust fan / wall mounting fan point controlled by one No. 1-way 6 Amps switch. (upto 4m)	Nos.	QRO				
	b)	One light / exhaust fan / wall mounting fan point controlled by one No. 1-way 6 Amps switch. (upto 6m)	Nos.	QRO				
	c)	One light / exhaust fan / wall mounting fan point controlled by one No. 1-way 6 Amps switch. (upto 9m)	Nos.	QRO				
	d)	One light / exhaust fan / wall mounting fan point controlled by one No. 1-way 6 Amps switch. (upto 12m)	Nos.	QRO				
	e)	One fan point (with regulator) controlled by one No. 1-way 6 Amps switch. The item including cost of fan hook with metal box, top round sheet/plate and 2M stepped regulator etc. (upto 6m)	Nos.	QRO				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
	f)	One fan point (with regulator) controlled by one No. 1-way 6 Amps switch. The item including cost of fan hook with metal box, top round sheet/plate and 2M stepped regulator etc. (upto 9m)	Nos.	QRO				
	g)	One fan point (with regulator) controlled by one No. 1-way 6 Amps switch. The item including cost of fan hook with metal box, top round sheet/plate and 2M stepped regulator etc. (upto 12m)	Nos.	QRO				
	h)	One light / exhaust fan / wall mounting point controlled by two Nos. 2-way 6 Amps switch. (upto 12m)	Nos.	QRO				
	i)	Two light / wall mounting point controlled by two Nos. 2-way 6 Amps switch. (upto 12m)	Nos.	QRO				
	j)	One additional light point extended from the existing light point and controlled by existing switch. (all items are as similar to {A1.a} but excluding of switch boxes, switches and sockets) (upto 3m length)	Nos.	QRO				
	k)	One additional light point extended from the existing light point and controlled by existing switch. (all items are as similar to {A1.a} but excluding of switch boxes, switches and sockets) (upto 4m length)	Nos.	QRO				
	l)	One additional light point extended from the existing light point and controlled by existing switch. (all items are as similar to {A1.a} but excluding of switch boxes, switches and sockets) (upto 6m length)	Nos.	QRO				
	m)	One additional light point extended from the existing light point and controlled by existing switch. (all items are as similar to {A1.a} but excluding of switch boxes, switches and sockets) (upto 9m length)	Nos.	QRO				
	n)	One additional light point extended from the existing light point and controlled by existing switch. (all items are as similar to {A1.a} but excluding of switch boxes, switches and sockets) (upto 12m length)	Nos.	QRO				
A3		Supply, installation, testing and commissioning of surface/concealed type of point wiring with **modular** type switches, sockets and all materials as per the point wiring chart. The item including cost of supply and installation of metal boxes, switches, sockets, draw boxes & top cover plate (3mm hylam sheet), 3 run of 1.5sq.mm FRLS copper wires, bakelite connectors, crimping type ferrules, copper lugs, brass cup washers & brass screws, clamps & screws and bolt & nuts etc. All the points shall be terminated with 300mm length of additional wires along with connector terminal blocks. The item including necessary chipping/cutting the wall and making good the same in case of recessed conduit as required. All complete as per specifications, drawings and / or as directed by the Engineer. **(The item excluding cost of 19mm/25mm dia PVC/MS conduits i.e, Point wiring in the existing conduits)**						
	a)	One light / exhaust fan / wall mounting fan point controlled by one No. 1-way 6 Amps switch. (upto 4m)	Nos.	QRO				
	b)	One light / exhaust fan / wall mounting fan point controlled by one No. 1-way 6 Amps switch. (upto 6m)	Nos.	QRO				
	c)	One fan point (with regulator) controlled by one No. 1-way 6 Amps switch. The item including cost of fan hook with metal box, top round sheet/plate and 2M stepped regulator etc. (upto 6m)	Nos.	QRO				
	d)	One light / exhaust fan / wall mounting point controlled by two Nos. 2-way 6 Amps switch. (upto 12m)	Nos.	QRO				
	e)	Two light / wall mounting point controlled by two Nos. 2-way 6 Amps switch. (upto 12m)	Nos.	QRO				
	f)	One additional light point extended from the existing light point and controlled by existing switch. (all items are as similar to {A1.a} but excluding of switch boxes, switches and sockets) (upto 3m length)	Nos.	QRO				
	g)	One additional light point extended from the existing light point and controlled by existing switch. (all items are as similar to {A1.a} but excluding of switch boxes, switches and sockets) (upto 4m length)	Nos.	QRO				
	h)	One additional light point extended from the existing light point and controlled by existing switch. (all items are as similar to {A1.a} but excluding of switch boxes, switches and sockets) (upto 6m length)	Nos.	QRO				
A4		POWER RECEPTACLES						
		Supply, Installation, testing and commissioning of power points by providing following switches/sockets, mounted flush to the walls using MS boxes, inner plates, front plate, modular switches and sockets with all wiring accessories.						
	a)	One 6A dependent 5-pin socket point controlled by one no of 6A switch. (switch & socket are mounted in the dependent switch box)	Nos.	15				
	b)	One 6A independent 5-pin socket point controlled by one no of 6A switch. (switch & socket are mounted in a independent switch box-White Colour)	Nos.	40				
	c)	One 6A independent 5-pin socket point controlled by one no of 6A switch. (switch & socket are mounted in a independent switch box-White Colour) (In flame proof encloure)	Nos.	2				
	d)	One 6A independent 5-pin socket point controlled by one no of 6A switch. (switch & socket are mounted in a independent switch box-Black Colour)	Nos.	QRO				
	e)	Two 6A independent 5-pin socket point controlled by two no of 6A switch. (switch & socket are mounted in a independent switch box-White Colour)	Nos.	2				
	f)	Two 6A independent 5-pin socket point controlled by two no of 6A switch. (switch & socket are mounted in a independent switch box-Black Colour)	Nos.	20				
	g)	One 6A/16A 5-pin socket point controlled by one 16A switch with indicator. (switch & socket are mounted in an independent switch box-WhiteColour)	Nos.	50				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
	h)	One 6A/16A 5-pin socket point controlled by one 16A switch with indicator. (switch & socket are mounted in an independent switch box-Black Colour) (In flame proof encloure)	Nos.	10				
	i)	One 6A/16A 5-pin socket point controlled by one 16A switch with indicator. (switch & socket are mounted in an independent switch box-Black Colour)	Nos.	10				
	j)	Two 6A/16A 5-pin socket point controlled by Two 16A switch with indicator. (switch & socket are mounted in an independent switch box-White Colour)	Nos.	8				
	k)	Two 6A/16A 5-pin socket point controlled by Two 16A switch with indicator. (switch & socket are mounted in an independent switch box-Black Colour)	Nos.	2				
	l)	One 6A, 3/5-pin socket with metal box and front plate.	Nos.	4				
	m)	One 6A switch with metal box and front plate.	Nos.	4				
	n)	One 6A, 3/5-pin socket with metal box and front plate (Black Colour).	Nos.	QRO				
	o)	One 6A switch with metal box and front plate (Black Colour).	Nos.	QRO				
	p)	One 16A 5-pin socket with metal box and front plate.	Nos.	QRO				
	q)	One 16A switch with metal box and front plate.	Nos.	QRO				
	r)	One 20A metal clad air conditioning socket controlled by one 20A single pole MCB.	Nos.	QRO				
	s)	Supplying and fixing metal box of following sizes on surface or in recess with suitable size of hylam sheet cover in front including all necessary accessories etc. as required.						
	i)	2 Module	Nos.	QRO				
	ii)	3 Module	Nos.	QRO				
	iii)	4 Module	Nos.	QRO				
	iv)	6 Module	Nos.	QRO				
	v)	8 Module	Nos.	QRO				
	vi)	12 Module	Nos.	QRO				
	vii)	16 Module	Nos.	QRO				
A5		Supply, installation, testing and commissioning of surface/concealed type of main **circuit wiring** from panel/DB to DB's, DB to switch boxes and switch box to other switch boxes using 1100V grade PVC insulated multistranded FRLS copper wires, to be drawn through existing laid conduits. All complete as per specifications, drawings and / or as directed by the Engineer. **(The item excluding cost of 19mm/25mm dia PVC/MS conduits - Circuit wiring in the existing conduits)**						
	a)	3 runs of 1.5 sq.mm. FRLS copper wiring in the existing laid PVC/MS conduits. (this item will be considered only where the point wiring exceeds the mentioned length)	R. mtr.	100			-	
	b)	2 runs of 2.5 sq.mm. & 1 run of 1.5 sq.mm. FRLS copper wiring in the existing laid PVC/MS conduits.	R. mtr.	2200			-	
	c)	1 run of 4 sq.mm. FRLS copper wiring in the existing laid PVC conduits.(For 15kVA UPS Body earthing)	R. mtr.	10				
	d)	2 runs of 4 sq.mm. & 1 run of 2.5 sq.mm. FRLS copper wiring in the existing laid PVC/MS conduits.	R. mtr.	1000			-	
	e)	2 runs of 6 sq.mm. & 1 run of 2.5 sq.mm. FRLS copper wiring in the existing laid PVC/MS conduits.	R. mtr.	QRO				
	f)	2 runs of 10 sq.mm. & 1 run of 4 sq.mm. FRLS copper wiring in the existing laid PVC/MS conduits.	R. mtr.	QRO				
	g)	2 runs of 10 sq.mm. FRLS copper wiring in the existing laid PVC conduits.(For 15kVA UPS Neutral earthing)	R. mtr.	60				
	h)	2 runs of 16 sq.mm. & 1 run of 4 sq.mm. FRLS copper wiring in the existing laid PVC/MS conduits.	R. mtr.	20			-	
	i)	4 runs of 4 sq.mm. & 2 run of 2.5 sq.mm. FRLS copper wiring in the existing laid PVC/MS conduits.	R. mtr.	75				
	j)	4 runs of 6 sq.mm. & 2 run of 2.5 sq.mm. FRLS copper wiring in the existing laid PVC/MS conduits.	R. mtr.	250				
	k)	4 runs of 10 sq.mm. & 2 run of 4 sq.mm. FRLS copper wiring in the existing laid PVC/MS conduits.	R. mtr.	60				
	l)	4 runs of 16 sq.mm. & 2 run of 4 sq.mm. FRLS copper wiring in the existing laid PVC/MS conduits.	R. mtr.	75				
A6		Supply and installlation of surface/recessed type PVC/MS, rigid/flexible, conduits of the following sizes with required couplers, junction boxes, bends, ceiling/wall plates, metal boxes, draw boxes & top cover plate (3mm hylam sheet), clamps, screws, bolt & nuts and necessary fixing accessories etc. The item including necessary chipping/cutting the wall and making good the same in case of recessed conduit as required. All complete as per specifications, drawings and / or as directed by the Engineer.						
	a)	20mm dia 2mm thick rigid PVC conduits.	R. mtr.	750				
	b)	25mm dia 2mm thick rigid PVC conduits.	R. mtr.	6500				
	c)	20mm dia 1.6mm thick rigid PVC conduits.	R. mtr.	800				
	d)	25mm dia 1.6mm thick rigid PVC conduits.	R. mtr.	2000				
	e)	25mm dia 1.6mm thick rigid MS conduits.	R. mtr.	QRO				
	f)	20mm dia flexible MS conduits.	R. mtr.	QRO				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
	g)	25mm dia flexible MS conduits.	R. mtr.	QRO				
	h)	50mm dia 1.6mm thick rigid PVC Conduits.	R. mtr.	QRO				
		TOTAL CARRIED OVER TO SUMMARY (Part - A)						
PART - B		**DISTRIBUTION BOARD**						
B1		Supply, installation, testing and commissioning of following ways of surface/flush mounting, double door phase segregation **seven segment type TPN MCB** DB's of sheet steel, powder coated, IP42 protection, metal door and cable end box etc. The item including terminal connectors for all incoming and outgoing circuits, duly pre-wired with suitable size of FRLS PVC copper wires upto terminal blocks, tinned copper bus bar of suitable rating, neutral links, earth bars, detachable gland plate, interconnections by using crimping type ferrules & copper lugs, and engraving of laminated as-built circuit drawings in the door inside etc. The item including necessary chipping/cutting the wall and making good the same in case of flush mounting as required. All complete as per specifications, drawings and / or as directed by the Engineer:						
	a)	4way	Nos.	23				
	b)	6way	Nos.	1				
	c)	8way	Nos.	1				
B2		Supply, installation, testing and commissioning of following ways of surface/flush mounting, **VTPN MCB DB's** of sheet steel, powder coated, IP43 protection, metal door and cable end box etc. The item including terminal connectors for all incoming and outgoing circuits, duly pre-wired with suitable size of FRLS PVC copper wires upto terminal blocks, tinned copper bus bar of suitable rating, neutral links, earth bars, detachable gland plate, interconnections by using crimping type ferrules & copper lugs, and engraving of laminated as-built circuit drawings in the door inside etc. The item including necessary chipping/cutting the wall and making good the same in case of flush mounting as required. All complete as per specifications, drawings and / or as directed by the Engineer:						
	a)	4way	Nos.	QRO				
	b)	6way	Nos.	QRO				
B3		Supply, installation, testing and commissioning of following ways of surface/flush mounting, **SPN MCB DB's** of sheet steel, powder coated, IP43 protection, metal door and cable end box etc. The item including terminal connectors for all incoming and outgoing circuits, duly pre-wired with suitable size of FRLS PVC copper wires upto terminal blocks, tinned copper bus bar of suitable rating, neutral links, earth bars, detachable gland plate, interconnections by using crimping type ferrules & copper lugs, and engraving of laminated as-built circuit drawings in the door inside etc. The item including necessary chipping/cutting the wall and making good the same in case of flush mounting as required. All complete as per specifications, drawings and / or as directed by the Engineer:						
	a)	4way	Nos.	1				
	b)	8way	Nos.	13				
	c)	12way	Nos.	1				
	d)	16way	Nos.	QRO				
B4		Supply, installation, testing and commissioning of following ratings & poles of single phase / three phase "C" curve, 10KA MCB's to be fixed in the existing MCCB/MCB DB's or enclosures complete with interconnections by using crimping type ferrules and copper lugs etc. All complete as per specifications, drawings and / or as directed by the Engineer:						
	a)	6A to 32A Single Pole MCB	Nos.	355				
	b)	6A to 32A Double Pole MCB	Nos.	6				
	c)	40A to 63A Singl Pole Neutral / Double Pole MCB	Nos.	QRO				
	d)	6A to 32A Triple Pole MCB	Nos.	2				
	e)	40A to 63A Triple Pole MCB	Nos.	QRO				
	f)	6A to 32A Four Pole MCB	Nos.	57				
	g)	40A to 63A Four Pole MCB	Nos.	31				
B5		Supply, installation, testing and commissioning of following ratings & poles of three phase 25KA adjustable thermal magnetic release type MCCB's to be fixed in the existing MCCB DB's or panels or enclosures complete with interconnections by using crimping type ferrules and copper lugs etc. All complete as per specifications, drawings and / or as directed by the Engineer:						
	a)	100A 4P MCCB	Nos.	3				
	b)	125A 4P MCCB	Nos.	1				
B6		Supply, installation, testing and commissioning of following ratings & poles of single phase / three phase **RCBO's** to be fixed in the existing MCCB/MCB DB's or enclosures complete with interconnections by using crimping type ferrules and copper lugs etc. All complete as per specifications, drawings and / or as directed by the Engineer:						
	a)	16A to 25A Double Pole RCBO, 30mA	Nos.	10				
	b)	40A Double Pole RCBO, 30mA	Nos.	22				
	c)	63A Double Pole RCBO, 30mA	Nos.	55				
	d)	32A Four Pole RCBO, 300mA	Nos.	QRO				
	e)	40A Four Pole RCBO, 300mA	Nos.	1				
	f)	63A Four Pole RCBO, 300mA	Nos.	2				
B7		Supply and installation of blanking plates in the existing MCCB/MCB DB's or enclosures etc. All complete as per specifications, drawings and / or as directed by the Engineer:	Nos.	280				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
B8		Supply, installation, testing and commissioning of following type metal box enclosures suitable for independent mounting of MCB/MCCB/RCBO's complete with all necessary fixing accessories etc. All complete as per specifications, drawings and / or as directed by the Engineer:						
	a)	Double Pole Enclosure for MCB's	Nos.	2				
	b)	Four Pole Enclosure for MCB's	Nos.	60				
	c)	Four Pole Enclosure for MCCB's (upto 125A)	Nos.	4				
B9		Supply, installation, testing and commissioning of following **weather proof box** suitable for independent mounting of MCB/MCCB/RCBO's complete with all necessary fixing accessories etc. All complete as per specifications, drawings and / or as directed by the Engineer:						
	a)	Four Pole Enclosure for MCB's	Nos.	2				
B10		Supply, installation, testing and commissioning of following **weather proof box** with higed door suitable for mounting of MCB/MCCB/RCBO's complete with all necessary fixing accessories etc. All complete as per specifications, drawings and / or as directed by the Engineer:						
	a)	300 (W) x 250 (H) x 140 (D)	Nos.	1				
B11		Supply and fixing of 32A TP+N+E industrial type switched socket with 32A TPN MCB with IP-43 metallic enclosure with all necessary fixing accessories etc.	Set.	61				
B12		Supply and fixing of 16A 2P+E industrial type switched socket with 16A DP MCB with IP-43 metallic enclosure with all necessary fixing accessories etc.	Set.	20				
B13		Supply,installation, testing & commissioning of WEATHER PROOF JUNCTION BOXES with Connector and necessary accessories.	Nos.	26				
B14		Supply and fixing of following sizes of fabricated ceiling/wall junction box with all necessary fixing accessories etc, for Electrical and communication flooring conduits.						
	a)	100 x 100 x 50 mm	Set.	3				
	b)	150 x 150 x 50 mm	Set.	5				
	c)	300 x 300 x 50 mm	Set.	3				
	d)	450 x 300 x 50 mm	Set.	4				
		TOTAL CARRIED OVER TO SUMMARY (Part - B)						
PART - C		**LUMINAIRES AND FIXTURES**						
C1		Supply,Installation, testing and commissioning of the following luminaires including driver, connecting wire,connectors, clamps, screws, bolt & nuts, down rods, required connector block terminals and necessary fixing accessories etc.						
	a)	20W, 4' length LED batten light with extruded aluminum housing and polycarbonate cover, input voltage AC 220 - 260 Volts, with high power LEDs, having System Efficacy of >=100 lumens/watt , ~~PF>0.9, Surge protection: 2KV, THD70, etc.,~~	Nos.	6				
	b)	10W, 2' length LED batten light with extruded aluminum housing and polycarbonate cover, input voltage AC 220 - 260 Volts, with high power LEDs, having System Efficacy of >=100 lumens/watt , ~~PF>0.9, Surge protection: 2KV, THD70, etc.,~~	Nos.	9				
	c)	Integral, SMD LED, IP40, 40W (4 feet) Surface/Suspended Mounted LED Batten with System efficacy of more than 110 lm/W (4400 lumens). LED luminaire shall have sleek design with Extruded Aluminum Section. The luminaire shall have High Optically Efficient Polycarbonate Diffuser for Uniform illumination and wider light distribution. Screwless Design ensures ease of maintenance. LM 80-08 compliant. LEDs used in the product shall comply with EN 62471 for Photo-biological safety and certificate for the same from manufacturer shall be provided. Luminaire manufacturer shall produce certificate of association with LED manufacturer for minimum five years. The LED shall be compliant withLM80-08 standard with Useful L70 life of 75000 Hrs tested at maximum current. The LEDs used should be with CCT of 5700-6000 K and CRI > 80. LED Driver shall be Isolatedtype, Constant Current topology driver with proper heat sink for heat dissipation suitable to operate in input voltage range of 150V to 270V (nominal rated voltage ~240V) with 4 KV internal surge protection, Power factor greater than 0.95 and total harmonic distortion (THD) of less than 10% should be integral to the luminaire. Compliance to Indian Standards of IS10322 Part 5 / Sect 1:1967; 16105 : 2012; IS 16106 : 2012; IS 15885 (Part2/Sec13) : 2012; IS 16108 : 2012	Nos.	14				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
	d)	12W, High efficient recess mounted LED round downlighter with white powder coated, pressure die cast aluminium housing in polycarbonate Sheet . High transmitivity, non-yellowing PMMA Diffuser. CRI>80, IP20, Ambient temp-0 to 45DegC, CCT - 4000/6500K, 50,000 hrs @ L70 life.Driver efficiency>88%, THD<20%, Powerfactor>0.95, Surge protection- 2 kV, Multistage Isolated Constant Current-Constant Voltage operated driver with range 100-240V AC and Safety Extra Low Voltage Safe level<60V DC **(For Passage & Toilets)**	Nos.	47				
	e)	18W, High efficient recess mounted LED round downlighter with white powder coated, pressure die cast aluminium housing in polycarbonate Sheet . High transmitivity, non-yellowing PMMA Diffuser. CRI>80, IP20, Ambient temp-0 to 45DegC, CCT - 4000/6500K, 50,000 hrs @ L70 life.Driver efficiency>88%, THD<20%, Powerfactor>0.95, Surge protection- 2 kV, Multistage Isolated Constant Current-Constant Voltage operated driver with range 100-240V AC and Safety Extra Low Voltage Safe level<60V DC	Nos.	11				
	f)	5W/m Non-integral flexible LED strip light with high brightness for indoor applications. Strip can be cut at marked interval to suit desired length. 20,000 burning hours as per L70 Criteria, Ambient temp-0 to 45DegC, Driver efficiency>85%, CCT - 6500K, THD<20%, Powerfactor>0.9, Surge protection in CM-3kV, Multistage Isolated Constant Current Operated driver with range 100-300V AC and Safety Extra Low Voltage Safe level<60V	Mtrs.	5				
	g)	10W, Robust & reliable LED bulkhead with IP65 protection & IK08 impact resistance suitable for surface and wall mounting applications.	Nos.	16				
	h)	10W, High efficient LED square type wall light with powder coated CRCA housing and PC diffuser.CRI>80, Ambient temp-0 to 45DegC, Driver efficiency>85%, THD<25%, CCT-6000K, 50,000 hrs @ L70 life.Powerfactor>0.9, Surge protection-2 kV, Multistage Isolated Constant Current Constant Voltage operated driver with range 150-270V AC and Safety Extra Low Voltage Safe level<60V DC	Nos.	29				
	i)	6W, High efficient LED Step recessed light with powder coated CRCA housing and PC diffuser.CRI>80, Ambient temp-0 to 45DegC, Driver efficiency>85%, THD<25%, CCT-5700-6000K, 50,000 hrs @ L70 life.Powerfactor>0.9, Surge protection-2 kV, Multistage Isolated Constant Current-Constant Voltage operated driver with range 110-270V AC and Safety Extra Low Voltage Safe level<60V DC	Nos.	20				
	j)	6W, High efficient LED Inground light with powder coated CRCA housing and PC diffuser.CRI>80,IP 65, Ambient temp-0 to 45DegC, Driver efficiency>85%, THD<25%, CCT-5700-6000K, 50,000 hrs @ L70 life.Powerfactor>0.9, Surge protection-2 kV, Multistage Isolated Constant Current-Constant Voltage operated driver with range 110-270V AC and Safety Extra Low Voltage Safe level<60V DC	Nos.	10				
	k)	Integral, SMD 2x2 LED, IP 20, 25W LED Recess mounted fixture with System efficacy of more than 120lm/W and system lumen output 3000lm. Luminaire shall have satin finished translucence (HET) diffuser for Uniform illumination and wider light distribution. LM 80-08 compliant LEDs from reputed makes such as Nichia / Cree / Bridgelux / Lumileds should be provided. LEDs used in the product shall comply with EN 62471 for Photo-biological safety and certificate for the same from manufacturer shall be provided. Luminaire shall use SMD type LED. The LED shall be compliant with LM80-08 standard with L70 life of 50000 Hrs tested at maximum current (Complete LM 80 test report for LED should be submitted for 10000 hrs of testing). The LEDs used should be with CCT of 5700 K and CRI of Minimum 80. LED Driver shall be Multistage, Isolated type, APFC, Constant Current topology driver with proper heat sink for heat dissipation suitable to operate in input voltage range of 150V to 270V (nominal rated voltage – 240V) with 3KV internal surge protection, Power factor greater than 0.95 and total harmonic distortion (THD) of less than 10% should be integral to the luminaire. Complying to SELV <60V DC standards. Compliance to Indian Standards of IS10322 Part 5 / Sect 1:1967; 16105 : 2012; IS 16106 : 2012; IS 15885 (Part2/Sec13) : 2012; IS 16108 : 2012	Nos.	49				
	l)	Integral, SMD LED, IP20, 39-40W Trunk Mounted Industrial integral LED channel with System efficacy of more than 100 lm/W (4000 lumens). LED luminaire shall have sleek design in high quality polyester white precoated galvanized steel. The luminaire shall have Soft contoured injection moulding plastic end caps. The luminaire shall have High Efficiency CRCA housing and Translucence (HET) diffuser for Uniform illumination and wider light distribution. Trunking system with its linear connectivity gives aseamless appearance. LM 80-08 compliant LEDs from reputed makes such as Nichia, Japan / Cree, USA / Bridgelux, USA / Lumileds, USA should be provided. LEDs used in the product shall comply with EN 62471 for Photo-biological safety and certificate for the same from manufacturer shall be provided. Luminaire manufacturer shall produce certificate of association with LED manufacturer for minimum five years. The LED shall be compliant with LM80-08 standard with Useful L70 life of 50000 Hrs tested at maximum current (Complete LM 80 test report for LED should be submitted for 10000 hrs of testing). The LEDs used should be with CCT of 5700 K and CRI of Minimum 80. LED Driver shall be CRCA constructed, Isolated type, Constant Current topology driver with proper heat sink for heat dissipation suitable to operate in input voltage range of 150V to 270V (nominal rated voltage – 240V) with 2 KV internal surge protection, Power factor greater than 0.95 and total harmonic distortion (THD) of less than 10% should be integral to the luminaire. Compliance to Indian Standards of IS10322 Part 5 / Sect 1:1967; 16105 : 2012; IS 16106 : 2012; IS 15885 (Part2/Sec13) : 2012; IS 16108 : 2012	Nos.	QRO				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
	m)	Integral, SMD LED, IP 66, IK08, 200W LED Surface/Suspend Mounted Round narrow beam (60deg) High-Bay fixture with System efficacy of more than 120 lm/W (24000 lumens). Luminaire shall be made up of Die Cast Aluminium Housing. Luminaire shall have Polycarbonate high transmitivity lens for Uniform illumination and wider light distribution. The innovetive design with Aeroflo Technology ensures flow of free air through the Housing and keep the heat away from Electrical Components . LM 80-08 compliant LEDs from reputed makes such as Nichia, Japan / Cree, USA / Bridgelux, USA / Lumiled USA / Seoul Korea should be provided. LEDs used in the product shall comply with EN 62471 for Photo-biological safety and certificate for the same from manufacturer shall be provided. Luminaire shall use SMD type LED. The LED shall be compliant with LM80-08 standard with Useful L70B50 life of 100000 Hrs tested at maximum current (Complete LM 80 test report for LED should be submitted for 10000 hrs of testing). The LEDs used should be with CCT of 5700 K and CRI > 70. LED Driver shall be CRCA constructed, Isolated type, multistage Constant Current topology driver with proper heat sink for heat dissipation suitable to operate in input voltage range of 140V to 285V (nominal rated voltage – 240V) with 4 KV internal surge protection, Power factor greater than 0.95 and total harmonic distortion (THD) less than 10% should be integral to the luminaire. Compliance to Indian Standards of IS10322 Part 5 / Sect 1:1967; 16105 : 2012; IS 16106 : 2012; IS 15885 (Part2/Sec13) : 2012; IS 16108 : 2012	Nos.	20				
	n)	Integral, SMD LED, IP 66, IK07, flameproof, 200W LED floodlight fixture with System efficacy of more than 120 lm/W (18000 lumens). Ex-d Gas Group IIC, Temperature Class T5, Zone 1 & 2 and 21 & 22, EPL Gb & Db. PDC Aluminum housing with heat sink, Epoxy powder coated in DA Grey (Glossy) finish. Borosilicate glass lens. LM 80-08 compliant LEDs from reputed makes such as Nichia, Japan / Cree, USA / Bridgelux, USA / Lumiled USA / Seoul Korea should be provided. LEDs used in the product shall comply with EN 62471 for Photo-biological safety and certificate for the same from manufacturer shall be provided. Luminaire shall use SMD type LED. The LED shall be compliant with LM80-08 standard with Useful L80B10 life of 50000 Hrs tested at maximum current. The LEDs used should be with CCT of 6500 K and CRI > 70. LED Driver shall be CRCA constructed, Isolated type, multistage Constant Current topology driver with proper heat sink for heat dissipation suitable to operate in input voltage range of 140V to 305V (nominal rated voltage – 240V) with 4 KV internal surge protection, Power factor greater than 0.95 and total harmonic distortion (THD) less than 10% should be integral to the luminaire. Compliance/Certification to CIMFR, PESO, BIS	Nos.	5				
	o)	100W LED Streetlight fixture with System efficacy of 110 lm/W (11000 lumens). Luminaire shall be made up of die cast Aluminium housing with PC lens and toughened glass diffuser. Luminaire shall be designed with street optic LENS for uniform light distribution. LM 80-08 compliant LEDs from reputed makes such as Nichia/Cree/ Bridgelux/ Lumiled/ Osram/Seoul should be provided. LEDs used in the product shall comply with EN 62471 for Photo-biological safety and certificate for the same from manufacturer shall be provided. Luminaire shall be with IP66, IK08 protection. The LED shall be compliant with LM80-08 standard with L70 life of 50000 Hrs tested at maximum current (Complete LM 80 test report for LED should be submitted for 10000 hrs of testing). The LEDs used should be with CCT of 5700 K and CRI of Minimum 70. LED Driver shall be potted, Integrated type, Multistage, Isolated, APFC Constant Current-Constant Voltage operated driver with range 150-300V AC. Driver Efficiency > 87% & 4 KV internal surge protection, Power factor greater than 0.95 and total harmonic distortion (THD) of less than 10% should be integral to the luminaire. Compliance to Indian Standards of IS10322 Part 5 / Sect 1:1967; 16105 : 2012; IS 16106 : 2012; IS 15885 (Part2/Sec13) : 2012; IS 16108 : 2012.	Nos.	26				
	p)	80W IP66 IK08 LED Floodlight fixture with System efficacy of 100 lm/W (8000 lumens). Luminaire shall be made up of die cast Aluminium housing with PC lens and toughened glass diffuser. LM 80 08 compliant LEDs from reputed makes should be provided. LEDs used in the product shall comply with EN 62471 for Photo-biological safety and certificate for the same from manufacturer shall be provided. The LED shall be compliant with LM80-08 standard with L70 life of 50000 Hrs tested at maximum current (Complete LM 80 test report for LED should be submitted for 10000 hrs of testing). The LEDs used should be with CCT of 5700 K and CRI of Minimum 70. LED Driver shall be potted, Integrated type, Multistage, Isolated, APFC Constant Current-Constant Voltage operated driver with range 120-300V AC. Driver Efficiency > 85% & 4 KV internal surge protection, Power factor > 0.95 and THD< 10% should be integral to the luminaire. Compliance to Indian Standards of IS10322 Part 5 / Sect 1:1967; 16105 : 2012; IS 16106 : 2012; IS 15885 (Part2/Sec13) : 2012; IS 16108 : 2012.	Nos.	14				
	q)	400W IP66 IK08 LED Floodlight fixture, with System efficacy of 115 lm/W (46000 lumens). Luminaire shall be made up of die cast Aluminium housing with PC lens and toughened glass diffuser. LM 80-08 compliant LEDs from reputed makes such as Nichia/Cree/ Bridgelux/ Lumiled/ Osram/Seoul should be provided. LEDs used in the product shall comply with EN 62471 for Photo biological safety and certificate for the same from manufacturer shall be provided. The LED shall be compliant with LM80-08 standard with L70 life of 50000 Hrs tested at maximum current (Complete LM 80 test report for LED should be submitted for 10000 hrs of testing). The LEDs used should be with CCT of 5700 K and CRI of Minimum 70. LED Driver shall be potted, Integrated type, Multistage, Isolated, APFC Constant Current-Constant Voltage operated driver with range 140-300V AC. Driver Efficiency > 85% & 4 KV internal surge protection + 10kV inline SPD. Power factor greater than 0.95 and total harmonic distortion (THD) of less than 10% should be integral to the luminaire. Compliance to Indian Standards of IS10322 Part 5 / Sect 1:1967; 16105 : 2012; IS 16106 : 2012; IS 15885 (Part2/Sec13) : 2012; IS 16108 : 2012.	Nos.	50				
	r)	Gate light type luminaire with 20W,230V, LED bulb	Nos.	2				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
C2		Supply,Installation, testing and commissioning of 48" (1200mm) Sweep 5 star rated BLDC (Brush less Direct Current) Ceiling Fan with double ball bearings, input voltage 230V AC converted to 24 V DC, power input not more than 30W, air delivery not less than 220 cubic meter/min and a minimum service value of 7.0, with remote and without Regulator.	Nos.	3				
C3		Supply and installation of following sizes of ceiling fan rod (for additional length) of approved make/colour with necessary fixing accessories and all complete as per specifications, drawings and / or as directed by the Engineer.						
	a)	2.5 feet rod	Nos.	QRO				
C4		Supply and installation of GI pipe of approved make/colour with necessary fixing accessories and all complete as per specifications, drawings and / or as directed by the Engineer.(For fixing 4' Batten light fittings in electrical rooms)	Mtrs.	QRO				
C5		Supply, Installation, testing and commissioning of light duty type 300mm diameter exhaust fan, with mounting frame and louvres, all complete as per specifications, drawings and / or as directed by the Engineer.	Nos.	2				
C6		Supply, Installation, testing and commissioning of light duty type 450mm diameter industrial type exhaust fan, with mounting frame and louvres, all complete as per specifications, drawings and / or as directed by the Engineer.	Nos.	4				
C7		Supply,Installing, testing and commissioning of 30" Heavy duty wall mounted fan , with mounting frame, all complete as per specifications, drawings and / or as directed by the Engineer.	Nos.	16				
C8		Supply, installation, testing and commissioning of automatic timer control unit with suitable enclosure for street lighting/geyser/motor control with one no. each 32A triple-pole MCB as incomer and outgoing, 1 no. of 32A triple-pole power contactor, one no. 24-hours modular type analog timer switch with 3-position changeover, all complete as per specifications, drawings and / or as directed by the Engineer-in-charge.	Set.	2				
C9		Supplying, fixing, connecting and commissioning of 2Mtrs height portable structure madeup of 50NB Class-B GI pipe with 75x75x9mm base and 50x6mm angular support suitable to fix 1No 100W LED Light Fitting with necessary accessories required for the job . The structure shall having uniform powder coating thickness of 85 / 65 microns for bottom / top sections respectively.	Nos.	24				
C10		Supplying, fixing, connecting and commissioning 20 Mtr. High Mast suitable for 180 km/hr wind speed and ~~suitable for mounting~~ with ~~Max~~ 10 nos. of 400W L E D luminaires in Symmetrical Orientation, ~~The mast thickness will be having the Top Thickeness of 4mm and Bottom 4mm Thickeness. Mast Bottom Dia 460mm Top : 150mm consisting~~ of:-Design calculation for mast, foundadtion and foundation bolt shall be submitted for approval.The mast shall Hot Dip Galvanised internally and externally, having uniform powder coating thickness of 85 microns a. Head Frame b. Movable lantern carriage c. Double drum with double Winch d. 6 mm 316 Grade S.S Hoisting Ropes of 7/19 construction. e. Flexible Multicore cable. f. Trailing Cable -5 Core X 2.5Sq. mm 1 per mast g. Foundation Bolts & Nuts h Anchor Plate & Template i. Lightning finial. j. Twin Dome Aviation light (L E D type) k. Power Tool. (Integral)	Nos.	5				
C11		~~Supplying, fixing, connecting and commissioning Feeder pillar with necessary accessories required for the job.~~	Nos.	QRO				
C12		Supply and installation of 76 mm diameter octagonal GI street lighting pole of following height pre-fabricated with a welded MS base plate of 300 x 300 x 6mm size, concealed junction box incorporating 16A 4-way terminal, 6A MCB and other accessories for loop in and loop out of cables, set of suitable length 40 mm dia GI pipes at the bottom for cable entry, 3 core 2.5 sq.mm. PVC flexible cable connection to the lighting fixture at top, 8 SWG copper coil earthing, 450 x 450 x 900 mm deep pedestal in cement concrete 1:2:4, complete including excavation and backfilling, fixing in position with approved hardware, etc., as per as per specifications and / or directed by the Engineer-in-charge.						
	a)	6 meter length single out reach curved bracket	Nos.	QRO				
	b)	6 meter length double out reach curved bracket	Nos.	QRO				
	c)	9 meter length single out reach curved bracket	Nos.	26				
	d)	9 meter length double out reach curved bracket	Nos.	QRO				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
C13		Supply, Installation, testing and commissioning of aviation obstruction light of 2 Nos. fitted in single arm with Neon bulb and mounted on to the lift machine room /above water tank in the terrace (which ever is higher point) with necessary photo electric sensors for automatic switching "ON & OFF" of the light depending on the outdoor light indensity. The scope includes providing necessary mounting arrangement its supports to withstand the wind pressure of 70 KMPh, wiring from the nearest tapping point, earthing including providing necessary battery back-up for 10 hours all complete as required as per IS 2039 and also as perother statutory authorities and as directed by Architect.	Set.	1				
		TOTAL CARRIED OVER TO SUMMARY (Part - C)						
PART - D		LT PANELS						
D1		Supply, installation, testing and commissioning of 415V cubical type, fully compartmenalised, floor mounted type main switch board fabricated with 14G CRCA sheet, powder coated with Siemens grey (RAL 7032) after seven tank process and complete with welded & bolted design and all incoming & outgoing switch gears as per the following.						
		Suitable aluminuim busbars, bus couplers, control wiring, control fuses, seperate metering compartment with multi function meter and phase indications.						
		Safety features and items including necessary earthing throughout the bottom length, 6 sq.mm FRLS copper wire interconnections for compartment earthing, complete copper control wiring with crimping type ferrules, copper lugs, proper engravation on each compartment etc.						
		The switch boards shall be CPRI approved of factory assembled and tested.						
		All the ACB's with microprocessor type over load, S-C, earth fault relay, over voltage and single phase preventor protections etc.						
		All the MCCB's with micro processor/thermal magnetic releases and have rotary handle mechanism & spreader						
		Current density not more than 0.7A/sq.mm for Aluminium bus bar. Neutral current rating is half the phase current						
		All busbars shall be fixed with standard space clearance and with colour coated heat shrinkable PVC sleeves with DMC/SMC bus bar supports and suitable earth bus ~~(25 x 6mm Cu)~~.						
		The cable entry shall be from the bottom/top as per site requirement.						
		The item including cost of MS base frame of 75mm height, ~~3.15mm~~ sheet steel or 40x40x6mm MS angle for load bearing members, lifting hooks, steel support structure required for erection and its painting, minor civil works, vendor drawings, necessary safety clearance from statutory authorities, panel approval from APDCL till obtaining final power supply, all complete as per specifications, drawings and / or as directed by the Engineer.						
		The contractor shall submit general arrangement ,power & control wiring drawings and get approval from site Engineer/Consultant before commence the fabrication works.						
	a)	**MAIN MV PANEL-1**						
		INCOMERS:						
		EB INCOMER:						
		1 No. - 630A 4P 36KA EDO ACB with Microprocessor- O/L, S/C, EF Releases.						
		Metering Compartment:						
		1 No- Digital Load Manager of approved Make ,Class accuracy of 1						
		3 Nos – 630/5A CT CL 1 15VA for Metering						
		3 Nos. – 630/5A CT CL 1 15VA for APFCP						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		1 Set of EFR Numeric relay with protection CT						
		1 Set- Mode selector & Breaker ON/OFF Push Button Station						
		1 Set - Mechanical interlock						
		1 Set - Electrical interlock						
		Standby earth fault relay and CT shall be considred if not available in HT panel						
		MFM with CTs shall be considered						
		DG INCOMER:						
		1 No. - 250A, 4P, 36KA, Motorized MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader						
		Metering Compartment:						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW) - 1 Set						
		1 Set – 250/5A CT CL 1 15VA for Metering						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		1 Set- Mode selector & Breaker ON/OFF Push Button Station						
		1 Set - Mechanical interlock						
		1 Set - Electrical interlock						
		BUSBAR RATING :-						
		630A, TPN, 36KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 20 x 5mm copper flat						
		OUTGOINGS:						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		400A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 2 Nos.						
		200A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 2 Nos.						
		160A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 2 Nos.						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 3 No.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	HT VCB feeding MV panel -1 to be tripped when MV panel -1 Incomer is off/Trip						
	b)	**MAIN MV PANEL-2**						
		INCOMER:						
		1 No- 2500A 4P 60KA EDO ACB with Microprocessor- O/L, S/C, EF Releases.						
		Metering Compartment:						
		1 No- Digital Load Manager of approved Make ,Class accuracy of 1						
		3 Nos – 2500/5A CT CL 1 15VA for Metering						
		3 Nos. – 2500/5A CT CL 1 15VA for APFCP-2						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		1 Set of EFR Numeric relay with protection CT						
		1 Set- Mode selector & Breaker ON/OFF Push Button Station						
		BUSBAR RATING :-						
		2500A, TPN, 60KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50 x 6mm copper flat						
		OUTGOINGS:						
		2000A TPN 50KA MDO ACB with Microprocessor- O/L, S/C, EF Releases & terminal adaptors - 3 Nos.						
		1600A TPN 50KA MDO ACB with Microprocessor- O/L, S/C, EF Releases & terminal adaptors - 2 Nos.						
		1000A, TPN, 50KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 4 Nos.						
		800A, TPN, 50KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 3 Nos.						
		400A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		315A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		250A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		160A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 No.						
		100A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 1 No.	Set.	1				
		MFM and CTs shall be included						
		Standby earth fault relay shall be considred if not available in HT panel						
		Restricted earth fault relay shall and CTs be considred if not available in HT panel						
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	HT VCB feeding MV panel -2 to be tripped when MV panel -2 Incomer is off/Trip						
	c)	**400V MAIN PANEL (EXPANDABLE IN FUTURE)**						
		Note: All ACB & MCCB shall be rated for 380V & 415V operation.						
		INCOMER:						
		800A 4P 50KA EDO ACB with Microprocessor- O/L, S/C, EF Releases - 1 No.						
		Metering:						
		1 No- Digital Load Manager of approved Make ,Class accuracy of 1						
		3 Nos – 800/5A CT CL 1 15VA for Metering						
		3 Nos. – 800/5A CT CL 1 15VA for APFCP-3						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		1 Set of EFR Numeric relay with protection CT						
		1 Set- Mode selector & Breaker ON/OFF Push Button Station						
		Bus bar:						
		800A, TPN, 50KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		Earth: 25 x 6mm copper flat						
		Outgoing:						
		630A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 4 Nos.	Set.	1				
		Standby earth fault relay shall be provided if it is not available in HT panel						
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	HT VCB feeding 400V Main Panel to be tripped when 400V Main Panel Incomer is off/Trip						
	d)	**400V PSB-1 AT REPAIR BAY-1 (OUTDOOR TYPE)**						
		Note: MCCB shall be rated for or 380V & 415V operation.						
		Incomer:						
		630A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Metering:						
		CT ratio 630/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		630A, TPN, 36KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6mm copper flat						
		Outgoing:						
		400A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 5 Nos.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	Panel to be located on a 300mm height MS channel flatform and bot the panel and the flatform to be secured tightly with screws to withstand wind pressure.						
	e)	**400V PSB-2 AT JETTY (OUTDOOR TYPE)**						
		Note: MCCB shall be rated for or 380V & 415V operation.						
		Incomer:						
		630A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Metering:						
		CT ratio 630/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		630A, TPN, 36KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6mm copper flat						
		Outgoing:						
		400A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 3 Nos.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	Panel to be located on a 300mm height MS channel flatform and bot the panel and the flatform to be secured tightly with screws to withstand wind pressure.						
	f)	**400V PSSB-1,2,3,4 & 5 (OUTDOOR TYPE)**						
		Incomer:						
		400A TPN SDF with DIN Type fuse link -1No.						
		Metering:						
		CT ratio 400/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.	Set.	5				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	Panel to be located on a 300mm height MS channel flatform and bot the panel and the flatform to be secured tightly with screws to withstand wind pressure.						
	g)	**DG PANEL-1 (EXPANDABLE IN FUTURE)**						
		Incomer:						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		800A, TPN, 50KA, ACB with micro processor releases with over current, short circuit,under voltage and earth fault protection spreader - 1 No.						
		Metering:						
		1 No- Digital Maximum demand indicator of approved Make ,Class accuracy of 1						
		3 Nos – 800/5A CT CL 1 15VA for Metering						
		1 Set of ~~EFR~~ Standby Earth Fault Relay ~~Numeric relay~~ with protection CT						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		MFM and CTs-1set						
		Bus bar:						
		800A, TPN, 50KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6 mm copper flat						
		Outgoing:						
		400A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 2 Nos.						
		315A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		250A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		160A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 2 Nos.						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 No.						
		40A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 3 Nos.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	h)	**DG PANEL-2 (OUTDOOR TYPE)**						
		Inconer:						
		250A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Metering:						
		CT ratio 250/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		250A, TPN, 36KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 3 mm copper flat						
		Outgoing:						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 7 Nos.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	Panel to be located on a 300mm height MS channel flatform and bot the panel and the flatform to be secured tightly with screws to withstand wind pressure.						
	i)	**SSB @ ELECTRICAL WORKSHOP**						
		Inconer:						
		800A, TPN, 50KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Metering:						
		CT ratio 800/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		800A, TPN, 50KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50 x 6mm copper flat						
		Outgoing:						
		630A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 2 Nos.						
		200A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 3 Nos.						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		100A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 2 Nos.						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 No.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	j)	**PSSB-1&2 @ ELECTRICAL WORKSHOP**						
		Incomer:						
		200A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Metering:						
		CT ratio 200/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		200A, TPN, 25KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6 mm copper flat						
		Outgoing:						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 7 Nos.	Set.	2				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	k)	**630A RFP-1 @ ELECTRICAL WORKSHOP**						
		Incomer:						
		630A TPN SDF with DIN Type fuse link -1No.						
		1 Set – Indication lamps for R,Y,B, with control MCBs.						
		Metering:						
		CT ratio 630/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		630A, TPN, 36KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6 mm copper flat						
		Outgoing:						
		400A TPN SDF with DIN Type fuse link -1Nos.						
		250A TPN SDF with DIN Type fuse link -1No.						
		200A TPN SDF with DIN Type fuse link -1No.						
		125A TPN SDF with DIN Type fuse link -2Nos.						
		63A TPN SDF with DIN Type fuse link -2Nos.						
		COMBINATION PLUGBOARD						
		80A TPN HRC Fuses - 1No.						
		63A 4P 10KA MCB 'C' curve - 1 No						
		63A 4P 10KA 30mA RCCB 'C' curve - 1 No						
		Bus bar:						
		63A, TPN, 18KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25x3mm copper flat						
		32A TP 10KA MCB 'C' curve with Industrial socket - 3 Nos						
		20A DP 10KA MCB 'C' curve with Industrial socket - 4 Nos	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	l)	**SSB @ PIPE WORKSHOP**						
		Incomer:						
		400A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Metering:						
		CT ratio 400/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		400A, TPN, 36KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50 x 5mm copper flat						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		Outgoing:						
		200A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 3 Nos.						
		125A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 No.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	m)	**PSSB-1&2 @ PIPE WORKSHOP**						
		Incomer:						
		200A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 1 Nos.						
		Metering:						
		CT ratio 200/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		200A, TPN, 25KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6 mm copper flat						
		Outgoing:						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 6 Nos.	Set.	2				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	n)	**SSB @ CARPENTRY WORKSHOP**						
		Incomer:						
		315A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Metering:						
		CT ratio 315/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		315A, TPN, 36KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50x5mm copper flat						
		Outgoing:						
		200A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 2 Nos.						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 6 Nos.						
		40A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader with 40A 4P on-load auto change over switch with each source phase indications etc- 1 No.						
		40A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 No.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	o)	**PSSB-1 @ CARPENTRY SHOP**						
		Incomer:						
		200A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Metering:						
		CT ratio 200/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		200A, TPN, 25KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6 mm copper flat						
		Outgoing:						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 6 Nos.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
	p)	**SSB @ ENGINE WORKSHOP**						
		Incomer:						
		1000A, TPN, 50KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Metering:						
		CT ratio 1000/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		1000A, TPN, 50KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50 x 6mm copper flat						
		Outgoing:						
		630A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 3 Nos.						
		200A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 3 Nos.						
		100A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 No.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	q)	**630A RFP-1&2 @ ENGINE WORKSHOP**						
		Incomer:						
		630A TPN SDF with DIN Type fuse link -1No.						
		1 Set – Indication lamps for R,Y,B, with control MCBs.						
		Metering:						
		CT ratio 630/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		630A, TPN, 36KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6 mm copper flat						
		Outgoing:						
		400A TPN SDF with DIN Type fuse link -1Nos.						
		250A TPN SDF with DIN Type fuse link -1No.						
		200A TPN SDF with DIN Type fuse link -1No.						
		125A TPN SDF with DIN Type fuse link -2Nos.						
		63A TPN SDF with DIN Type fuse link -2Nos.						
		COMBINATION PLUGBOARD						
		80A TPN HRC Fuses - 1No.						
		63A 4P 10KA MCB 'C' curve - 1 No						
		63A 4P 10KA 30mA RCCB 'C' curve - 1 No						
		Bus bar:						
		63A, TPN, 18KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25x3mm copper flat						
		32A TP 10KA MCB 'C' curve with Industrial socket - 3 Nos						
		20A DP 10KA MCB 'C' curve with Industrial socket - 4 Nos	Set.	2				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	r)	**PSSB-1&2 @ ENGINE WORKSHOP**						
		Incomer:						
		200A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Metering:						
		CT ratio 200/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		200A, TPN, 25KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6 mm copper flat						
		Outgoing:						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 7 Nos.	Set.	2				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	s)	**SSB @ FABRICATION WORKSHOP**						
		Incomer:						
		1000A, TPN, 50KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Metering:						
		CT ratio 1000/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		1000A, TPN, 50KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50x6mm copper flat						
		Outgoing:						
		630A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 2 Nos.						
		200A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 5 Nos.						
		40A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader with 40A 4P on-load auto change over switch with each source phase indications etc- 1 No.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	t)	**630A RFP @ FABRICATION WORKSHOP**						
		Incomer:						
		630A TPN SDF with DIN Type fuse link -1No.						
		1 Set – Indication lamps for R,Y,B, with control MCBs.						
		Metering:						
		CT ratio 630/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		630A, TPN, 36KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6 mm copper flat						
		Outgoing:						
		400A TPN SDF with DIN Type fuse link -1Nos.						
		250A TPN SDF with DIN Type fuse link -1No.						
		200A TPN SDF with DIN Type fuse link -1No.						
		125A TPN SDF with DIN Type fuse link -2Nos.						
		63A TPN SDF with DIN Type fuse link -2Nos.						
		COMBINATION PLUGBOARD						
		80A TPN HRC Fuses - 1No.						
		63A 4P 10KA MCB 'C' curve - 1 No						
		63A 4P 10KA 30mA RCCB 'C' curve - 1 No						
		Bus bar:						
		63A, TPN, 18KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25x3mm copper flat						
		32A TP 10KA MCB 'C' curve with Industrial socket - 3 Nos						
		20A DP 10KA MCB 'C' curve with Industrial socket - 4 Nos	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	u)	**PSSB-1,2,3&4 @ FABRICATION WORKSHOP**						
		Incomer:						
		200A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Metering:						
		CT ratio 200/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		200A, TPN, 25KA, for 1 sec Aluminium bus bar						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6 mm copper flat						
		Outgoing:						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 7 Nos.	Set.	4				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	v)	**SSB @ PAINT SHOP**						
		Incomer:						
		160A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 7 Nos.						
		Metering:						
		CT ratio 160/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		160A, TPN, 25KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50x4mm copper flat						
		Outgoing:						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 8 Nos.						
		40A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader with 40A 4P on-load auto change over switch with each source phase indications etc- 1 No.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	w)	**SSB AT ADMIN BLOCK**						
		Incomer:						
		160A, 4P, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 2 Nos.						
		160A 4P on-load auto change over switch with phase indicating lamps for each source - 1 No						
		160A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 No.						
		Metering:						
		CT ratio 160/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		2 Sets – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		160A, TPN, 25KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25x3mm copper flat						
		Outgoing:						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 12 Nos.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	x)	**UTILITY PANEL AT ADMIN BLOCK**						
		Incomer:						
		160A, 4P, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 2 Nos.						
		160A 4P on-load auto change over switch with phase indicating lamps for each source - 1 No						
		160A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 No.						
		Metering:						
		CT ratio 160/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		2 Sets – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		160A, TPN, 25KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25x3mm copper flat						
		100A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 3 Nos.						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 6 Nos.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	y)	**UPS OUTGOING PANEL FOR ADMIN BLOCK**						
		Incomer:						
		63A, TPN 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 2 Nos.						
		Metering:						
		CT ratio 63/5A,CL:1.0 tape insulated type with suitable sorting links -2 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 2 Sets						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs. -2 Set						
		Bus bar:						
		63A, TPN, 25KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25x3mm copper flat						
		Outgoing:						
		40A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 7 Nos.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	z)	**ELSB FOR WORKSHOP (WALL MOUNTED)**						
		Incomer:						
		32A, TPN 25KA, MCCB with Thermal magnetic releases and rotary handle mechanism & spreader- 1 No.						
		Metering:						
		CT ratio 32/5A,CL:1.0 tape insulated type with suitable sorting links.						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 2 Sets						
		1 Set – Indication lamps for R, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		32A, SPN, 25kA for 1 sec Aluminium bus bar						
		Phase & Neutral: current density not more than .7A/sq.mm						
		Earth: 25x3mm copper flat						
		Outgoings:						
		25A DP 10KA MCB - 6 Nos.	Set	1				
		NOTE :-						
	i)	Each outgoing feeder should be provided in separate compartment						
	ii)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	aa)	**SSB @ REPAIR BAY-1 (OUTDOOR TYPE)**						
		EB Incomer:						
		2000A 4P 50KA EDO ACB with Microprocessor- O/L, S/C, EF Releases terminal adaptors - 1 Nos.						
		Metering:						
		CT ratio 2000/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		1 Set - Mechanical interlock						
		1 Set - Electrical interlock						
		1 Set- Mode selector & Breaker ON/OFF Push Button Station						
		DG Incomer:						
		63A,125A 4P, 25KA, Motorized MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 Nos.						
		Metering:						
		CT ratio 63/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		1 Set - Mechanical interlock						
		1 Set - Electrical interlock						
		1 Set- Mode selector & Breaker ON/OFF Push Button Station						
		Bus bar:						
		2000A, TPN, 50KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50x6mm copper flat						
		Outgoing:						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		630A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 3 Nos.						
		400A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 5 Nos.						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 2 Nos.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	Panel to be located on a 300mm. height MS channel flatform and bot the panel and the flatform to be secured tightly with screws to withstand wind pressure.						
	ab	**SSB @ TRANSFER BAY (OUTDOOR TYPE)**						
		EB Incomer:						
		1600A 4P 50KA EDO ACB with Microprocessor- O/L, S/C, EF Releases terminal adaptors - 1 Nos.						
		Metering:						
		CT ratio 1600/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		1 Set - Mechanical interlock						
		1 Set - Electrical interlock						
		1 Set- Mode selector & Breaker ON/OFF Push Button Station						
		DG Incomer:						
		63A, 125A,4P, 25KA, Motorized MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 Nos.						
		Metering:						
		CT ratio 63/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		1 Set - Mechanical interlock						
		1 Set - Electrical interlock						
		1 Set- Mode selector & Breaker ON/OFF Push Button Station						
		Bus bar:						
		1600A, TPN, 50KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50x6mm copper flat						
		Outgoing:						
		630A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 4 Nos.						
		400A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 4 Nos.						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader-1 Nos.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	Panel to be located on a 300mm. height MS channel flatform and bot the panel and the flatform to be secured tightly with screws to withstand wind pressure.						
	ac)	**SSB @ JETTY (OUTDOOR TYPE)**						
		EB Incomer:						
		1000A, 4P, 50KA, Motorized MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Metering:						
		CT ratio 1000/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		1 Set - Mechanical interlock						
		1 Set - Electrical interlock						
		1 Set- Mode selector & Breaker ON/OFF Push Button Station						
		DG Incomer:						
		63A, 125A,4P, 25KA, Motorized MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 Nos.						
		Metering:						
		CT ratio 63/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		1 Set - Mechanical interlock						
		1 Set - Electrical interlock						
		1 Set- Mode selector & Breaker ON/OFF Push Button Station						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		Bus bar:						
		1000A, TPN, 50KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50x6mm copper flat						
		Outgoing:						
		630A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 3 Nos.						
		400A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader -2 Nos.						
		250A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	Panel to be located on a 300mm. height MS channel flatform and bot the panel and the flatform to be secured tightly with screws to withstand wind pressure.						
	ad)	**SSB @ BOAT HOIST JETTY-1 (OUTDOOR TYPE)**						
		EB Incomer:						
		800A, 4P, 50KA, Motorized MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Metering:						
		CT ratio 800/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		1 Set - Mechanical interlock						
		1 Set - Electrical interlock						
		1 Set- Mode selector & Breaker ON/OFF Push Button Station						
		DG Incomer:						
		63A, 4P, 25KA, Motorized MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 Nos.						
		Metering:						
		CT ratio 63/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		1 Set - Mechanical interlock						
		1 Set - Electrical interlock						
		1 Set- Mode selector & Breaker ON/OFF Push Button Station						
		Bus bar:						
		800A, TPN, 50KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50x4mm copper flat						
		Outgoing:						
		630A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 2 Nos.						
		400A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader -2 Nos.						
		250A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 No.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	Panel to be located on a 300mm. height MS channel flatform and bot the panel and the flatform to be secured tightly with screws to withstand wind pressure.						
	ae)	**SSB @ BOAT HOIST JETTY-2 (OUTDOOR TYPE)**						
		EB Incomer:						
		1600A 4P 50KA EDO ACB with Microprocessor- O/L, S/C, EF Releases terminal adaptors - 1 Nos.						
		Metering:						
		CT ratio 1600/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		1 Set - Mechanical interlock						
		1 Set - Electrical interlock						
		1 Set- Mode selector & Breaker ON/OFF Push Button Station						
		DG Incomer:						
		63A, 4P, 25KA, Motorized MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 Nos.						
		Metering:						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		CT ratio 63/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		1 Set - Mechanical interlock						
		1 Set - Electrical interlock						
		1 Set- Mode selector & Breaker ON/OFF Push Button Station						
		Bus bar:						
		1600A ,TPN, 50KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50x6mm copper flat						
		Outgoing:						
		630A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 5 Nos.						
		400A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader -3 Nos.						
		63A, TPN, 25KA, MCCB with Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader- 1 No.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	Panel to be located on a 300mm. height MS channel flatform and bot the panel and the flatform to be secured tightly with screws to withstand wind pressure.						
	af)	**630A RFP 1,2,3&4 @ REPAIR BAY-1 (OUTDOOR TYPE)**						
		Incomer:						
		630A TPN SDF with DIN Type fuse link -1No.						
		1 Set – Indication lamps for R,Y,B, with control MCBs.						
		Metering:						
		CT ratio 630/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		630A, TPN, 36KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6 mm copper flat						
		Outgoing:						
		400A TPN SDF with DIN Type fuse link -1Nos.						
		250A TPN SDF with DIN Type fuse link -1No.						
		200A TPN SDF with DIN Type fuse link -1No.						
		125A TPN SDF with DIN Type fuse link -2Nos.						
		63A TPN SDF with DIN Type fuse link -2Nos.						
		COMBINATION PLUGBOARD						
		80A TPN HRC Fuses - 1No.						
		63A 4P 10KA MCB 'C' curve - 1 No						
		63A 4P 10KA 30mA RCCB 'C' curve - 1 No						
		Bus bar:						
		63A, TPN, 18KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25x3mm copper flat						
		32A TP 10KA MCB 'C' curve with Industrial socket - 3 Nos						
		20A DP 10KA MCB 'C' curve with Industrial socket - 4 Nos	Set.	4				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	Panel to be located on a 300mm. height MS channel flatform and bot the panel and the flatform to be secured tightly with screws to withstand wind pressure.						
	ag)	**630A RFP 1,2&3 @ TRANSFER BAY (OUTDOOR TYPE)**						
		Incomer:						
		630A TPN SDF with DIN Type fuse link -1No.						
		1 Set – Indication lamps for R,Y,B, with control MCBs.						
		Metering:						
		CT ratio 630/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		630A, TPN, 36KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6 mm copper flat						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		Outgoing:						
		400A TPN SDF with DIN Type fuse link -1Nos.						
		250A TPN SDF with DIN Type fuse link -1No.						
		200A TPN SDF with DIN Type fuse link -1No.						
		125A TPN SDF with DIN Type fuse link -2Nos.						
		63A TPN SDF with DIN Type fuse link -2Nos.						
		COMBINATION PLUGBOARD						
		80A TPN HRC Fuses - 1No.						
		63A 4P 10KA MCB 'C' curve - 1 No						
		63A 4P 10KA 30mA RCCB 'C' curve - 1 No						
		Bus bar:						
		63A, TPN, 18KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25x3mm copper flat						
		32A TP 10KA MCB 'C' curve with Industrial socket - 3 Nos						
		20A DP 10KA MCB 'C' curve with Industrial socket - 4 Nos	Set.	3				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	Panel to be located on a 300mm. height MS channel flatform and bot the panel and the flatform to be secured tightly with screws to withstand wind pressure.						
	ah)	**630A RFP 1&2 @ JETTY (OUTDOOR TYPE)**						
		Incomer:						
		630A TPN SDF with DIN Type fuse link -1No.						
		1 Set – Indication lamps for R,Y,B, with control MCBs.						
		Metering:						
		CT ratio 630/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		630A, TPN, 36KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6 mm copper flat						
		Outgoing:						
		400A TPN SDF with DIN Type fuse link -1Nos.						
		250A TPN SDF with DIN Type fuse link -1No.						
		200A TPN SDF with DIN Type fuse link -1No.						
		125A TPN SDF with DIN Type fuse link -2Nos.						
		63A TPN SDF with DIN Type fuse link -2Nos.						
		COMBINATION PLUGBOARD						
		80A TPN HRC Fuses - 1No.						
		63A 4P 10KA MCB 'C' curve - 1 No						
		63A 4P 10KA 30mA RCCB 'C' curve - 1 No						
		Bus bar:						
		63A, TPN, 18KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25x3mm copper flat						
		32A TP 10KA MCB 'C' curve with Industrial socket - 3 Nos						
		20A DP 10KA MCB 'C' curve with Industrial socket - 4 Nos	Set.	2				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	Panel to be located on a 300mm. height MS channel flatform and bot the panel and the flatform to be secured tightly with screws to withstand wind pressure.						
	ai)	**630A RFP 1 @ BOAT HOIST JETTY-1 (OUTDOOR TYPE)**						
		Incomer:						
		630A TPN SDF with DIN Type fuse link -1No.						
		1 Set – Indication lamps for R,Y,B, with control MCBs.						
		Metering:						
		CT ratio 630/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		630A, TPN, 36KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6 mm copper flat						
		Outgoing:						
		400A TPN SDF with DIN Type fuse link -1Nos.						
		250A TPN SDF with DIN Type fuse link -1No.						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		200A TPN SDF with DIN Type fuse link -1No.						
		125A TPN SDF with DIN Type fuse link -2Nos.						
		63A TPN SDF with DIN Type fuse link -2Nos.						
		COMBINATION PLUGBOARD						
		80A TPN HRC Fuses - 1No.						
		63A 4P 10KA MCB 'C' curve - 1 No						
		63A 4P 10KA 30mA RCCB 'C' curve - 1 No						
		Bus bar:						
		63A, TPN, 18KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25x3mm copper flat						
		32A TP 10KA MCB 'C' curve with Industrial socket - 3 Nos						
		20A DP 10KA MCB 'C' curve with Industrial socket - 4 Nos	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	Panel to be located on a 300mm. height MS channel flatform and bot the panel and the flatform to be secured tightly with screws to withstand wind pressure.						
	aj)	**630A RFP 1,2,3&4 @ BOAT HOIST JETTY-2 (OUTDOOR TYPE)**						
		Incomer:						
		630A TPN SDF with DIN Type fuse link -1No.						
		1 Set – Indication lamps for R,Y,B, with control MCBs.						
		Metering:						
		CT ratio 630/5A,CL:1.0 cast resin type with suitable sorting links - 1 Set						
		Multifunction meter of class 1.0 accuracy (V+I+F+PF+KW+KWH+KVAR+KVA) - 1 Set						
		1 Set – Indication lamps for R,Y,B, Breaker ON(Red), Breaker OFF (Green), Breaker Trip (Amber) with control MCBs.						
		Bus bar:						
		630A, TPN, 36KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25 x 6 mm copper flat						
		Outgoing:						
		400A TPN SDF with DIN Type fuse link -1Nos.						
		250A TPN SDF with DIN Type fuse link -1No.						
		200A TPN SDF with DIN Type fuse link -1No.						
		125A TPN SDF with DIN Type fuse link -2Nos.						
		63A TPN SDF with DIN Type fuse link -2Nos.						
		COMBINATION PLUGBOARD						
		80A TPN HRC Fuses - 1No.						
		63A 4P 10KA MCB 'C' curve - 1 No						
		63A 4P 10KA 30mA RCCB 'C' curve - 1 No						
		Bus bar:						
		63A, TPN, 18KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25x3mm copper flat						
		32A TP 10KA MCB 'C' curve with Industrial socket - 3 Nos						
		20A DP 10KA MCB 'C' curve with Industrial socket - 4 Nos	Set.	4				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	ii)	Panel to be located on a 300mm. height MS channel flatform and bot the panel and the flatform to be secured tightly with screws to withstand wind pressure.						
	ak)	**LT ACB (OUTDOOR TYPE)**						
		2500 AMPS TPN ACB (EDO) 60 KA (Ics) withstanding capcity with over Load and Short circuit realy in weather proof enclosure. The breaker to have 6 NO/6 NC spare auxiliary contacts for remote Close/Open/trip indications and remote ON/OFF. The ACB shall have a provision to receive 4000 Amps bus duct in incoming terminal and to terminate 4000 Amps bus duct at the outgoing terminal with necessary accessories.						
		RYB LED Cluster Type Indicating Lamps and Control fuses shall be provided.	Nos.	QRO				
	al)	**DC DISTRIBUTION SYSTEM**						
		Supply, installation, testing and commissioning of 24V DC distribution system with the following specifications						
		Battery						
		100Ah Ni-Cad batteries for 30minutes backup with suitable BCB (battery circuit breaker) and stand						
		Input Voltage: 415V AC + 10%, 50 Hz + 5%,						
		Output Voltage : 24V DC + 1% of set value for + 10% input voltage variations and 0-100% load variation.						
		Load Current : 70A						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		Microprocessor based Float cum boost charger with full-wave, Half-controlled thyristor controlled bridge rectifier circuit LCD graphic board/Communication board and control button interface.						
		DC Distribution Board						
		Supply, installation, testing and commissioning of 24V cubical type, fully compartmenalised, Wall mounted type main switch board fabricated with 14G CRCA sheet, powder coated with Siemens grey (RAL 7032) after seven tank process and complete with welded & bolted design and all incoming & outgoing switch gears as per the following.						
		Incomer:						
		100A DP 10KA MCB "D" Curve - 1 No.						
		Metering:						
		1 Set – Indication lamps for R with control MCBs.						
		Bus bar:						
		70A, DP, for 1 sec Aluminium bus bar						
		Phase & Neutral: current density not more than .7A/sq.mm						
		Earth: 25x3mm copper flat						
		Outgoings:						
		10A DP 10KA MCB "D" Curve - 11 Nos.	Set	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
D2		**APFCP R PANEL**						
	a)	Supply, installation, testing and commissioning of 415V cubical type, ~~fully compartmenalised,~~ floor mounted type automatic power factor correction panel board fabricated with 14G CRCA sheet, powder coated after seven tank process and complete with bolted design and the provisions as follows. Gas filled cylindrical heavy duty capacitors (APP type) of **75KVAR(net)** with 7% detuned harmonic filter (copper wound reactor), push buttons, indications, APFC relay, with auto and manual operation. ~~The switch boards shall be CPRI approved of factory assembled and tested.~~ The cable entry shall be from the bottom/top, suitable aluminuim busbars, control wiring, control fuses, seperate metering compartment, phase indications, safety features and items including necessary earthing throughout the bottom length, 6 sq.mm FRLS copper wire interconnections for compartment earthing, complete copper control wiring with crimping type ferrules, copper lugs, proper engravation on each compartment etc. Also the cost inclusive of MS base frame, steel support structure required for erection and its painting, minor civil works, vendor drawings, necessary safety clearance from statutory authorities, panel approval from APDCL till obtaining final power supply, all complete as per specifications, drawings and / or as directed by the Engineer.						
		All the MCCB's with micro processor / thermal magnetic releases and have rotary handle mechanism.						
		Each compartment/section shall have exhaust fans						
		The incoming shall have metering, Ammeter & Voltmeter with selector switches, RYB indication lamp with control MCBs and 6 stage APFC relay etc.						
		Each outgoings shall have set of **capacitor duty contactors**, set of On/Off indication lamps and set of On/Off push button etc.						
		Incomer:						
		200A, TPN, 25KA, MCCB with Adjustable Thermal magnetic releases with earth fault protection and rotary handle mechanism & spreader - 1 No.						
		Bus bar:						
		200A, TPN, 25KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.8A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth : 25 x 6 mm copper flat						
		Outgoing:						
		25 KVAr feeder fitted with 100A TP 25KA MCCB - 1 nos.						
		15 KVAr feeder fitted with 63A TP 25KA MCCB -1 nos.						
		10 KVAr feeder fitted with 63A TP 25KA MCCB -3 nos.						
		5 KVAr feeder fitted with 32A TP 25KA MCCB -1 no.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	b)	Supply, installation, testing and commissioning of 415V cubical type, fully compartmenalised, floor mounted type automatic power factor correction panel board fabricated with 14G CRCA sheet, powder coated after seven tank process and complete with bolted design and the provisions as follows. Gas filled cylindrical heavy duty capacitors (APP type) of **250KVAR** with 7% detuned harmonic filter (copper wound reactor),push buttons, indications, APFC relay with auto and manual operation. The switch boards shall be CPRI approved of factory assembled and tested. The cable entry shall be from the bottom/top, suitable aluminuim busbars, control wiring, control fuses, seperate metering compartment, phase indications, safety features and items including necessary earthing throughout the bottom length, 6 sq.mm FRLS copper wire interconnections for compartment earthing, complete copper control wiring with crimping type ferrules, copper lugs, proper engravation on each compartment etc. Also the cost inclusive of MS base frame, steel support structure required for erection and its painting, minor civil works, vendor drawings, necessary safety clearance from statutory authorities, panel approval from APDCL till obtaining final power supply, all complete as per specifications, drawings and / or as directed by the Engineer.						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		All the MCCB's with micro processor / thermal magnetic releases and have rotary handle mechanism.						
		Each compartment/section shall have exhaust fans						
		The incoming shall have metering, Ammeter & Voltmeter with selector switches, RYB indication lamp with control MCBs and 8 stage APFC relay etc.						
		Each outgoings shall have set of **capacitor duty contactors**, set of On/Off indication lamps and set of On/Off push button etc.						
		Incomer:						
		630A, TPN, 36KA, MCCB with micro processor releases with earth fault protection and rotary handle mechanism & spreader - 5 Nos.						
		Bus bar:						
		630A, TPN, 25KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.8A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth : 50 x 6 mm copper flat						
		Outgoing:						
		50 KVAr feeder fitted with 160A TP 25KA MCCB - 3 nos.						
		25 KVAr feeder fitted with 100A TP 25KA MCCB - 3 nos.						
		15 KVAr feeder fitted with 63A TP 25KA MCCB -1 no.						
		10 KVAr feeder fitted with 63A TP 25KA MCCB -1 no.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
	c)	Supply, installation, testing and commissioning of 415V cubical type, fully compartmenalised, floor mounted type automatic power factor correction panel board fabricated with 14G CRCA sheet, powder coated after seven tank process and complete with bolted design and the provisions as follows. Gas filled cylindrical heavy duty capacitors (APP type) of **800KVAR(net)** with 7% detuned harmonic filter (copper wound reactor),push buttons, indications, APFC relay with auto and manual operation. The switch boards shall be CPRI approved of factory assembled and tested. The cable entry shall be from the bottom/top, suitable aluminuim busbars, control wiring, control fuses, seperate metering compartment, phase indications, safety features and items including necessary earthing throughout the bottom length, 6 sq.mm FRLS copper wire interconnections for compartment earthing, complete copper control wiring with crimping type ferrules, copper lugs, proper engravation on each compartment etc. Also the cost inclusive of MS base frame, steel support structure required for erection and its painting, minor civil works, vendor drawings, necessary safety clearance from statutory authorities, panel approval from APDCL till obtaining final power supply, all complete as per specifications, drawings and / or as directed by the Engineer.						
		All the MCCB's with micro processor / thermal magnetic releases and have rotary handle mechanism.						
		Each compartment/section shall have exhaust fans						
		The incoming shall have metering, Ammeter & Voltmeter with selector switches, RYB indication lamp with control MCBs and 16 stage APFC relay etc.						
		Each outgoings shall have set of **capacitor duty contactors**, set of On/Off indication lamps and set of On/Off push button etc.						
		Incomer:						
		2000A TPN 50KA EDO ACB with Microprocessor- O/L, S/C, EF Releases, U/V, Releases - 1 No.						
		Bus bar:						
		2000A, TPN, 50KA, for 1 sec Aluminium bus bar						
		Phase: current density not more than 0.8A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth : 50 x 6 mm copper flat						
		Outgoing:						
		100 KVAr feeder fitted with 250A TP 36KA MCCB - 5 nos.						
		50 KVAr feeder fitted with 160A TP 25KA MCCB - 4 nos.						
		25 KVAr feeder fitted with 100A TP 25KA MCCB - 4 nos.	Set.	1				
		Note:						
	i)	Thermostat controlled anticondensation Space Heater to be provided for all compartments						
D3		Supply, installation, testing and commissioning of following ratings of 415V 4P ATS panel with indication lamps, fabricated with 14G CRCA sheet steel and powder coated. The item including cost of supply and erection of control wiring, phase indication and necessary supporting structures (steel frame with painting of required size) & fixing accessories etc.						
	i)	400A, 4P, ATS	Set.	1				
	ii)	63A, 4P, ATS	Set.	1				
D4		**CABLE ADOPTER BOX (OUTDOOR TYPE)**						
	a)	Supply, installation, testing and commissioning of following cable adopter box with busbars fabricated with 14G CRCA sheet steel and powder coated. The item including cost of supply and erection of necessary supporting structures & fixing accessories etc. (The adopter box to be suitable to terminate 13Rx3.5Cx300 Sq.mm XLPE AL.AR.Cable)						
		2000A, TPN, 50KA, for 1 sec Aluminium bus bar	Set.	1				
		Phase: current density not more than .7A/sq.mm						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50x6mm copper flat						
	b)	Supply, installation, testing and commissioning of following cable adopter box with busbars fabricated with 14G CRCA sheet steel and powder coated. The item including cost of supply and erection of necessary supporting structures & fixing accessories etc. (The adopter box to be suitable to terminate 11Rx3.5Cx300 Sq.mm XLPE AL.AR.Cable)						
		1600A, TPN, 50KA, for 1 sec Aluminium bus bar	Set.	1				
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50x6mm copper flat						
	c)	Supply, installation, testing and commissioning of following cable adopter box with busbars fabricated with 14G CRCA sheet steel and powder coated. The item including cost of supply and erection of necessary supporting structures & fixing accessories etc. (The adopter box to be suitable to terminate 8Rx3.5Cx300 Sq.mm XLPE AL.AR.Cable)						
		1000A, TPN, 50KA, for 1 sec Aluminium bus bar	Set.	1				
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50x6mm copper flat						
	d)	Supply, installation, testing and commissioning of following cable adopter box with busbars fabricated with 14G CRCA sheet steel and powder coated. The item including cost of supply and erection of necessary supporting structures & fixing accessories etc. (The adopter box to be suitable to terminate 16Rx3.5Cx300 Sq.mm XLPE AL.AR.Cable)						
		1600A, TPN, 50KA, for 1 sec Aluminium bus bar	Set.	1				
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50x6mm copper flat						
	e)	Supply, installation, testing and commissioning of following cable adopter box with busbars fabricated with 14G CRCA sheet steel and powder coated. The item including cost of supply and erection of necessary supporting structures & fixing accessories etc. (The adopter box to be suitable to terminate 4Rx3.5Cx300 Sq.mm XLPE AL.AR.Cable)						
		800A, TPN, 50KA, for 1 sec Aluminium bus bar	Set.	QRO				
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 50x4mm copper flat						
	f)	Supply, installation, testing and commissioning of following cable adopter box with busbars fabricated with 14G CRCA sheet steel and powder coated. The item including cost of supply and erection of necessary supporting structures & fixing accessories etc. (The adopter box to be suitable to terminate 4Rx3.5Cx300 Sq.mm XLPE AL.AR.Cable)						
		630A, TPN, 36KA, for 1 sec Aluminium bus bar	Set.	QRO				
		Phase: current density not more than .7A/sq.mm						
		Neutral: half of the phase current (0.5 x phase)						
		Earth: 25x6mm copper flat						
		TOTAL CARRIED OVER TO SUMMARY (Part - D)						
PART - E		**BUS DUCT**						
E1		Supply, Erection, Testing & Commissioning of 415V, **2500A**, 3-phase, 4-wire Air insulated busbar trunking system fabricated with 14G CRCA sheet steel powder coated after seven tank process, with aluminium conductors, 25 x 6mm copper earthing on both sides of the Busduct. (Phase: 2Rx150x12mm Al, Netural:1Rx150x12mm Al,). The item including cost of steel support structure/supports required for erection and its painting with anticorrosion paint, necessary fixing accessories, minor civil works and safety features etc., all complete as per specifications, drawings and / or as directed by the Engineer.						
		2500A TPN Aluminium bus duct of straight length **(Outdoor)**	R. mtr.	7				
		2500A TPN Aluminium bus duct of straight length **(Outdoor)**	R. mtr.	15				
		90deg (right angle) bend	Nos.	3				
		TPN flexible joints	Set.	3				
		End chamber (Transformer side)	Nos.	1				
		End chamber (MV panel side)	Nos.	1				
E2		Supply, Erection, Testing & Commissioning of 415V, **2000A**, 3-phase, 4-wire Air insulated busbar trunking system fabricated with 14G CRCA sheet steel powder coated after seven tank process, with aluminium conductors, 25 x 6mm copper earthing on both sides of the Busduct. (Phase: 2Rx150x10mm Al, Netural:1Rx150x10mm Al,). The item including cost of steel support structure/supports required for erection and its painting with anticorrosion paint, necessary fixing accessories, minor civil works and safety features etc., all complete as per specifications, drawings and / or as directed by the Engineer. **(INDOOR TYPE) For APFCP**						
		2000A TPN Aluminium bus duct of straight length	R. mtr.	25				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		90deg (right angle) bend	Nos.	3				
		TPN flexible joints	Set.	3				
		End chamber (MV panel side)	Nos.	1				
		End chamber (800kVAr APFC panel side)	Nos.	1				
		TOTAL CARRIED OVER TO SUMMARY (Part - E)						
PART - F		**HT & LT CABLING**						
F1	a)	Supply along with test certificate, laying, testing and commissioning of following sizes of HT XLPE Aluminium cable, without any cable joint in pre-excavated / pre-formed trenches or drawn through GI pipe sleeves / hume pipes etc. The item including cost of clamping arrangements, fixing accessories, cable route markers, cable ties, identification tags etc. all complete as per specifications, drawings and / or as directed by the Engineer. (All complete as required by APDCL)						
	i)	11KV, 3C x 185 Sq.mm XLPE Al cable	R. mtr.	560				
	b)	Supply, termination, testing and commissioning of following sizes of 11KV outdoor type heat shrinkable trifurcating cable kits with necessary fixing accessories. (All complete as required by APDCL)						
	i)	11KV, 3C x 185 Sq.mm XLPE Al cable	Set.	2				
	c)	Supply, termination, testing and commissioning of following sizes of 11KV indoor type heat shrinkable trifurcating cable kits with necessary fixing accessories. (All complete as required by APDCL)						
	i)	11KV, 3C x 185 Sq.mm XLPE Al cable	Set.	12				
F2		Supply, laying, testing and commissioning of following 1.1KV grade multicore aluminium conductor XLPE/PVC insulated GI round(upto 10sqmm) / flat(16sqmm and above) armoured PVC sheathed cables (without any cable joint) drawn through tray or steel supports or clamping on the ceiling/wall or pre-excavated / pre-formed trenches or GI pipe sleeves / hume pipes with suitable clamping arrangement and fixing accessories, cable route markers, cable ties, identification tags etc. all complete as per specifications, drawings and / or as directed by the Engineer.						
	a)	3.5C x 400 sq.mm Aluminium XLPE cable	R. mtr.	24				
	b)	3.5C x 300 sq.mm Aluminium XLPE cable	R. mtr.	28420				
	c)	3.5C x 240 sq.mm Aluminium XLPE cable	R. mtr.	700				
	d)	3.5C x 185 sq.mm Aluminium XLPE cable	R. mtr.	470				
	e)	3.5C x 150 sq.mm Aluminium XLPE cable	R. mtr.	960				
	f)	3.5C x 120 sq.mm Aluminium XLPE cable	R. mtr.	330				
	g)	3.5C x 95 sq.mm Aluminium XLPE cable	R. mtr.	385				
	h)	3.5C x 70 sq.mm Aluminium XLPE cable	R. mtr.	QRO				
	i)	3.5C x 50 sq.mm Aluminium XLPE cable	R. mtr.	710				
	j)	3.5C x 35 sq.mm Aluminium XLPE cable	R. mtr.	QRO				
	k)	4C x 25 sq.mm Aluminium XLPE cable	R. mtr.	270				
	l)	4C x 16 sq.mm Aluminium XLPE cable	R. mtr.	440				
	m)	4C x 10 sq.mm Aluminium cable	R. mtr.	1135				
	n)	4C x 6 sq.mm Aluminium cable	R. mtr.	425				
	o)	4C x 4 sq.mm Aluminium cable	R. mtr.	QRO				
	p)	4C x 2.5 sq.mm Aluminium cable	R. mtr.	QRO				
	q)	3C x 16 sq.mm Aluminium XLPE cable	R. mtr.	28				
	r)	3C x 10 sq.mm Aluminium XLPE cable	R. mtr.	15				
	s)	3C x 6 sq.mm Aluminium XLPE cable	R. mtr.	465				
	t)	3C x 4 sq.mm Aluminium XLPE cable	R. mtr.	QRO				
F3		Supply, laying, testing and commissioning of following 1.1KV grade multicore copper conductor XLPE/PVC insulated GI round(upto 10sqmm) / flat(16sqmm and above) armoured PVC sheathed cables (without any cable joint) drawn through tray or steel supports or clamping on the ceiling/wall or pre-excavated / pre-formed trenches or GI pipe sleeves / hume pipes with suitable clamping arrangement and fixing accessories, cable route markers, cable ties, identification tags etc. all complete as per specifications, drawings and / or as directed by the Engineer.						
	a)	4C x 6 sq.mm copper XLPE cable	R. mtr.	55				
	b)	4C x 4 sq.mm copper XLPE cable	R. mtr.	1760				
	c)	4C x 2.5 sq.mm copper XLPE cable	R. mtr.	QRO				
	d)	3C x 6 sq.mm copper XLPE cable	R. mtr.	650				
	e)	3C x 4 sq.mm copper XLPE cable	R. mtr.	3700				
	f)	3C x 2.5 sq.mm copper XLPE cable	R. mtr.	1720				
	g)	14C x 2.5 sq.mm copper XLPE cable	R. mtr.	35				
	h)	19C x 2.5 sq.mm copper XLPE cable	R. mtr.	85				
F4		Supply, laying, testing and commissioning of following 1.1KV grade multicore copper control/flexible cables without any cable joint drawn through tray or on steel supports or clamping on the ceiling/wall or pre-excavated / pre-formed trenches or GI pipe sleeves / hume pipes with suitable clamping arrangement and fixing accessories, cable route markers, cable ties, identification tags etc. all complete as per specifications, drawings and / or as directed by the Engineer.						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
	a)	3C x 2.5 Sqmm flexible cable	R. mtr.	QRO				
	b)	3C x4 Sqmm flexible cable	R. mtr.	QRO				
	c)	4C X 4 Sq mm flexible Cable	R. mtr.	QRO				
F5		Supply and termination of the following sizes of 1.1KV XLPE/PVC insulated Al/Cu conductor cables with single compression brass cable glands and tinned copper lugs including gland earth clips, adequate size of bare copper wire connecting to the main bus bars etc. all complete as per specifications, drawings and / or as directed by the Engineer.						
	a)	3.5C x 400 sq.mm Aluminium XLPE cable	Nos.	14				
	b)	3.5C x 300 sq.mm Aluminium XLPE cable	Nos.	248				
	c)	3.5C x 240 sq.mm Aluminium XLPE cable	Nos.	12				
	d)	3.5C x 185 sq.mm Aluminium XLPE cable	Nos.	10				
	e)	3.5C x 150 sq.mm Aluminium XLPE cable	Nos.	16				
	f)	3.5C x 120 sq.mm Aluminium XLPE cable	Nos.	24				
	g)	3.5C x 95 sq.mm Aluminium XLPE cable	Nos.	2				
	h)	3.5C x 70 sq.mm Aluminium XLPE cable	Nos.	QRO				
	i)	3.5C x 50 sq.mm Aluminium XLPE cable	Nos.	12				
	j)	3.5C x 35 sq.mm Aluminium XLPE cable	Nos.	QRO				
	k)	4C x 25 sq.mm Aluminium XLPE cable	Nos.	8				
	l)	4C x 16 sq.mm Aluminium XLPE cable	Nos.	18				
	m)	4C x 10 sq.mm Aluminium cable	Nos.	58				
	n)	4C x 6 sq.mm Aluminium cable	Nos.	30				
	o)	4C x 4 sq.mm Aluminium cable	Nos.	QRO				
	p)	4C x 2.5 sq.mm Aluminium cable	Nos.	QRO				
	q)	3C x 16 sq.mm Aluminium XLPE cable	Nos.	2				
	r)	3C x 10 sq.mm Aluminium XLPE cable	Nos.	2				
	s)	3C x 6 sq.mm Aluminium XLPE cable	Nos.	10				
	t)	3C x 4 sq.mm Aluminium XLPE cable	Nos.	QRO				
	u)	4C x 6 sq.mm copper XLPE cable	Nos.	2				
	v)	4C x 4 sq.mm copper XLPE cable	Nos.	96				
	w)	4C x 2.5 sq.mm copper XLPE cable	Nos.	QRO				
	x)	3C x 6 sq.mm copper XLPE cable	Nos.	8				
	y)	3C x 4 sq.mm copper XLPE cable	Nos.	84				
	z)	3C x 2.5 sq.mm copper XLPE cable	Nos.	90				
	aa)	14C x 2.5 sq.mm copper XLPE cable	Nos.	2				
	ab)	19C x 2.5 sq.mm copper XLPE cable	Nos.	6				
	ac)	3C x 2.5 Sqmm flexible cable	Nos.	QRO				
	ad)	3C x4 Sqmm flexible cable	Nos.	QRO				
	ae)	4C X 4 Sq mm flexible Cable	Nos.	QRO				
		Note:						
		Gland earthing to be provided for all cables						
F6		Supply and erection of following size of hot dip GI ladder type cable trays including horizontal and vertical bends, reducers, tees, right angles, cross members and other accessories etc. The item including cost of steel support structures at every 0.6m/1m intervels as required for suspend from the ceiling or supported from walls with MS suspenders/brackets and all complete with painting/powder coating etc. with all necessary accessories to complete the job as per the specifications / drawings ad or as directed by the Engineer.						
	a)	150 x 50 x 2mm	R. mtr.	110				
	b)	300 x 50 x 2mm	R. mtr.	240				
	c)	450 x 75 x 2mm	R. mtr.	15				
	d)	600 x 75 x 2mm	R. mtr.	30				
	e)	750 x 75 x 2mm	R. mtr.	15				
	f)	1000 x 75 x 2mm	R. mtr.	QRO				
F7		Supply and erection of following size of perforated GI cable trays including horizontal and vertical bends, reducers, tees, right angles, cross members and other accessoriess etc. The item including cost of steel support structures at every 0.6m/1m intervels as required for suspend from the ceiling or supported from walls with MS suspenders/brackets and all complete with painting/powder coating etc. with all necessary accessories to complete the job as per the specifications / drawings ad or as directed by the Engineer.						
	a)	150 x 50 x 2mm with cover	R. mtr.	170				
	b)	300 x 75 x 2mm without cover	R. mtr.	QRO				
F8		Providing earthen cable trenches, including necessary excavation, supply and placing in position of sand, bricks / PCC protective slabs, cable markers and backfilling in compacted layers, with all necessary accessories to complete the job as per specifications, drawings and /or as directed by the Engineer.						
	a)	750 mm wide x 1000 mm deep for HT cables	R. mtr.	175				
	b)	750 mm wide x 750 mm deep for LT cables	R. mtr.	225				
	c)	450 mm wide x 11200 mm deep for LV cables	R. mtr.	50				
F9		Supply, installation of following sizes of PVC Pipe for cable crossing or ble entry & external lights and its includes excavation, back filling for depth 1.2meter, with all necessary accessories to complete the job as per specifications, drawings and / or as directed by the Engineer.						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
	a)	50mm dia	R. mtr.	125				
	b)	75mm dia	R. mtr.	QRO				
	c)	100mm dia	R. mtr.	110				
	d)	200mm dia	R. mtr.	400				
	e)	250mm dia	R. mtr.	QRO				
	f)	400mm dia	R. mtr.	QRO				
F10		Supply, installation of following sizes of hume pipes for cable crossing of drains, roads, sanitary and water supply lines and its includes excavation, back filling for depth 1.2meter, with all necessary accessories to complete the job as per specifications, drawings and / or as directed by the Engineer.						
	a)	150mm dia	R. mtr.	QRO				
	b)	300mm dia	R. mtr.	QRO				
F11		Supply and erection of following size of PVC Trunking channel including horizontal and vertical bends, joints, tees, angles, cross members and other accessoriess etc. The item including cost of support clamping at every 0.6m/1m intervels as required for wall / floor mounting system and all complete etc. with all necessary accessories to complete the job as per specifications, drawings and / or as directed by the Engineer.						
	a)	50 x 80 mm	R. mtr.	5				
	b)	50 x 105 mm	R. mtr.	5				
	c)	50 x 130 mm	R. mtr.	5				
F12		Providing structural steel work riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying anti corrosion paint etc. with all necessary accessories to complete the job as per specifications, drawings and / or as directed by the Engineer.	Kgs	12500				
		NOTE : a) CIVIL WORK FOR CABLE TRENCH CONSTRUCTION WORKS IN THE ELECTRICAL CONTRACTOR SCOPE. *b) LAYOUT DRAWINGS WILL BE PROVIDED BY EMPLOYER AFTER AWARD OF THE CONTRACT AND TO BE INCLUDED IN THE SCOPE*						
		TOTAL CARRIED OVER TO SUMMARY (Part - F)						
PART - G		DIESEL GENERATOR (CPCB IV+ COMPLIANT)						
G1		Supply,Unloading & handling, erection, testing and commissioning of following ratings of DG set **(~~CPCB IV+~~ Latest CPCB Compliant)** with standard accessories coupled to alternator, 3 phase, 4 wire, 0.8 PF (lag), 415 V mounted on a channel iron base frame with foot mounting AVM pads, Fuel tank, Charged battery with leads, hospital type silencer along with exhaust stack (~~appx~~ 15m ht or as per APCB normsor as per CPCB normswhichever is higher, MS supports for stack, thermal insulation for exhaust system, Composite type acoustic enclosure and standard control panel. The governor shall be of electronic ~~& mechanical~~ type with manual ~~auto~~ START/STOP panel , microprocessor type controller and complete with necessary control wiring/cabling, metering, indication lamps and fixing accessories etc.						
	i)	500KVA	Set.	1				
		TOTAL CARRIED OVER TO SUMMARY (Part - G)						
PART - H		TRANSFORMER						
H1		Supply ,Unloading & handling, erection , testing and commissioning of 11KV/433V, **1600KVA** of **outdoor type, oil filled** , copper wound, natural cooled (ONAN) type energy efficient (level 2) transformer with the following specifications etc. The items including necessary fixing accessories, surge arrester, NCT , NCT box and with all complete as required. [IS: 1180 PART-1 (2014)]						
	a)	**Rated Voltage**						
		HV Windings - 11 KV						
		LV Windings - 433 V						
		No load voltage ratio - 11 KV/ 433 V						
		Rated Frequency - 50 Hz						
	b)	**Temperature rise**						
		Oil by thermometer - 50°C (above ambient temperature of 40 Deg C)						
		Winding by resistance - 55 °C (above ambient temperature of 40 Deg C)						
		Number of phases - THREE						
	c)	**Winding Connections**						
		HV Windings - DELTA						
		LV Windings - STAR with Neutral						
		Vector Group - Dyn 11						
	d)	**Terminal arangement**						
		Primary - 11KV Cable box						
		Secondary - 433V,2500A Bus Duct						
		Separate L.V Neutral Bushing for earthing						
		Core lamination material - Cold Rolled Grain Oriented Core						
		Type of winding insulation - DPC of class A insulation						
	e)	**Losses**						
		Losses at No load,50% load & 100% load and efficiency - as per energy efficiency requirements/standards. (Level 2)						
		Tap Changes						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		Type - On-load tap changer through RTCC						
		Range - +5% to -15% in steps of 2.5%						
		STANDARD FITTINGS						
		1) Name - Rating & connection diagram plate.						
		2) Earthing Terminals						
		3) Lifting Lugs.						
		4) Oil level Guage (Plain) with level markings.						
		5) Drain cum bottom filter valve with plug.						
		6) Filter value with plug.						
		7) Pocket for thermometer.						
		8) Oil conservator with drain plug.						
		9) Oil filling point with cap on the conservator.						
		10) Air release plug.						
		11) Skids for pushing the transformer.						
		12) Silicagel Breather.						
		13) Explosion vent with diaphragm.						
		14) Pulling lugs for transformers						
		15) Cover lifting lugs.						
		16) Uni-directional roller.						
		17) Fixed type radiators.						
		18) Buchholz relay						
		19) Busduct flange						
		Note: The handling from the truck and placing on the plinth is included in the scope. The plinth shall be constructed by civil contractor based on the load calculations given by the electrical contractor. Suitable stopper fabricated out of MS angles shall be fixed to arrest the movement of the transformer.	Set.	1				
H2		Supply ,Unloading & handling, erection , testing and commissioning of 11KV/433V, **315KVA** of **outdoor type, oil filled** , copper wound, natural cooled (ONAN) type energy efficient (level 2) transformer with the following specifications etc. The items including necessary fixing accessories, surge arrester, NCT , NCT box and with all complete as required. [IS: 1180 PART-1 (2014)]						
	a)	**Rated Voltage**						
		HV Windings - 11 KV						
		LV Windings - 433 V						
		No load voltage ratio - 11 KV/ 433 V						
		Rated Frequency - 50 Hz						
	b)	**Temperature rise**						
		Oil by thermometer - 50ºC (above ambient temperatureof 40 Deg C)						
		Winding by resistance - 55 ºC (above ambient temperature of 40 Deg C)						
		Number of phases - THREE						
	c)	**Winding Connections**						
		HV Windings - DELTA						
		LV Windings - STAR WITH NEUTRAL						
		Vector Group - Dyn 11						
	d)	**Terminal arangement**						
		Primary - 11KV Cable box						
		Secondary - 433V,LT XLPE Cables						
		Separate L.V Neutral Bushing for earthing						
		Core lamination material - Cold Rolled Grain Oriented Core						
		Type of winding insulation - DPC of class A insulation						
	e)	**Losses**						
		Losses at No load,50% load & 100% load and efficiency - as per energy efficiency requirements/standards. (Level 2)						
		Tap Changes						
		Type - On-load tap changer through RTCC						
		Range - +5% to -15% in steps of 2.5%						
		STANDARD FITTINGS						
		1) Name - Rating & connection diagram plate.						
		2) Earthing Terminals						
		3) Lifting Lugs.						
		4) Oil level Guage (Plain) with level markings.						
		5) Drain cum bottom filter valve with plug.						
		6) Filter value with plug.						
		7) Pocket for thermometer.						
		8) Oil conservator with drain plug.						
		9) Oil filling point with cap on the conservator.						
		10) Air release plug.						
		11) Skids for pushing the transformer.						
		12) Silicagel Breather.						
		13) Explosion vent with diaphragm.						
		14) Pulling lugs for transformers						
		15) Cover lifting lugs.						
		16) Uni-directional roller.						
		17) Fixed type radiators.						
		18) Buchholz relay						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		Note: The handling from the truck and placing on the plinth is included in the scope. The plinth shall be constructed by civil contractor based on the load calculations given by the electrical contractor. Suitable stopper fabricated out of MS angles shall be fixed to arrest the movement of the transformer.	Set.	1				
H3		Supply ,Unloading & handling, erection , testing and commissioning of **11KV/400V, 500 KVA** of **indoor dry type,** cast resin, copper wound, natural cooled (ANAN) type energy efficient (level 2) transformer with the following specifications etc. The items including necessary fixing accessories, surge arrester, NCT , NCT box and with all complete as required. [IS: 11171]						
	a)	**Rated Voltage**						
		HV Windings - 11 KV						
		LV Windings - 400 V						
		No load voltage ratio - 11 KV/ ~~380~~ 400V						
		Rated Frequency - 50 Hz						
	b)	**Temperature rise**						
		Winding by resistance - 90 °C (above ambient temperature 40 Deg C)						
		Number of phases - THREE						
	c)	**Winding Connections**						
		HV Windings - DELTA						
		LV Windings - STAR WITH NEUTRAL						
		Vector Group - Dyn 11						
	d)	**Terminal arangement**						
		Primary - 11KV Cable box						
		Secondary - 400V, LT XLPE Cables						
		Separate L.V Neutral Bushing for earthing						
		Core lamination material - Copper wound with CRGO M4 mitredcore , cast resin HV/LV windings						
		Type of winding insulation - Epoxy resin class 'F' insulation ~~with temperature rise of 90 degree Celsius.~~						
	e)	**Losses**						
		Losses at No load,50% load & 100% load and efficiency - as per energy efficiency requirements/standards. (Level 2)						
		Tap Changes						
		Type - On-load tap changer through RTCC						
		Range - +5% to -15% in steps of 2.5%	Set.	1				
		TOTAL CARRIED OVER TO SUMMARY (Part - H)						
PART - I		**HT PANELS WITH BREAKERS**						
I1		Supply, Unloading, erection, testing, commioning of **Outdoor** (IP 54) Ring Main Gear of 11 KV 3 Panel 630A Ring main gear panel as per technical specification mentioned below this panel also shall cater to the requirement of APDCL Supply Authorities. Rate shall include the approval from authorities.						
	i)	**Panel 1 & 3: 1No LOOP-IN and LOOP-OUT Feeders each fitted with:**						
		1no - 11 kV, 630A, 25KA/1s triple pole, manually operated, quick make, quick break, Air break LOAD BREAK SWITCH fitted with 2NO+2NC auxiliary contacts, mechanical ON/OFF indicator						
		rotary front drive mechanism and an integrally interlocked earth switch.						
		1set - LBS ON/OFF LED type indicating lamps.						
		1set - Thermostat controlled anticondensation Space Heater.						
		1set - Door switch actuated CFL for Panel illumination.						
		1set - LV control fuses/control links.						
		1set - Power/Control terminals as required.						
	ii)	**Panel 2: 1No TEE-OFF OUTGOING FEEDER fitted with:**						
		1 no - 11 kV ,630A , 25KA/3s , Triple Pole, Horizontal Isolation Horizontal draw out type VCB fitted with 230V AC Spring Charge Motor, 110V DC Trip coil/ Closing Coil, Anti Pumping relay, 6NO + 6NC Auxiliary Contacts, Mechanical CLOSE/OPEN Pushbuttons, Mechanical ON/OFF and Service/ Test Position indicators, Automatic safety shutter assembly, Operation counter, Multi pin Secondary disconnecting plug and socket and 3nos. vacuum interrupters ~~of CGL make~~.						
		3 nos - 11KV, **/5-5A, twin core epoxy resin cast Current Transformers having						
		Core -1: class – 0.2S/5VA for Metering						
		Core -2: class – 5P20/15VA for Protection.						
		1 no. - 11KV/RT3/110V/RT3, Class 0.2, 50VA 3 phase epoxy resin cast Potential Transformer with HRC fuses on primary and secondary windings, mounted in a drawout carriage. (Bus connected).						
		1 no. - 0-**A, 96mm sq.dial, class 1.0, dual scale Analog Ammeter with 1no. OFF-R-Y-B 4 position Ammeter selector switch.						
		1 no. - 0-15kV, 96mm sq.dial, class 1.0, Analog Voltmeter with 1 no.OFF-RY-YB-BR 4 position Voltmeter selector switch.						
		1 no. - Numerical combined overcurrent and earth fault relay with IDMT and instantaneous elements.						
		1 no.- High speed master trip relay with hand reset.						
		1 no. - 3 phase, 4 wire, 3 element front connection type Test Terminal Block.						
		1 no. - TRIP-NEUTRAL-CLOSE Spring return to neutral Breaker Control Switch.						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		5 nos - LED type indicating lamp for BR ON/OFF/TRIP/SPR CHARGED/TRIP CKT.						
		1 no. - 230V AC - 110V DC, Battery storage type Power pack.						
		1 no. - 'TRIP CIRCUIT HEALTHY CHECK' Pushbutton with series resistor.						
		1 set. - Thermostat controlled anticondensation Space Heater.						
		1 set - Door switch actuated CFL for Panel illumination.						
		1 set - LV control fuses/Power & Control terminals as required.						
		1 - Cable box for outgoing 11 KV 3C 150 Sqmm XLPE earthed cable.						
		Busbar:						
		The RMG will be provided with heat shrinkable PVC colour sleeved, electrolytic grade copper busbars of size 50X10mm mounted on nonhygroscopic epoxy resin cast insulators.	No.	1				
		Note:						
		1no. - Capacitor trip device to trip the breaker in the absence of DC supply. Provision for fixing Tri Vector Meter in the VCB panel shall be available.All CT/PT wiring will be carried out with 4.0 sq.mm cable. All Panel doors shall have provision for APDCL sealing.						
		The above specification are only a guideline and this ring main gear should be as per the specificational requirement of local supply authorities (APDCL)						
I2		Supply, erection, testing, commioning, loading of **outdoor** (IP 54) consumer **Three** panel 11 KV floor mounted HT isolation panel at the entrance as per technical specification mentioned below						
		3 Nos. - 11 KV 630A TP 500 MVA VCB of drawout VCB having horizontal drawout and vertical isolation suitable for effectively earthed system with manual &motor wound spring charge mechanism for closing, mechanical ON - OFFindicator,emergency trip, shunt trip, safety shutter, breaker position indicator such as service/test/isolation etc. The shall be with closing coil suitable for 110V and a shunt tripsuitable for operation on 110V DC. Providing necessary power also forms part of the scope. The panel shall also be provided with the required.Auxiliary contact for internal self use and along with spare 4 NO + 4 NC spare contact for external linkings,alsopackbreaker						
		3 nos. - Trip neutral close switch.						
		3 nos.- Master trip relay.						
		3 nos. - MISC 144 Sqmm volt meter scaled 0-15KV suitable for operation with 110V secondary.						
		3 Nos. - Ammeter with selector switch.						
		3 nos. - Voltmeter selector switch.						
		3 no. - Tripole non-directional IDMT combined over current & earth fault (Numerical) relay having 2 O/C Elements with setting from 50 -200% of 5A CT secondary and earth fault element 10-40% of 5A CT secondary and with provision for sensor in BMS.						
		3 no. - Epoxy cast resin current transformer of ratio 120-150/5-5 dual core, core 1 15VA 5 P10 for protection and core 2 15VA class 1 for metering.						
		3 no. - Epoxy cast resin current transformer of ratio 10-20/5-5 dual core, core 1 15VA 5 P10 for protection and core 2 15VA class 1 for metering.						
		3 no. - Epoxy cast resin current transformer of ratio 80-100/5-5 dual core, core 1 15VA 5 P10 for protection and core 2 15VA class 1 for metering.						
		1 No. Ammeter (0 - 200A) with 1No. ON-R-Y-B 4 position selector switch						
		1 No. Ammeter (0 - 100A) with 1No. ON-R-Y-B 4 position selector switch						
		1 No. Ammeter (0 - 30A) with 1No. ON-R-Y-B 4 position selector switch						
		1 Set- Surge protection device 9kV,10kA						
		3 Set. - Panel illumination lamp operated by door switch.						
		3 Set - Control fuse for both HT / LT.						
		3 Set.- Panel earth bus.						
		3 no.- Power pack suitable of 230V A/C input & 110V DC output /indication circuit and tripping circuit.						
		3 Set - Spare axilary contact with minimum 4 NO & 4 NC contacts.						
		3 no. - Operation counter.						
		3 no.- Draw out type 3 limb 11 KV /110V, 100VA, class 0.5, epoxy cast resin potential transformer with necessary H.T. & LT fuses.						
		3 no. - Thermostat controlled anticondensation Space Heater.						
		3 Sets of ON/OFF/Trip indication lamps with 2 Amps SP MCB for protection (Red, Green, Amber White).						
		3 no. - White lamp for trip circuit health with push button for testing.						
		3 no.- Blue lamp for spring charged indication.						
		3 no.- Test terminal block.						
		3 Set - Under voltage protection.						
		3 No - 110V DC Hooter.						
		3 No- 110V DC Alarm Bell (4" / 6" gong)						
		3 no. - 230V AC - 110V DC, Battery storage type Power pack.						
		3 no.- Cable box for incoming/outgoing 11 KV 3C 185 Sqmm XLPE earthed cable.						
		1 - 630A TP Alu. bus having a current density of 0.7A per Sqmm duly sleeved with the exception joint.						
		The Vacuum Circuit Breaker shall be of IS 13118 / IEC -56, rated for 11 KV and the interruption						
		shall be confirms to the following :-						
		Continuous rated current - 630A						
		Rated Frequency - 50 HZ						
		Impulse withstand voltage - 75 KV						
		One Min. Power frequency withstand voltge - 28 KV						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		Min clearance between phases. - as per standard						
		Clearance between live parts to ground - as per standard						
		Bus support insulator - Epoxy resin cast 11 KV grade.						
		Type of main contact. - Butt contact						
		Type of Aux. Contacts - Rotary type (copper)						
		Auxiliary switch. - 4 NO + 4 N/C spare in addition to the panel inherant requirement.						
		Operating mechanism - Motor operated spring charged (stored energy)	No.	1				
		1no Temperature trip Aux relay for 315KVA transformer and relay for Bucholz trip						
		3nos individual MFMs with metering CTs						
		Standby Earth fault relay and protection Class CT for 315KVA transformer(if not provided in the Main secondary panel of transformer)						
I3		Supply, erection, testing, commioning, loading of **outdoor** (IP 54) consumer **Three** panel **(Expandable upto 4panel in future)** 11 KV floor mounted HT isolation panel at the entrance as per technical specification mentioned below						
		3 Nos. - 11 KV 630A TP 500 MVA VCB of drawout VCB having horizontal drawout and vertical isolation suitable for effectively earthed system with manual &motor wound spring charge mechanism for closing, mechanical ON - OFFindicator,emergency trip, shunt trip, safety shutter, breaker position indicator such as service/test/isolation etc. The shall be with closing coil suitable for 110V and a shunt tripsuitable for operation on 110V DC. Providing necessary power also forms part of the scope. The panel shall also be provided with the required Auxiliary contact for internal self use and along with spare 4 NO + 4 NC spare contact for external linkings,alsopackbreaker						
		3 nos. - Trip neutral close switch.						
		3 nos.- Master trip relay.						
		3 nos. - MISC 144 Sqmm volt meter scaled 0-15KV suitable for operation with 110V						
		3 Nos. - Ammeter with selector switch.						
		3 nos. - Voltmeter selector switch.						
		3 no. - Tripole non-directional IDMT combined over current & earth fault (Numerical) relay having 2 O/C Elements with setting from 50 -200% of 5A CT secondary and earth fault element 10-40% of 5A CT secondary and with provision for sensor in BMS.						
		3 no. - Epoxy cast resin current transformer of ratio 80-100/5-5 dual core, core 1 15VA 5 P10 for protection and core 2 15VA class 1 for metering.						
		3 no. - Epoxy cast resin current transformer of ratio 80-100/5-5 dual core, core 1 15VA 5 P10 for protection and core 2 15VA class 1 for metering.						
		3 no. - Epoxy cast resin current transformer of ratio 25-30/5-5 dual core, core 1 15VA 5 P10 for protection and core 2 15VA class 1 for metering.						
		2 No. Ammeter (0 - 100A) with 1No. ON-R-Y-B 4 position selector switch						
		1 No. Ammeter (0 - 30A) with 1No. ON-R-Y-B 4 position selector switch						
		1 Set- Surge protection device 9kV,10kA						
		1 Set- Surge protection device 9kV,10kA						
		3 Set. - Panel illumination lamp operated by door switch.						
		3 Set - Control fuse for both HT / LT.						
		3 Set.- Panel earth bus.						
		3 no.- Power pack suitable of 230V A/C input & 110V DC output /indication circuit and tripping circuit.						
		3 Set - Spare axilary contact with minimum 4 NO & 4 NC contacts.						
		3 no. - Operation counter.						
		3 no.- Draw out type 3 limb 11 KV /110V, 100VA, class 0.5, epoxy cast resin potential transformer with necessary H.T. & LT fuses.						
		3 no. - Thermostat controlled anticondensation Space Heater.						
		3 Sets of ON/OFF/Trip indication lamps with 2 Amps SP MCB for protection (Red, Green, Amber White).						
		3 no. - White lamp for trip circuit health with push button for testing.						
		3 no.- Blue lamp for spring charged indication.						
		3 no.- Test terminal block.						
		3 Set - Under voltage protection.						
		3 No - 110V DC Hooter.						
		3 No- 110V DC Alarm Bell (4" / 6" gong)						
		3 no. - 230V AC - 110V DC, Battery storage type Power pack.						
		3 no.- Cable box for incoming/outgoing 11 KV 3C 185 Sqmm XLPE earthed cable.						
		1 - 630A TP Alu. bus having a current density of 0.7A per Sqmm duly sleeved with the exception joint.						
		The Vacuum Circuit Breaker shall be of IS 13118 / IEC -56, rated for 11 KV and the interruption shall be confirms to the following :-						
		Continuous rated current - 630A						
		Rated Frequency - 50 HZ						
		Impulse withstand voltage. - 75 KV						
		One Min. Power frequency withstand voltge - 28 KV						
		Min clearance between phases. - as per standard						
		Clearance between live parts to ground - as per standard						
		Bus support insulator - Epoxy resin cast 11 KV grade.						
		Type of main contact. - Butt contact						
		Type of Aux. Contacts - Rotary type (copper)						
		Auxiliary switch. - 4 NO + 4 N/C spare in addition to the panel inherant requirement.						
		Operating mechanism - Motor operated spring charged (stored energy)	No.	1				
		1no Temperature trip Aux relay for 1600KVA transformer and relay for Bucholz trip						
		3nos individual MFMs with metering CTs						

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		Standby Earth fault relay and protection Class CT for 1600KVA transformer(if not provided in the Main secondary panel of transformer)						
		Restricted Earth fault relay and protection Class CTs for 1600KVA transformer						
I4		Supply, erection, testing, commioning, loading of **indoor** consumer **single** panel 11 KV floor mounted HT isolation panel next to 11kV,400V Transformer as per technical specification mentioned below						
		1 - 11 KV 630A TP 500 MVA VCB of drawout VCB having horizontal drawout and vertical isolation suitable for effectively earthed system with manual &motor wound spring charge mechanism for closing, mechanical ON - OFFindicator,emergency trip, shunt trip, safety shutter, breaker position indicator such as service/test/isolation etc. The shall be with closing coil suitable for 110V and a shunt tripsuitable for operation on 110V DC. Providing necessary power also forms part of the scope. The panel shall also be provided with the required Auxiliary contact for internal self use and along with spare 4 NO + 4 NC spare contact for external linkings.alsopackbreaker						
		1 no. - Trip neutral close switch.						
		1 no.- Master trip relay.						
		1 no. - MISC 144 Sqmm volt meter scaled 0-15KV suitable for operation with 110V secondary.						
		1 No. - Ammeter with selector switch.						
		1 no. - Voltmeter selector switch.						
		1 no. - Tripole non-directional IDMT combined over current & earth fault (Numerical) relay having 2 O/C Elements with setting from 50 -200% of 5A CT secondary and earth fault element 10-40% of 5A CT secondary and with provision for sensor in BMS.						
		3 no. - Epoxy cast resin current transformer of ratio 25-30/5-5 dual core, core 1 15VA 5 P10 for protection and core 2 15VA class 1 for metering.						
		1 No. Ammeter (0 - 30A) with 1No. ON-R-Y-B 4 position selector switch						
		1 Set- Surge protection device 9kV,10kA						
		1 Set. - Panel illumination lamp operated by door switch.						
		1 Set - Control fuse for both HT / LT.						
		1 Set.- Panel earth bus.						
		1 no.- Power pack suitable of 230V A/C input & 110V DC output /indication circuit and tripping circuit.						
		1 Set - Spare axilary contact with minimum 4 NO & 4 NC contacts.						
		1 no. - Operation counter.						
		1 no.- Draw out type 3 limb 11 KV /110V, 100VA, class 0.5, epoxy cast resin potential transformer with necessary H.T. & LT fuses.						
		1 no.- Panel heater with a control switch.						
		1 Set of ON/OFF/Trip indication lamps with 2 Amps SP MCB for protection (Red, Green, Amber White).						
		1 no. - White lamp for trip circuit health with push button for testing.						
		1 no.- Blue lamp for spring charged indication.						
		1 no.- Test terminal block.						
		1 Set - Under voltage protection.						
		1 No - 110V DC Hooter.						
		1 No- 110V DC Alarm Bell (4" / 6" gong)						
		1 no. - 230V AC - 110V DC, Battery storage type Power pack.						
		1 no.- Cable box for incoming/outgoing 11 KV 3C 185 Sqmm XLPE earthed cable.						
		1 - 630A TP Alu. bus having a current density of 0.7A per Sqmm duly sleeved with the exception joint.						
		The Vacuum Circuit Breaker shall be of IS 13118 / IEC -56, rated for 11 KV and the interruption						
		shall be confirms to the following :-						
		Continuous rated current - 630A						
		Rated Frequency - 50 HZ						
		Impulse withstand voltage. - 75 KV						
		One Min. Power frequency withstand voltge - 28 KV						
		Min clearance between phases - as per standard						
		Clearance between live parts to ground - as per standard						
		Bus support insulator - Epoxy resin cast 11 KV grade.						
		Type of main contact - Butt contact						
		Type of Aux. Contacts - Rotary type (copper)						
		Auxiliary switch. - 4 NO + 4 N/C spare in addition to the panel inherant requirement.						
		Operating mechanism - Motor operated spring charged (stored energy)	No.	1				
		1no Temperature trip Aux relay for 1600KVA transformer						
		1no individual MFMs with metering CTs						
		Standby Earth fault relay and protection Class CT for 500KVA transformer(if not provided in the Main secondary panel of transformer)						
I5		Supply and erection of gate for RMG/HT switchgear & Transformer yard made out of 32mm dia GI tubular frame with 25 x 25mm diamond mesh. The Gate will be of size 2400(W) x 1800(H). Proper supports will be provided with MS flats wherever necessary to prevent the mesh from warpping. The 50x 40 mm channel vertical support for the gate shall be fixed into the ground with PCC. The item including required civil works etc.	Set.	3				
I6		Supply and erection of 2.1 Mtr. height 50mm diameter GI Poles around the RMU / HT switchgear /Transformer yard and laid with 25x25mm welded mesh with 2 coats of Alminum paint on it. The pole to pole gap will be maintained as 2.25Mts max. (1/5th of the Pole will be embedded in the ground). The item including required civil works and kerb wall etc.	Sq.mtr	150				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
		TOTAL CARRIED OVER TO SUMMARY - (PART-I)						
PART - J		UPS/INVERTER						
J1		Supplying,Erection, testing and commissioning of 1 Phase, 230 V, **6kVA** 1P -in 1P out **INVERTER** with suitable BCB (battery circuit breaker), filters, suitable VRLA batteries with 30Minutes backup with necessary fixing accessories etc. For Workshop Emergency Lighting	Sets.	1				
J2		Supplying,Erection, testing and commissioning of 3 Phase, 415 V, **15kVA** 3P -in 3P out UPS with suitable BCB (battery circuit breaker), filters, suitable VRLA batteries with 30Minutes backup with necessary fixing accessories etc. In **Parallel configuration mode**. For Admin Block	Set.	2				
		TOTAL CARRIED OVER TO SUMMARY (Part - J)						
PART - K		EARTHING						
K1		Supply, installation, testing and commissioning of Copper plate of size 600mm x 600 mm x 6 mm at a depth of 3000mm in an earth pit of 700x700x3500mm, filled with salt and charcoal mixed with sand in alternate layers 150mm each upto a height of 3000mm from bottom. Two copper flats of 25 x 6mm shall be braced to this copper plate throughout the overlaping length with the copper plate and brought to the surface of the earthpit. This copper flat shall have provision for connecting wires of flats as the case may be. A suitable size of 40mm dia. GI Pipe shall be provided uptil the bottom of the earth pit. This GI Pipe shall have provision for watering through a a depth of 450mm and a heavy duty CI Cover shall be used to cover the pit. The cost of digging and back filling shall also be included.Sand,salt and charcoal are in the Contractor's scope.	Nos.	33				
K2		Supply, installation, testing and commissioning of maintenance free-earth station comprising approved make pointed-end copper-bonded steel-core earthing rods with at least 0.25mm copper thickness, 23mm diameter and 5 meter length from ground surface, using threaded couplers for rod lengths, including approved clamps, bolts, nuts, 150mm dia tube well screen pipe for total depth, special backfill compound (bentonite/fly ash) within pipe, 450mm x 450mm brick masonary chamber, heavy duty RCC / CI cover, drilling into all types of earth and rock, any excavation and backfilling, all complete as per specifications, drawings and / or as directed by the Engineer.	Nos.	30				
K3		Supply, installation, testing and commissioning of maintenance free-earth station comprising approved make pointed-end copper-bonded steel-core earthing rods with at least 0.25mm copper thickness, 23mm diameter and 5 meter length from ground surface, using threaded couplers for rod lengths, including approved clamps, bolts, nuts, 150mm dia tube well screen pipe for total depth, special backfill compound (bentonite/fly ash) within pipe, heavy duty RCC / CI cover, drilling into all types of earth and rock, any excavation and backfilling, all complete as per specifications, drawings and / or as directed by the Engineer. (Without masonary chamber)	Nos.	4				
K4		Supply, laying, testing and commissioning of following sizes of the earth conductors for the electrical system which including cost of supply and fixing of saddles, insulators, clamps, screws, bolt & nuts,bituminious tape and providing earth work of 2' depth, sleeves wherever required etc., all complete as per specifications, drawings and/or as directed by the Engineer.						
	i)	100x6mm hot dip GI flat,insulated	R. mtr.	740				
	ii)	50x6mm hot dip GI flat,insulated	R. mtr.	1730				
	iii)	25x6mm hot dip GI flat,insulated	R. mtr.	770				
	iv)	25x3mm hot dip GI flat,insulated	R. mtr.	375				
	v)	80x6mm copper flat,insulated	R. mtr.	25				
	vi)	50x6mm copper flat,insulated	R. mtr.	210				
	vii)	50x4mm copper flat,insulated	R. mtr.	165				
	viii)	50x3mm copper flat,insulated	R. mtr.	100				
	ix)	25x6mm copper flat,insulated	R. mtr.	40				
	x)	25x3mm copper flat,insulated	R. mtr.	220				
	xi)	20x5mm copper flat,insulated	R. mtr.	55				
	xii)	8 SWG copper wire.	R. mtr.	220				
	xiii)	10 SWG copper wire.	R. mtr.	25				
	xiv)	300mm long 50x6mm copper flat as earth link	R. mtr.	3				
	xv)	300mm long 50x6mm hot dipped GI flat as earth link	R. mtr.	2				
	xvi)	150mm long 25x6mm hot dipped GI flat as earth link	R. mtr.	2				
		TOTAL CARRIED OVER TO SUMMARY (Part - K)						
PART - L		SAFETY ACCESSORIES						
L1		Supply and installation of the following safety accessories to be installed in the Electrical Panel Room.						
	i)	First aid box. (IS marked - as per standard requirement)	Nos.	5				
	ii)	Supply and fixing of 6 Kgs CO2 type (ISI marked) Fire extinguisher complete with all clamps and hardwares etc.	Nos.	14				
	iii)	Supply and fixing of 11KV danger board as per standard with all fixing accessories etc.	Nos.	3				
	iv)	Supply and fixing of 440V danger board as per standard with all fixing accessories etc.	Nos.	10				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
	v)	Supply and position of 1.1 KV grade 2Mtr x 1Mtr rubber mat for LT switch boards to suit the switch board. (as per standard & ISI marked)	Nos.	60				
	vi)	Supply and position of 1.1 KV grade 2Mtr x 1Mtr rubber mat for HT switch boards to suit the switch board. (as per standard & ISI marked)	Nos.	2				
	vii)	Supply and fixing of shock treatment/First Aid treatment chart in Tamil, Hindi and English, complete with necessary fixing accessories etc.	Nos.	10				
	viii)	Supply of 11KV Rubber gloves.	Pair	2				
	ix)	Supply of 1.1KV Rubber gloves.	Pair	10				
	x)	Supply and fixing of 10Ltr capacity of 4 Nos. Fire Bucket painted as per relevant standard, complete with necessary clamps, screws etc.	Nos.	3				
	xi)	Supply and fixing of 6mm thick MS Chequered Plates as floor separators for covering the trench with angle iron supports.	Kg	150				
	xii)	Supply and fixing of fire barrier (fire barrier protection) with atleast two hour fire rated by sealing all gaps around the cable/rising mains, between floors and cutout/shaft etc.	Sq. mtr.	10				
		TOTAL CARRIED OVER TO SUMMARY (Part - L)						
PART - M		TELEPHONE SYSTEM						
M1	a)	Supply and fixing of RJ-11 modular type outlet mounted on suitable zinc-passivated metal box for telephone complete with metal box, front plate, screws and fixing accessories etc., The item including necessary chipping/cutting the wall and making good the same incase of recessed mounting and all complete as per specifications, drawings and / or as directed by the Engineer.	Nos.	25				
	b)	Supply, laying and termination of high quality CAT-5E Ethernet LAN cable preferably with FR PVC insulation to be laid in existing tray/raceways/ conduit from individual telephone to network jack/switch/patch panel/hub located in the communication room. All complete as per specifications, drawings and / or as directed by the Engineer.	R. mtr.	QRO				
	c)	Supply, laying and termination of following sizes of telephone cable laid in exiting conduit/tray/raceways from Krone junction box to other Krone junction box/EPABX etc. and all complete as per specifications, drawings and / or as directed by the Engineer.						
	i)	2-Pair telephone cable	R. mtr.	990				
	ii)	10-Pair telephone cable	R. mtr.	120				
	iii)	20-Pair telephone cable (Armoured)	R. mtr.	370				
	iv)	50-Pair telephone cable (Armoured)	R. mtr.	420				
	d)	Supply and fixing of the following telephone Krone type junction boxes enclosed in MS box with hinged cover with lock & key arrangements etc. The item including necessary clamping and making good the same in case of recessed mounting as required. All complete as per specifications, drawings and / or as directed by the Engineer.						
	i)	10 - pair KJB	Nos	2				
	ii)	20 - pair KJB	Nos	1				
	iii)	50 - pair KJB	Nos	2				
	e)	Supply , installation , testing and commissioning of Supply of 50 pair MDF loaded with 2/10 Modular with all necessary accessories to complete the job as per specifications, drawings and / or as directed by the Engineer.	Nos	1				
	f)	Supply , installation , testing and commissioning of the TEC approved ISDN EPABX system upto 2 Line in : Extendable to 64 intercom connection Intel Microprocessor type of advanced system or equivalen type as acceptable to the client with suitable battery charger, all complete as per specifications and / or as direcyted by the Engineer. with following specifications.	Set	1				
	g)	Supply , installation , testing and commissioning of electronic push button telephone instrument	Nos	25				
		TOTAL CARRIED OVER TO SUMMARY (Part - M)						
PART - N		DATA NETWORKING SYSTEM						
N1	a)	Supply and fixing of RJ-45 modular type data outlet (CAT-6A) mounted on suitable zinc-passivated box complete with metal box, front plate, screws and fixing accessories etc. The item including necessary chipping/cutting the wall and making good the same in case of flush mounting as required. All complete as per specifications, drawings and / or as directed by the Engineer.	Nos.	50				
	b)	Supply, laying and termination of high quality CAT-6A Ethernet LAN cable preferably with FR PVC insulation to be laid in exisitng tray/conduit/raceways from individual data to network jack/switch/patch panel/hub located in the communication room. All complete as per specifications, drawings and / or as directed by the Engineer.	R. mtr.	1425				
	c)	Supply, laying and termination of high quality CAT-6 Ethernet LAN cable preferably with FR PVC insulation to be laid in exisitng tray/conduit/raceways from individual data to network jack/switch/patch panel/hub located in the communication room. All complete as per specifications, drawings and / or as directed by the Engineer.	R. mtr.	QRO				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
	d)	Supply and Fixing of modular type information outlet (for Wi-Fi) with necessary fixing accessories. The item including necessary chipping/cutting the wall and making good the same in case of flush mounting as required. All complete as per specifications, drawings and / or as directed by the Engineer.	Nos.	QRO				
	e)	Supply, laying and termination of 6 pair fibre optic outdoor cable laid in existing conduit/trav/hume pipe with the all necessory accessories as required.	R. mtr.	650				
	f)	Supply, laying and termination of HDMI cable of 15 meters in length laid in 40mm pvc pipe with the all necessory accessories as required.	R. mtr.	1				
	g)	Supply, fixing and termination of high quality rack mounted type patch panel with one number of 24 port POE network switch, fixing frames, links and interconnections, necessary accessories etc., all complete as per specifications, drawings and / or as directed by the Engineer.	Nos	2				
	h)	Supply and fixing of CAT-6 patch card 1mtr length with necessary tags as required.	Nos	60				
	i)	Checking of Communication cable measurement using Fluke meter including labour charge, device rent, person transpotation & accomudation	Lot	1				
		TOTAL CARRIED OVER TO SUMMARY (Part - N)						
PART - O		COMPUTERS/PRINTERS & SCANNERS						
O1	a)	Supply , installation , testing and commissioning of Desktop with monitor with fully loaded software as desired, with the following configuration. 1. Processor: Intel® Core™ i5-12th Generation or Higher version processor with Intel® HD Graphics 770 (2.9 GHz base frequency with Intel® Turbo Boost Technology, 18 MB cache 6 core 12 threads) Intel Chipset 2. Memory: 8 GB DDR4-3200 MHz SDRAM (1 x 8 GB) 3. Hard drive 512GB SSD (Hard Drive 2 nd 1 TB 7200 SATA HDD) 4. 1 audio line in; 1 audio line out; 1 HDMI; 1 RJ-45; 1 VGA; 4 USB 3.0; 4 USB 2.0 5. Operating Systems: Windows 11 Pro professional 64 bit with product key License. However, the product key should be mentioned in the installation report at the time of installation. 6. communications (intel Wi-Fi & Blue tooth) 7. Preloaded with latest version of Antivirus Symantec/ McAfee / NOD32 / eTrust / Avast Internet Security / Kaspersky / Quickheal / eScan / Msecure with following features: Antivirus, Antispyware, intrusion prevention Browser protection with single management console with 3 year subscription with support updates and patches. 8. Accessories: With required connecting cables and driver media should be supplied. 9. Warranty: 3 Year Standard On-Site Comprehensive Hardware Warranty (including O.S support, Spares- Parts/Service/Labour/On-site)	Nos	44				
	b)	Supply , installation , testing and commissioning of wired electronic keyboard	Nos	44				
	c)	Supply , installation , testing and commissioning of wired mouse	Nos	44				
	d)	Supply , installation , testing and commissioning of All-in-One (Print, Copy, Scan) with duplex, auto document feeder features: -Print Resolution 600 x 600dpi -Print Speed (A4) 27ppm -Auto Duplex Printing Standard -Available Paper Size for Auto Duplex Print A4, Letter, Legal (*1), Indian Legal, Fulllscape -COPY Copy Speed (A4) 27ppm Maximum Number of Copies Up to 999 copies Scan Type Colour Contact Image Sensor Scan Resolution Optical Up to 600 x 600dpi Pull Scan Yes, USB and Network Makes: As per list of recommended brands.	Nos	6				
		TOTAL CARRIED OVER TO SUMMARY (Part - O)						
PART - P		AUDIO-VIDEO SYSTEMS						
	a)	Supply, installation, testing & commissioning of 3LCD/1DLP laser projector with 3500 ANSI Lumens brightness, Resolution: WXGA (1280 x 800), Colors: 16.7 million colors, Contrast Ratio: 2,000,000 : 1, Life: 40,000 hours, Speaker Output: 16W, Input Ports: 2 x HDMI, 2 x VGA, 1 x composite video, 1 x component video, 1 x RCA jack, Output: 1 x 3.5 mm stereo mini jack, 1 x VGA, Wired and wireless network LAN, 1 x RS-232 control port.	Nos	1				
	b)	Supply and Fixing of Celling Mount Kits for Projector etc. complete.						
	c)	Supply and fixing of 120" Motorized projection screen with remote control etc. complete.	Nos.	1				
	d)	Supply and fixing of 55" Full HD LED Large format Display (LFD) Commercial model for 24x7 operations, as 1920 x 1080 (16:9) resolution & 170°/160°(H/V) viewing angle, with HDMI & VGA Interface etc., complete.	Nos.	1				
	e)	Supply and Fixing of Celling Mount Kits for front LED etc. complete.	Nos.	1				
	f)	Supply and Fixing of Wireless remote control Laser point Presenter and Slider etc. complete.	Nos.	1				
	g)	Supply, installation, testing & commissioning of 2.4 GHz Digital Wireless Handheld Microphone with 256 bit, AES Encryption, Frequency Response: 70 Hz–20 KHz, Dynamic Range: 116 dB @ 1 KHz, Signal-to-noise: >90 dBA, Latency<=2.9ms along with Up to 12 Hours battery life.	Nos.	1				
	h)	Supply, installation, testing & commissioning of Gooseneck Microphone with on/off button with Polar pattern: Cardioid, Frequency range: 70 to 18,000 Hz , Max. SPL 125 dB, Equivalent noise level: <21 dB-A , Signal/noise ratio: >73 dB, Impedance: <=600 ohms, load impedance >=2,000 ohms, Connector 3-pin male XLR.	Nos.	1				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
	i)	Supply, installation, testing & commissioning of Column Line array Speaker with 8 nos. vertically aligned array of full range speakers with Frequency Range: 80 Hz – 20 kHz, Sensitivity: 93 dB, Power Capacity: 100 Watt (400 W Peak), Nominal Impedance: 8 ohms, Max SPL: 121 dB, Transformer Tap: 60W, 30W @ 100V, Fiberglass reinforced ABS cabinet, painted aluminum grille along with Swivel (pan)/tilt wall bracket.	Nos.	1				
	j)	Supply and fixing of 650 W per channel Class-H power amplifier With 2x 450W @ 4 Ohms etc. complete.	Nos.	1				
	k)	Supply, Installation, Testing and Commissioning of Multiformat 3 x 1 automatic transmitter and receiver with scaler solution, Should support HDCP 2.2 and auto scaling at output, 4K30 Support for source devices and displays, Inputs (TX) – Transmitter includes 2x HDMI and 1x VGA inputs, Outputs(RX) – Receiver includes 1x HDMI input and scaled HDMI output , control port: RS-232, 2 x Relay and de-embedded audio out.	Nos.	1				
	l)	Supply, installation, testing and commissioning of Wireless Presentation System with 4K resolution, enables iOS, Android, Chromebook, PC, and Mac device users to instantly connect to a main display without a dongle, 2.4GHz/5GHz Wi-Fi and MIMO antennas, Two participants can simultaneously present content on main display along with in-built processor of Intel, Main Memory: 4GB, Storage: 32 GB, Networking: 802.11 ac/b/g/n dual band Wireless LAN and Bluetooth 4.1, Operating System: Linux.	Nos.	1				
		TOTAL CARRIED OVER TO SUMMARY (Part - P)						
PART - Q		**TELEVISION SYSTEM**						
Q1	a)	Supply and fixing of modular type television socket mounted on suitable zinc passivated metal box complete with metal box, front plate, screws and required fixing accessories etc. The item including necessary chipping/cutting the wall and making good the same in case of flush mounting as required. All complete as per specifications, drawings and / or as directed by the Engineer.	Nos.	2				
	b)	Supply, laying and termination of closed circuit television co-axial RG6 cable laid in exisitng tray/conduit/raceways from dish/amplifier/communication room to individual TV, All complete as per specifications, drawings and / or as directed by the Engineer.	R. mtr.	100				
	c)	Supply and fixing of HDMI cable (MX) with connectors and necessary fixing accessories etc. All complete as per specifications, drawings and / or as directed by the Engineer.	Nos.	QRO				
		TOTAL CARRIED OVER TO SUMMARY (Part - Q)						
PART - R		**CLOSED CIRCUIT TELEVISION SYSTEM**						
R1	a)	Supplying and installing Wall or ceiling mounted **indoor type** Fixed Dome IP Camera with 1/3" 2MP PS CMOS Image Sensor 2MP@25/30fps (2560 × 1440), IR Range of 30 Mtrs,. The items including necessary fixing accessories.	Nos	5				
	b)	Supplying and installing Wall mounted **outdoor type** Bullet IP Camera with with 1/3" 4MP PS CMOS Image Sensor 4MP @25/30fps (2560 × 1440), IR Range of 30 Mtrs, The items including necessary fixing accessories.	Nos	62				
	c)	Supply and laying of high quality CAT-6 Ethernet LAN cable preferably with FR PVC insulation to be laid in exisitng tray/conduit/raceways from individual CCTV camera outlets to network jack/switch/patch panel/hub located in the communication room. All complete as per specifications, drawings and / or as directed by the Engineer.	R. mtr.	2540				
	d)	Supply and laying of high quality CAT-6 Ethernet LAN **armoured** cable preferably with FR PVC insulation to be laid in exisitng tray/conduit/raceways from individual CCTV camera outlets to network jack/switch/patch panel/hub located in the communication room. All complete as per specifications, drawings and / or as directed by the Engineer.	R. mtr.	500				
	e)	Supply, laying and termination of 6 pair fibre optic outdoor cable laid in existing conduit/tray/hume pipe with the all necessory accessories as required.	R. mtr.	1050				
	f)	Supply, fixing and termination of high quality rack mounted type patch panel with one number of 8 port POE network switch, fixing frames, links and interconnections, necessary accessories etc., all complete as per specifications, drawings and / or as directed by the Engineer.	Nos	3				
	g)	Supply, fixing and termination of high quality rack mounted type patch panel with one number of 16 port POE network switch, fixing frames, links and interconnections, necessary accessories etc., all complete as per specifications, drawings and / or as directed by the Engineer.	Nos	QRO				
	h)	Supply, fixing and termination of high quality rack mounted type patch panel with one number of 24 port POE network switch, fixing frames, links and interconnections, necessary accessories etc., all complete as per specifications, drawings and / or as directed by the Engineer.	Nos	3				
	i)	Supply, laying and termination of 6 pair fibre optic cable laid in existing conduit/tray/hume pipe with the all necessory accessories as required.	R. mtr.	350				
	j)	Supplying and installing of 32 Channel Network Video Recorder with Max 320Mbps incoming bandwidth Smart H.265+/H.265/ Smart H.264+/H.264/MJPEG Up to 12MP resolution preview and playback Support 4 SATA HDDs up to 10TB Each, 4 USB (2 USB3.0, 2USB2.0) 2 HDMI / 2 VGA simultaneous video output Support Multi-brand network cameras Support RAID 0/1/5/10 Mobile Software: iCMOB, gCMOB CMS Software: KVMS Pro. The items including supply of 8TB hard disk, connectors, pins and providing complete configuration etc.	Nos	3				
		Note: Hard disk capacity is inicative only.						
	k)	Supplying and installing of Power Supply Unit along with necessary Battery backup, suitable for 1 nos. 32 channel network video recorder system.	Nos	3				
	l)	Supplying and installing of 32" LED colour monitor.	Nos	QRO				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
	m)	Supplying and installing of 43" LED colour monitor.	Nos	5				
	n)	Supplying and installing of Single-Mode 1 Pair Ethernet To Fiber Media Converter	Nos	2				
	o)	19" 1U Fiber Shelf 24 Ports SM LCPC DX Adapters and Splice Tray - Supply, Installation Testing & Commissioning of rack mount 24 Ports, coupler & Pigtail loaded (LIU) interconnect unit with adapter panel as per specification complete. Fibre Shelf Specification: The 19" 1U Fiber Shelf is a shelf assembly for a fiber management system in a networking rack environment. Splice Tray is Plastic, ABS/PC. Dimensions of Fiber shelf [mm] - 482 Height x 270 Width x 44.45 Depth. Splice elements for up to 12x LC-PC SM DX, 24F Splice Trays - 1 no. Capacity of Ports in Fiber shelf (ports): 24. Number of connectors (A) are 12. Connector type (A) is LC Duplex. Inner tray of patch panel can be easily slide front & back. Easily removable Top plate with push buttons. Front panel equipped with adapters.1U Patch panel material Color - CRCA 1.2mm, RAL 7035. Transport Temperature – -40 up to +85. Storage Temperature – -40 up to +85. Operation Temperature - -25 up to +55. Climate testing IEC 60068-2-2 / IEC 60068-2-1. Temperature change and damp heat IEC 61300-2-22 /IEC 61300-2-19.	Nos	5				
	p)	Supply, fixing and termination of high quality floor mounted type 24U floor mountable powder coated Rack with 3x5A Power Manager, 1 position fan, min 1 nos of shelf, Front Glass double door with Lock & key with suitable network port switch, fixing frames, links and interconnections, necessary accessories etc., all complete as per specifications, drawings and / or as directed by the Engineer.	Nos	1				
	q)	Supply, fixing and termination of high quality floor mounted type 32U floor mountable powder coated Rack with 3x5A Power Manager, 1 position fan, min 1 nos of shelf, Front Glass double door with Lock & key with suitable network port switch, fixing frames, links and interconnections, necessary accessories etc., all complete as per specifications, drawings and / or as directed by the Engineer.	Nos	QRO				
	r)	Supply, fixing and termination of high quality floor mounted type 4U Wall mountable powder coated **OUTDOOR IP66** Rack with 3x5A Power Manager, min 1 nos of shelf, Front Glass Single door with Lock & key with suitable network port switch, fixing frames, links and interconnections, necessary accessories etc., all complete as per specifications, drawings and / or as directed by the Engineer.	Nos	3				
	s)	Supply, fixing and termination of high quality floor mounted type 6U Wall mountable powder coated Rack with 3x5A Power Manager, min 1 nos of shelf, Front Glass Single door with Lock & key with suitable network port switch, fixing frames, links and interconnections, necessary accessories etc., all complete as per specifications, drawings and / or as directed by the Engineer.	Nos	QRO				
	t)	Supply, fixing and termination of high quality floor mounted type 9U Wall mountable powder coated Rack with 3x5A Power Manager, min 1 nos of shelf, Front Glass Single door with Lock & key with suitable network port switch, fixing frames, links and interconnections, necessary accessories etc., all complete as per specifications, drawings and / or as directed by the Engineer.	Nos	1				
	u)	Supply and installation of IP66 encloser mounting at 9M pole for camera cable termination	Nos	62				
	v)	Testing and commissioning of CCTV system	Lot	1				
R2		Supply and installation of 76 mm diameter octagonal GI pole of following height pre-fabricated with a welded MS base plate of 300 x 300 x 6mm size, , 450 x 450 x 900 mm deep pedestal in cement concrete 1:2:4, complete including excavation and backfilling, fixing in position with approved hardware, etc., as per as per specifications and / or directed by the Engineer-in-charge.						
	a)	9 meter length	Nos.	14				
R3	a)	Supply , installation , testing and commissioning of Desktop with fully loaded software as desired, with the following configuration. 1. Processor: Intel® Core™ i5-12th Generation or Higher version processor with Intel® HD Graphics 770 (2.9 GHz base frequency with Intel® Turbo Boost Technology, 18 MB cache 6 core 12 threads) Intel Chipset 2. Memory: 8 GB DDR4-3200 MHz SDRAM (1 x 8 GB) 3. Hard drive 512GB SSD (Hard Drive 2 nd 1 TB 7200 SATA HDD) 4. 1 audio line in; 1 audio line out; 1 HDMI; 1 RJ-45; 1 VGA; 4 USB 3.0; 4 USB 2.0 5. Operating Systems: Windows 11 Pro professional 64 bit with product key License. However, the product key should be mentioned in the installation report at the time of installation. 6. communications (intel Wi-Fi & Blue tooth) 7. Preloaded with latest version of Antivirus Symantec/ McAfee / NOD32 / eTrust / Avast Internet Security / Kaspersky / Quickheal / eScan / Msecure with following features: Antivirus, Antispyware, intrusion prevention Browser protection with single management console with 3 year subscription with support updates and patches. 8. Accessories: With required connecting cables and driver media should be supplied. 9. Warranty: 3 Year Standard On-Site Comprehensive Hardware Warranty (including O.S support, Spares- Parts/Service/Labour/On-site)	Nos.	1				
	b)	Supply , installation , testing and commissioning of wired electronic keyboard	Nos	1				
	c)	Supply , installation , testing and commissioning of wired mouse	Nos	1				
		TOTAL CARRIED OVER TO SUMMARY (Part - R)						
PART - S		**PUBLIC ADDRESS SYSTEM**						
S1	a)	Supply, laying and termination of 2 core 1 sq.mm flexible copper cable laid in exisitng tray/conduit/raceways from Amplifier to speaker and from speaker to other speakers,all complete as per specifications, drawings and / or as directed by the Engineer.	R. mtr.	500				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
	b)	Supplying and installing of 10 Watts, Wall/ceiling mounted type high quality metallic grill type 100V line speaker with built-in line matching transformer and necessary mounting boxes and fixing accessories.	Nos.	28			-	
	c)	Supplying and installing of amplifier rack unit complete with one no. five zones voice alarm controller with 500W amplifier. The items including of suitable mixer amplifier /booster amplifier, line matching transformer, power supply unit, connection strip, mounting desk etc.,	Nos.	2			-	
	d)	Supplying and installing of microphone (call station) for 5 zones unidirectional communication/announcement with emergency button for remote emergency activation.	Nos.	1			-	
	e)	Supply and installation of metal junction boxes (Appx. 300mm x 150mm) for speaker cable terminations with terminal arrangements to be located in the shaft at each floor. The item including necessary fixing accessories etc. All complete as per specifications, drawings and / or as directed by the Engineer.	Nos.	2			-	
	f)	Supplying and installing of 230V, CD/MP3/DVD Player with necessary power chord.	Nos.	QRO				
		TOTAL CARRIED OVER TO SUMMARY (Part - S)						
PART - T		**LIGHTNING PROTECTION SYSTEM**						
T1	a)	Supplying, erecting, connecting and commissioning solid copper air terminal of 3 M height with proper spike arrangement at top, base plate, jointing, supporting arrangements, clamping and necessary fixing accessories etc., all complete as per specifications, drawings and / or as directed by the Engineer.	Nos.	2				
	b)	Supplying, erecting, connecting and commissioning solid copper air terminal of 5 M height with proper spike arrangement at top, base plate, jointing, supporting arrangements, clamping and necessary fixing accessories etc., all complete as per specifications, drawings and / or as directed by the Engineer.	Nos.	4				
	c)	Supplying, erecting, connecting and commissioning of 25 x 3 mm copper flats for the horizontal & vertical drops from the terrace level to test link which mounted at 1000mm heigh from the finished ground level. The flats shall be fixed with epoxy resin insulator used as spacer. The spacer shall be fixed with self threading screws and it shall be fixed at every 1000mm intervels.	R. mtr.	2160				
	d)	25 x 6 mm copper flats (insulated) for the vertical drops from the test link to the ground and upto earth electrodes, including necessary excavation, backfilling, fixing accessories, termination at both ends, etc. The flats shall be fixed with epoxy resin insulator used as spacer. The spacer shall be fixed with self threading screws and it shall be fixed at every 1000mm intervels.	R. mtr.	90				
	e)	Supply, fixing, testing and commissioning of test links for lightning protection system, inclusive of jointing and clamping, necessary fixing accessories etc., all complete as per specifications, drawings and / or as directed by the Engineer.	Nos.	23				
	f)	Maintenance-free tri-polar earth pits made of ground enhancing materials and copper bounded ground rods, including laying of high-purity copper tape for interconnecting the pits, treating the earth pit with filling materials, 450mm x 450mm brick masonary chamber, heavy duty RCC / CI cove,clamps, bolts & nuts and its associated accessories as per standard IS, including cost of excavation, backfilling, minor civil works, and all complete as per specifications, drawings and / or as directed by the Engineer.	Set.	17				
	g)	Maintenance-free tri-polar earth pits made of ground enhancing materials and copper bounded ground rods, including laying of high-purity copper tape for interconnecting the pits, treating the earth pit with filling materials, heavy duty RCC / CI cove,clamps, bolts & nuts and its associated accessories as per standard IS, including cost of excavation, backfilling, minor civil works, and all complete as per specifications, drawings and / or as directed by the Engineer. (Without masonary chamber)	Set.	6				
		TOTAL CARRIED OVER TO SUMMARY (Part - T)						
PART - U		**MISCELLANEOUS**						
U1		Preparation of complete set of as-built/schematic drawings, substation layout, physical layout and the technical documents for submission with Chief Electrical Inspector to Government. **(Liasion with CEA/CEIG for obtaining approval for all drawings) ***** {Complete electrical system all equipments/switchgears including transformer, HT & LT breakers, DG sets, panels, HT/LT cables, Earthing, Lightning protection system, DBs, wiring, luminaires and fixtures, Elevators and motors & pumps etc.}**	Lump Sum	1				
U2		Preparation of completion report, arranging for inspection and attending to defects report and preparation of final & as-built drawings and obtaining Safety Certificate from CEA / CEIG for commissioning/energisation. **(Liasion with the CEA/CEIG for obtaining safety certificate for energising the substation)**	Lump Sum	1				
U3		Liasioning with APDCL including submission of application & documents for obtaining required Demand power. **(Appx. Cost)**	Lump Sum	1				
U4		Preparation of final & as-built drawings and submission of 3 Sets of hard copies and 1 Set of soft copy.	Lump Sum	1				
U5		Supply and installation of Glass framed HT & LT single line diagram in A1 paper size.	Lump Sum	1				

Item No.		Description	Unit	Quantity	Rate in Rs.		Amount in Rs.	
					Supply	Installation	Supply	Installation
U6		Constructing masonry Chamber of following sizes, inside in brick work in cement mortar 1:4 (1 cement : 4 coarse sand) for electrical and communication cable, and RCC top slab to withstand 40tons 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) , i/c necessary excavation,back filling , foundation concrete 1:5:10 (1 cement : 5 fine sand:10 graded stone aggregate 40 mm nominal size) and inside plastering with cement mortar 1:3 (1 cement : 3 coarse sand) 12 mm thick, finished with a floating coat of neat cement complete as per standard design :						
	a)	1200mm. (L) x 1200mm. (W) x 1550mm. (D)	Nos.	QRO				
	b)	1200mm. (L) x 750mm. (W) x 1550mm. (D)	Nos.	QRO				
	c)	1000mm. (L) x 750mm. (W) x 1550mm. (D)	Nos.	QRO				
	d)	1000mm. (L) x 750mm. (W) x 1120mm. (D)	Nos.	QRO				
U7		Construction of pcc concrete plinth foundation for the following equipments including excavationm backfilling as required						
	a)	315kVA Transformer Foundation (LxBxH) 1950x2400x1000 App.	No.	1				
	b)	500kVA Transformer Foundation (LxBxH) 1950x2400x1000 App.	No.	1				
	c)	1600kVA Transformer Foundation (LxBxH) 2450x2650x1000 App.	No.	1				
	d)	DG Set Foundation (LxBxH) 6600x2600x750 App.	No.	1				
	e)	RMU (LxBxH) 2700x2150x700 App.	No.	1				
	f)	HT VCB 1Panel unit (LxBxH) 1200x2150x700 App.	No.	2				
	g)	HT VCB 3Panel unit (LxBxH) 3000x2150x700 App.	No.	2				
	h)	HT VCB 4Panel unit (LxBxH) 3900x2150x700 App.	No.	2				
		TOTAL CARRIED OVER TO SUMMARY (Part - U)						
PART - V		**ADDITIONAL ITEMS**						
		STEEL ITEMS - SUPPLY AND INSTALLATION						
V1	a)	Supply and installation of mild steel (MS) items, including angles, channels. The steel items shall be properly prepared and coated with two coats of red oxide primer followed by two coats of epoxy paint. Steel items specifically covered under other BOQ line items in this Price Bid shall not be measured and paid under this line item.	Lump Sum					
		TOTAL CARRIED OVER TO SUMMARY (Part - V)						
		TOTAL CARRIED OVER TO SUMMARY (Part-A to Part-V)						
		GRAND TOTAL in Rs. (SUPPLY + INSTALLATION)						-
		GST						-
		GRAND TOTAL in Rs.						-
		In Word						

Note:
L1 will be arrived based on the total amount quoted for works excluding GST.

Un-Price bid: Price bid without price & with percentage of taxes & duties and details like quoted/Nil/Included, shall be submitted along with the technical bid.