भारत हेवी इलेक्ट्रिकल्स लिमिटेड
(भारत सरकार का उपक्रम)
BHARAT HEAVY ELECTRICALS LIMITED
(A Govt. of India Undertaking)

Ref: PSER:PMX:KOD: Safety Control Room:2025/03 **Date: 26:07.25**

NOTICE INVITING TENDER

Sealed offers in two part bid system are invited from reputed & experienced bidders meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-1 through Email or hard copy mode, for the subject job by the undersigned on the behalf of BHARAT HEAVY ELECTRICALS LIMITED as per the tender document. Issue/ forwarding intimation regarding tender to any bidder shall not construe that the bidder is considered to be qualified. Following points relevant to the tender may please be noted and complied with.

1.0 **Salient Features of NIT**

SL NO	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	**Ref: PSER:PMX:KOD: Safety Control Room:2025/03**	
ii	**Broad Scope of job**	**Work of Electrical Package for Safety Control Room at DVC Koderma Thermal Power Station Phase-II (2x800 MW)Project, Jharkhand..**	
iii	**DETAILS OF TENDER DOCUMENT**		
a	Volume-IB	*General conditions of contract (Service)*	***Applicable.***
b	Volume-IE	*Forms and Procedures etc.*	***Applicable.***
c	Volume-IF	*Technical Conditions of Contract (TCC)*	***Applicable.***
d	Volume-III	*Price Schedule (Absolute value) – Rev-00*	***Applicable.***
iv	**ISSUE OF TENDER DOCUMENTS**	*1. Through E-mail*	***Applicable.***
v	**TIME OF OFFER SUBMISSION**	***Time period from opening to closing of tender shall be 3 days.*** ***The bidder may respond by submitting their offer either Email or through hard copy mode. Offers are invited in one-parts only.***	***Applicable.***
vi	**OPENING OF TENDER**	***1 hours after the latest due date and time of Offer submission*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time.* *(2) Bidder may depute representative to witness the opening of tender.*	***Applicable.***
vii	**EMD AMOUNT**		***Not Applicable***
viii	**COST OF TENDER**		***Not Applicable***
ix	**LAST DATE FOR SEEKING CLARIFICATION**	***Last day of closing of tender by 17:00 Hrs.*** *Along with soft version also, addressing to undersigned & to others as per contact address given below*	*Applicable.*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**	--	*Not Applicable (In case BHEL decides to conduct PBD, date, time &*

			venue of PBD will be intimated suitably thru TCN.)
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**		*Not Applicable*
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be sent over Email. Bidders to keep themselves updated with all such information.	*Shall be intimated to bidder.*
xiii	**Execution Period**	One month (30 days) from the date of P.O	

2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed and stamped) on each page, as part of offer. **Rates/Price including discounts/rebates, if any, mentioned anywhere/ in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.**

3.0 **Procedure for Submission of Tenders**: The Tenderers must submit their Tenders as detailed below:

FOR HARD COPY SUBMISSION OF OFFER

- SINGLE PART- (Price Bid) – in sealed and super scribed envelope
  One set of tender documents shall be retained by the bidder for their reference

The contents for ENVELOPES and the superscription for each sealed cover/Envelope are as given below. FOR HARD COPY SUBMISSION **(All pages to be signed and stamped)**

Sl no	**Description**	Remarks
	Part-I A	
	ENVELOPE – super scribed as : SINGLE PART (PRICE BID) TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION:	
	CONTAINING THE FOLLOWING:-	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	Duly filled-in `No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above. **Note:** a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding.	

	i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender	
iii.	Supporting documents/ annexures / schedules/ drawing etc as required in line with Pre-Qualification criteria. It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, **Email**,FAX no, etc.	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	*Not Applicable*
vi.	Duly filled-in annexures, formats etc as required under this Tender Specification/NIT	
vii.	Notice inviting Tender (NIT)	
viii.	Volume – I F : Technical Conditions of Contract (TCC)	
ix.	Volume - I B : General Conditions of Contract (GCC)-Service	
x.	Volume – III- (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item.	
xi.	Any other details preferred by bidder with proper indexing.	

4.0 Assessment of Capacity of Bidders**: Deleted**

5.0 Since the job shall be executed at site**,** bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation, applicable wage structure, wage rules, etc before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions.

6.0 For any clarification on the tender document, the bidder may seek the same in writing, through e-mail or, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to any delay. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.

7.0 BHEL may decide holding of pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.

8.0 In the event of any conflict between requirement of any clause of this specification/ documents/drawings/data sheets etc or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error/missing pages/ other clerical errors in the tender documents, noticed must be pointed out before pre-bid meeting/submission of offer else BHEL's interpretation shall prevail.

9.0 Unless specifically mentioned otherwise, bidder's quoted price shall deemed to be in compliance with tender including PBD.

10.0 The Bidder has to satisfy the Pre Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of satisfying the Pre Qualification Criteria specified in this NIT as per Annexure-1 (as applicable), past performance etc. and date of opening of price bids shall be intimated to only such bidders. BHEL reserves the right not to consider offers of parties under HOLD.

11.0 In case BHEL decides on a `Public Opening', the date & time of opening of the PRICE BID shall be intimated to the qualified bidders.

12.0 Validity of the offer shall be for **six months** from the latest due date of offer submission (including extension, if any) unless specified otherwise.

13.0 On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.

14.0 The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.

15.0 Consortium Bidding (or Technical Tie up) shall be allowed only if specified in Pre Qualifying Requirement (PQR) criteria, and in such a case the details to be complied with is enclosed herewith as per Annexure-5 UNLESS SPECIFIED OTHERWISE IN PQR.

16.0 The bidder shall submit documents in support of possession of 'Qualifying Requirements' duly self certified and stamped/ digitally signed (as applicable) by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.

17.0 The bidder may have to produce original document for verification if so decided by BHEL.

18.0 The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL Website (www.bhel.com).

I) Integrity commitment, performance of the contract and punitive action thereof:

a) Commitment by BHEL:

BHEL commits to take all measures necessary to prevent corruption in connection with the tender process and execution of the contract. BHEL will during the tender process treat all Bidder(s) in a transparent and fair manner, and with equity.

b) Commitment by Bidder/ Supplier/ Contractor:

b.i) The bidder/ supplier/ contractor commit to take all measures to prevent corruption and will not directly or indirectly influence any decision or benefit which he is not legally entitled to nor will act or omit in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India.

b.ii) The bidder/ supplier/ contractor will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and shall adhere to relevant guidelines issued from time to time by Govt. of India/ BHEL.

b.iii) The bidder/ supplier/ contractor will perform/ execute the contract as per the contract terms & conditions and will not default without any reasonable cause, which causes loss of business/ money/ reputation, to BHEL.

If any bidder/ supplier/ contractor during pre-tendering/ tendering/ post tendering/ award/ execution/ post-execution stage includes in mal-practices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the price or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal code, 1860 or any other law in force in India, then, action may be taken against such bidder/ supplier/ contractor as per extant guidelines of the company available on www.bhel.com and/ or under applicable legal provisions.

19.0 It may please be noted that Guidelines/Rules in respect of Suspension of business dealings (Hold- 12 to 24 Months/ Banning – 3 years etc), Vendor Evaluation formats, quality, safety and HSE guidelines , standard T&P hire charges of BHEL etc may undergo change from time to time and the latest one shall be followed. Latest "Guidelines for Vendor Evaluation" is web based, quality, safety & HSE"; standard T&P hire charges shall be available at site and shall be given to the successful vendors/ subcontractors during execution.

20.0 MSE suppliers can avail the intended benefits in respect of the procurements related to the Goods and Services only (Definition of Goods and Services as enumerated by Govt. of India vide Office Memorandum F. No. 21(8)/2011-MA dtd. 09/11/2016 office of AS & DC, MSME) if they submit along with the offer, attested copies of either EM II certificate having deemed validity (five years from the date of issue of acknowledgement in EM II) or valid NSIC certificate or Udyog Aadhar Memorandum (UAM) & Acknowledgement or EM II certificate along with attested copy of a CA certificate (Format enclosed at Annexure – C where deemed validity of EM II certificate of five years has expired) applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the date of bid opening (Part 1 in case of two part bid). Non submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer.

Any Bidder falling under MSME category, shall furnish the following details & submit documentary evidence/Govt. Certificate etc. in support of the same along with their techno-commercial offer: -

Type under MSME	SC/ST owned	Others
Micro		
Small		
Medium		

Note: - If the bidder does not furnish the above, offer shall be processed construing that the bidder is not falling under MSME category.

21.0 The bidder along with its associates/collaborators/sub-contractors/sub-vendors/consultants/service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.

22.0 Annexure-A -Amendment to GCC/SCC shall be read in conjunction with GCC-Volume-IB & SCC-Volume-ID. This Annexure-A (Amendment to GCC/SCC) of NIT shall not be considered as part of the NIT but addendum/corrigendum to the GCC/SCC only.

23.0 For this procurement, Public Procurement (Preference to Make in India), Order 2017 dated 15.06.2017 & 28.05.2018 and subsequent Orders issued by the respective Nodal Ministry shall be applicable even if issued after issue of this NIT but before finalization of contract/ PO/ WO against this NIT.
In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and/ or local content in respect of this procurement, same shall be applicable.

24.0 The contractor shall, at all stages of work deploy skilled/ semi-skilled tradesmen who are qualified and possess certificate in particular trade from CPWD Training Institute/ Industrial Training Institute/ National

Institute of Construction Management and Research (NICMAR), National Academy of Construction, CIDC or any similar reputed and recognized Institute managed/ certified by State/ Central Government. The number of such qualified tradesmen shall not be less than 20% of total skilled/ semi-skilled workers required in each trade at any stage of work. The contractor shall submit number of man days required in respect of each trade, its scheduling and the list of qualified tradesmen along with requisite certificate from recognized Institute to Engineer-in-Charge for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade, the contractor shall substitute such tradesmen within two days of written notice from Engineer-in-Charge. Failure on the part of contractor to obtain approval of Engineer-in-Charge or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of Rs. 100 per such tradesman per day. Decision of Engineer-in-Charge as to whether particular tradesman possesses requisite skill and amount of compensation in case of default shall be final and binding."

25.0 It may please be noted that Bid should be free from correction, overwriting, using corrective fluid, etc. Any interlineation, cutting, erasure or overwriting shall be valid only if they are attested under full signature(s) of person(s) signing the bid, else bid shall be liable for rejection.

All overwriting/ cutting, etc. will be numbered by bid opening officials and announced during bid opening.

26.0 Order of Precedence

In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:

a. Amendments/Clarifications/Corrigenda/Errata etc issued in respect of the tender documents by BHEL
b. Notice Inviting Tender (NIT)
c. Price Bid-Volume-III
d. Technical Conditions of Contract (TCC) ---Volume-IF
e. General Conditions of Contract (GCC) — Volume-IB
f. Forms and Procedures —Volume-IE

for BHARAT HEAVY ELECTRICALS LTD

Sr.Mgr (KODERMA SITE)

Agency	Contact details	
BHEL, PSER, Koderma Site	Address	BHEL SITE OFFICE, 2 X 800 MW Koderma Power Project, Banjhedih, P.O. Jhumri Telaiya, Dist. Koderma-825409 (Jharkand)
	Phone no	
	E-mail	

Enclosure

01. Annexure-1: Pre Qualification Criteria.
02. Annexure-2: Format for No Deviation Certificate.
03. Annexure-3: Format for seeking clarification.
04. Annexure-4: Check List.
05. Annexure –A- Amendment to GCC/SCC.
06. Annexure– CPP-GST/I.
07. Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFICATION CRITERIA

JOB	WORK OF ELECTRICAL PACKAGE FOR SAFETY CONTROL ROOM AT DVC KODERMA THERMAL POWER STATION PHASE-II (2X800 MW)PROJECT, JHARKHAND.

SL.NO.	TECHNICAL CRITERIA
1.0	
(a)	THE BIDDER SHOULD HAVE EXPERIENCE OF SUCCESSFULLY COMPLETED SIMILAR WORKS FOR AT LEAST TWO MONTHS AT LEADING PSU'S/STATE GOVERNMENTS/CENTRAL GOVERNMENTS / REPUTED COMPANIES IN THE LAST 07 YEARS, ENDING ON THE LATEST DUE DATE OF SUBMISSION OF OFFER.
2.0	NOTE
(a)	BIDDER SHOULD HAVE VALID PAN. RELEVANT DOCUMENT IN SUPPORT OF ABOVE SHALL BE SUBMITTED BY BIDDER.
(b)	CONSORTIUM / JV BIDDING IS NOT ALLOWED.
(c)	SIMILAR WORKS MEANS ELECTRICAL OR C&I OR ELECTRICAL AND C&I (SUPPLY, ERECTION, COMMISSIONING AND O&M IN ANY COMBINATION.

ANNEXURE - 2

FORMAT FOR NO DEVIATION CERTIFICATE
(To be submitted in the bidder's letter head)

BHARAT HEAVY ELECTRICALS LIMITED,
Power Sector - Eastern Region,
2 X 800 MW Koderma Power Project,
Banjhedih, P.O. Jhumri Telaiya,
Dist. Koderma-825409 (Jharkand)

Sub	No Deviation Certificate.	
Job	Work of Electrical Package for Safety Control Room at DVC Koderma Thermal Power Station Phase-II (2x800 MW)Project, Jharkhand.	
Ref	1.0	Ref: PSER:PMX:KOD: Safety Control Room:2025/03
	2.0	All other pertinent issues till date.

Dear Sirs,

With reference to above, this is to confirm that as per tender conditions, we have visited site before submission of our offer and noted the job content & site conditions etc. We also confirm that we have not changed/ modified the tender documents as appeared in the website/ issued by you and in case of such observance at any stage, it shall be treated as null and void.

We hereby confirm that we have not taken any deviation from tender clauses together with other references as enumerated in the above referred NIT. We hereby confirm our unqualified acceptance to all terms & conditions, unqualified compliance to technical specification, integrity pact (if applicable) and acceptance to reverse auctioning process.

In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null & void.

We confirm to have submitted/uploaded offer/documents in accordance with tender instructions with acceptance of the terms & conditions of the tender by us and as per aforesaid references.

Thanking you,

Yours faithfully,

(Signature, date & seal of authorized
representative of the bidder)

ANNEXURE - 3

FORMAT FOR SEEKING CLARIFICATION

JOB	Work of Electrical Package for Safety Control Room at DVC Koderma Thermal Power Station Phase-II (2x800 MW)Project, Jharkhand.
TENDER NO	Ref: PSER:PMX:KOD: Safety Control Room:2025/03

Sl no	Reference clause of tender document	Existing provision	Bidder's query	BHEL's clarification

ANNEXURE - 4

CHECK LIST

NOTE:- Tenderers are required to fill in the following details and no column should be left blank

1	Name and Address of the Tenderer			
2	Details about type of the Firm/Company			
3.a	Details of Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Email ID: Fax No:		
3.b	Details of alternate Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Email ID: Fax No:		
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER		
5	Validity of Offer	TO BE VALID FOR SIX MONTHS FROM DUE DATE		
			APPLICABILITY(BY BHEL)	ENCLOSED BY BIDDER
6	Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format		Applicable	YES / NO
7	Audited profit and Loss Account for the last three years		Applicable/Not Applicable	YES/NO
8	Copy of PAN Card		Applicable/Not Applicable	YES/NO
9	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed		Applicable/Not Applicable	YES/NO
10	Integrity Pact		Applicable/Not Applicable	YES/NO
11	Declaration by Authorised Signatory		Applicable/Not Applicable	YES/NO
12	No Deviation Certificate		Applicable/Not Applicable	YES/NO
13	Declaration confirming knowledge about Site Conditions		Applicable/Not Applicable	YES/NO
14	Declaration for relation in BHEL		Applicable/Not Applicable	YES/NO
15	Non Disclosure Certificate		Applicable/Not Applicable	YES/NO
16	Bank Account Details for E-Payment		Applicable/Not Applicable	YES/NO
17	Capacity Evaluation of Bidder for current Tender		Applicable/Not Applicable	YES/NO
18	Tie Ups/Consortium Agreement are submitted as per format		Applicable/Not Applicable	YES/NO
19	Power of Attorney for Submission of Tender/Signing Contract Agreement		Applicable/Not Applicable	YES/NO
20	Analysis of Unit rates		Applicable/Not Applicable	YES/NO
21	Undertaking regarding Bankruptcy Code Proceedings (IBC) by NCLT or under Liquidation / BIFR		Applicable/Not Applicable	YES/NO

NOTE: STRIKE OFF 'YES' OR 'NO', AS APPLICABLE. TENDER NOT ACCOMPANIED BY THE PRESCRIBED **ABOVE APPLICABLE DOCUMENTS** ARE LIABLE TO BE SUMMARILY REJECTED.

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

Annexure - A

Amendment to GCC/SCC

1. **Introduction of Clause No 1.15.13 in GCC as below:**

Clause No 1.15.13: Additional security deposit (SD) has to be submitted by the successful bidder with value as follows:

"If the final price of successful bidder is lesser by 'more than 20%' of BHEL's estimate - 'Additional Security Deposit' will be required to be submitted by the successful bidder with value as follows:

Additional Security Deposit = 30 % of (A-B) limited to a maximum of 10% of the 'Total Price/Contract Value', where,

A = 80% of BHEL estimate

B = The final offered price of successful bidder through RA (In case of RA)

OR

Sealed paper price bid of successful bidder (in case of paper bid)

This 'Additional Security Deposit' shall have the same validity as that of the 'Security Deposit' and shall be revalidated/released in the manner as spelt out for the 'Security Deposit' as per relevant clause of GCC.

The BHEL's estimated value shall be disclosed to the successful bidder (on their request) at appropriate juncture in case 'Additional Security Deposit' is applicable."

2. **Clause no. 1.9.1(ii) of GCC shall be read as below:**

The EMD may be accepted only in the following forms:

(a) Cash deposit as permissible under the extant Income Tax Act (before tender opening)

(b) Electronic Fund Transfer credited in BHEL account (before tender opening)

(c) Banker's cheque/ Pay order/ Demand draft, in favour of BHEL (along with offer)

(d) Fixed Deposit Receipt (FDR) issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL).

In addition to above, the EMD amount in excess of Rs. 2 Lakh may also be accepted in the form of Bank Guarantee from scheduled bank. The Bank Guarantee in such cases shall be valid for atleast six months. EMD of successful tenderer will be retained as part of Security Deposit.

Clause no. 1.9.1(iv) & (v) of GCC stands deleted.

3. **Clause no. 1.10.1 of GCC shall be read as below:**

The total amount of Security Deposit will be 5% of the contract value. EMD of the successful tenderer shall be converted and adjusted towards the required amount of Security Deposit.

4. **Clause no. 1.10.2 of GCC shall be read as below:**

At least 50% of the required Security Deposit, including the EMD, should be furnished before start of the work. Balance of the Security Deposit can be deposited by deducting 10% of the gross amount progressively from each of the running bills of the Contractor till the total amount of the required Security Deposit is collected.

The recoveries made from running bills (cash deduction towards balance SD amount) can be released against submission of equivalent Bank Guarantee in acceptable form, but only once, before completion of work, with the approval of competent authorities.

5. Clause no. 1.10.3 of GCC shall be read as below:

The balance amount to make up the required Security Deposit of 5% of the contract value may be accepted in the following forms:

a) Cash (as permissible under the extant Income Tax Act)
b) Local cheques of Scheduled Banks (subject to realization)/ Pay Order/ Demand Draft/ Electronic Fund Transfer in favour of BHEL
c) Bank Guarantee from Scheduled Banks/ Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL
d) Fixed Deposit Receipt issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL)
e) Securities available from Indian Post offices such as National Savings Certificates, Kisan Vikas Patras etc. (held in the name of Contractor furnishing the security and duly endorsed/ hypothecated/ pledged, as applicable, in favour of BHEL)

(Note: BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith)

6. Introduction of Clause No. 1.10.8 in GCC as below:

Clause No 1.10.8: SDBG to be furnished by the vendor before start of work. No payment will be released till SDBG is submitted by the vendor.
If requested by the vendor, cash recovery equivalent to SDBG value to be made from bills submitted by the vendor.
Also recovery of interest calculated @SBI PLR +2% on amount equivalent to SDBG / PBG value to be made for the gap period (difference between date of start of work and date of submission of BG / cash recovery).
In case of delay in extension of SDBG, in case of validity expiry, SDBG shall be invoked. However if the vendor submits a new BG after invocation of the previous BG then, it shall be refunded and recovery for the gap period, i.e. the duration for which BG is not available shall be made as stated above.

(b) Clause no. 1.11 of GCC shall be read as below:

Security Deposit shall be refunded/Bank Guarantee(s) released to the Contractor along with the 'Final Bill' after deducting all expenses / other amounts due to BHEL under the contract / other contracts entered into with them by BHEL upon fulfilment of contractual obligations as per terms of the contract.

(c) Clause no. 2.8.3, 2.8.4 and 2.8.5 of GCC shall be read as below:

Clause no. 2.8.3: The contractor shall comply with all applicable State and Central Laws, Statutory Rules, Regulations, Notifications, etc. such as Payment of Wages Act, Minimum Wages Act, Workmen Compensation Act, Employer's Liability Act, Industrial Disputes Act, Employers Provident Act, Employees State Insurance Scheme, Contract Labour (Regulation and Abolition) Act, 1970, Payment of Bonus & Gratuity Act, Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996, The Building and Other Construction Workers' Welfare Cess Act, 1996 and other Acts, Rules, and Regulations for labour/workers as applicable and as may be enacted by the State Government and Central Govt. during the tenure of the Contract and having force or jurisdiction at Site. The Contractor shall also comply with provisions of and give all such

notices to the local Governing Body, Police and other relevant Authorities as may be required by the Law.

Clause no. 2.8.4: The Contractor shall obtain independent License under the Contract Labour (Regulations and Abolition) Act, 1970 for engaging contract labour as required from the concerned Authorities based on the certificate (Form- V) issued by the Principal Employer/Customer.

Clause no. 2.8.5: The contractor shall pay and bear all taxes, fees, license charges, Cess, duties, deposits, tolls, royalties, commission or other charges which may be leviable on account of his operations in executing the contract.

(d) Clause 2.12 of GCC (Overrun Compensation)

2.12 OVERRUN COMPENSATION (ORC)

2.12.1 **ORC during original contract period:** No ORC shall be applicable during the original contract period.

2.12.2 **ORC during extended period for the reasons solely attributable to contractor:** No ORC shall be applicable during the extended period granted for the reasons solely attributable to contractor and work executed during this period shall be paid as per original contract rates.

2.12.3 **ORC during extended period for the reasons not attributable to contractor:** ORC shall be payable as per following procedure:

2.12.3.1 For initial period of twelve months of extended period, ORC rate applicable over executed value shall be 5%. For every subsequent period of twelve months, ORC rate shall be further increased by 5% over the previous rate. For example, ORC rates applicable for initial period of 12 months and subsequent period of 12 months are given below.

Sl. No.	Extended Period for the reasons attributable to BHEL	ORC rate applicable over executed value
1	First 12 months	5%
2	13th-24th month and so on	10.25% {[(1.05 x 1.05)-1] x 100}

This process of increasing ORC rate for each subsequent period of 12 months shall continue till applicability of ORC.

2.12.3.2 On completion of original contract period as well as on completion of each subsequent period of twelve months i.e. at the time of change in applicable ORC rate, Delay Analysis shall be carried out and percentage shortfall attributable to both BHEL & Contractor shall be calculated.

2.12.3.3 For the purpose of calculation of ORC, executed value of work in the month shall be divided in Part-1 and Part-2 in proportion of percentage shortfall attributable to BHEL and contractor respectively, based on the last delay analysis as worked out in 2.12.3.2.
ORC shall be payable only on Part-1 and no ORC shall be payable on Part-2.

Value of Part-1 shall be further limited to the value of actual inputs provided by BHEL i.e. "Plan - Shortfall attributable to BHEL" for the month, as per Form-14 for calculation of ORC.

2.12.3.4 Payment of ORC amount shall be further regulated as follows:

(i) 50% of the ORC is allocated for deployment of matching resources (with weightages) agreed as per the joint programme drawn vide 2.11.4. ORC Payment against resources shall be calculated in proportion to percentage of resources actually deployed w.r.t. planned resources, as per Form-14.

(ii) 50% of ORC is allocated for achieving of planned progress agreed as per the joint programme drawn vide 2.11.4. ORC Payment shall be reduced in proportion to percentage shortfall attributable to contractor w.r.t. "Plan - Shortfall attributable to BHEL" for the month, as per Form-14.

2.12.3.5 The maximum amount of ORC payable for the month shall be limited to Rs. 5,00,000/-.

2.12.3.6 In case, there is no shortfall attributable to contractor for the month and also contractor has deployed the resources as agreed in Form-14 but ORC amount payable for the month worked out as per procedure mentioned in clause 2.12.3.3, 2.12.3.4 and 2.12.3.5, is less than Rs.1,00,000/-, then ORC amount payable for the month shall be Rs.1,00,000/- otherwise ORC amount payable for the month shall remain same.

2.12.3.7 In case execution is on **HOLD** (Other than Force Majeure), ORC shall be payable as per following:

i). Contractor has not been permitted by BHEL to de-mobilize
   a) ORC amount of Rs. 1,00,000/- per month shall be applicable during the period of HOLD provided resources as planned are deployed (not demobilised) during the period of hold.
   b) Subsequent to lifting of HOLD, Period of HOLD shall not be excluded in calculation of period for deciding applicable ORC rate as per clause 2.12.3.1.

ii). Contractor has been permitted to demobilize and to remobilize after lifting of HOLD
   a) No ORC shall be payable to contractor for the period of HOLD.
   b) Subsequent to lifting of HOLD, Period of HOLD shall not be excluded in calculation of period for deciding applicable ORC rate as per clause 2.12.3.1.

2.12.3.8 In case **Force Majeure** is invoked:
   (i) No ORC shall be applicable during the period of Force Majeure.
   (ii) Subsequent to revocation of Force Majeure, period of Force Majeure shall be excluded in calculation of period for deciding applicable ORC rate as per clause 2.12.3.1.

2.12.4 Applicability of ORC: ORC shall not be applicable for following activities.
   (i) Area cleaning, removal of temporary structures and return of scrap.
   (ii) Punch list points / pending points liquidation pending due to reasons attributable to contractor
   (iii) Submission of "As built Drawing"
   (iv) Material Reconciliation
   (v) Completion of Contract Closure formalities like HR Clearance/ No dues from various dept./ Statutory Authorities etc.

2.12.5 Total Over Run Compensation shall be limited to 10% of the cumulatively executed contract value till the month (excluding Taxes and Duties if payable extra). For this purpose, executed contract value excludes PVC, ORC and Extra/Supplementary Works.

(e) Clause 2.14 of GCC (Quantity Variation)

a) Existing Clause 2.14.1 of GCC stands revised as follows:

"**The quantities given in the contract are tentative and may change to any extent (both in plus side and minus side)**. The quoted rates for individual items shall remain firm irrespective of any variations in the individual quantities No compensation becomes payable in case the variation of the final executed contract value is within the limit of Minus (-) 15% of awarded contract value"

b) Existing Clause 2.14.2 ii). of GCC stands revised as follows:

"In case the finally executed contract value increases above the awarded Contract Value due to quantity variation, there will be no upward revision in the rates **for the individual items and also contractor is not eligible for any compensation.**"

(f) Clause 2.17 of GCC (Price Variation Compensation) stands revised as follows:

2.17 PRICE VARIATION COMPENSATION – NOT APLICABLE

2.17.1 In order to take care of variation in cost of execution of work on either side, due to variation in the index of LABOUR, HIGH SPEED DIESEL OIL, WELDING ROD, CEMENT, STEEL, MATERIALS,
Price Variation Formula as described herein shall be applicable (only for works executed during extended period, if any, subject to other conditions as described in this section)

2.17.2 85% component of Contract Value shall be considered for PVC calculations and remaining 15% shall be treated as fixed component. The basis for calculation of price variation in each category, their component, Base Index shall be as under:

SL NO	CATEGORY	BASE INDEX	PERCENTAGECOMPONENT('K')				
			CIVIL PACKAGES (See Note AB/C)			MECHANICAL PACKAGES	Electrical, C&I Material Management/Handling and other labour oriented packages
			A	B	C		
i)	LABOUR (ALL CATEGORIES)	'MONTHLY ALL-INDIA AVERAGE CONSUMER PRICE INDEX NUMBERS FOR INDUSTRIAL WORKERS' published by Labour Bureau, Ministry of Labour and Employment, Government of India. (Website: labourbureau.nic.in)	40	25	30	65	80
ii)	HIGH SPEED DIESEL OIL	Name of Commodity: HSD Commodity Code: 1202000005 (See Note E)	5	3	5	5	5
iii)	WELDING ROD	Name of Commodity: MANUFACTURE OF BASIC METALS Commodity Code: 1314000000 (See Note E)				15	
iv)	CEMENT	Name of Commodity: ORDINARY PORTLAND CEMENT Commodity Code: 1313050003 (See Note E)		20	30		
v)	STEEL (Structural and Reinforcement Steel)	Name of Commodity: MILD STEEL: LONG PRODUCTS Commodity Code: 1314040000 (See Note E)		25			
vi)	All OTHER MATERIALS (Other than Cement & Steel)	Name of Commodity: ALL COMMODITIES Commodity Code:1000000000 (See Note E)	40	12	20		

Note: A) Cement & Steel:Free Issue (BHEL Scope)
B) Cement & Steel :In Contractor Scope
C) Cement in Contractor Scope, and Steel is Free Issue (BHEL Scope)
D) For Composite packages (i.e. Civii+Mechanicai+Eiectrical and/or CI or Civil+Mechanical or Mechanicai+Eiectrical and/or CI}, the COMPONENT ('K') for various categories shall be as per respective packages as above.
E) As per the 'MONTHLY WHOLE SALE PRICE INDEX' for the respective Commodity and Type, published by Office of Economic Adviser, Ministry of Commerce and Industry, Government of India. (Website: http://eaindustry.nic.in/home.asp). Revisions in the index or commodity will be re adjusted accordingly.

2.17.3 #

2.17.4 Payment/recovery due to variation in index shall be determined on the basis of the following notional formula in respect of the identified COMPONENT ('K') viz LABOUR, HIGH SPEED DIESEL OIL, WELDING ROD, CEMENT, STEEL, MATERIALS.

$$P = K \times R \times \frac{(X_N - X_o)}{X_o}$$

Where

P =Amount to be paid/recovered due to variation in the Index for Labour, High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials

K = Percentage COMPONENT ('K') applicable for Labour, High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials

R=Value of work done for the billing month (Excluding Taxes and Duties if payable extra)

X_N = Revised Index for Labour, High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials for the billing month under consideration

Xo = Index for Labour, High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials as on the Base date

2.17.5 Base date shall be the calendar month of the schedule completion date (i.e. Actual start date+ Scheduled Contractual completion period as per Letter of Intent/award and/or work order).

2.17.6 PVC shall not be payable for the ORC amount, Supplementary/Additional Items, Extra works.
However, PVC will be payable for items executed under quantity variation of BOQ items under originally awarded contract.

2.17.7 The contractor shall furnish necessary monthly bulletins in support of the requisite indices from the relevant websites along with his Bills.

2.17.8 The contractor will be required to raise the bills for price variation payments on a monthly basis along with the running bills irrespective of the fact whether any increase/decrease in the index for relevant categories has taken place or not. In case there is delay in publication of bulletins (final figure), the provisional values as published can be considered for payments and arrears shall be paid/recovered on getting the final values.

2.17.9 PVC shall be applicable only, during the extended period of contract (if any) after the scheduled completion period and for the portion of work delayed / backlog for the reasons not attributable to the Contractor.

However total quantum of Price Variation amount payable/recoverable shall be regulated as follows:

i. For the portion of shortfall / backlog not attributable to contractor, PVC shall be worked out on the basis of indices applicable for the respective month in which work is done. Base index shall be applicable as defined in clause 2.17.5

ii. In case of Force majeure, PVC shall be regulated as per (a) or (b) below:

a) Force majeure is invoked before "base date"/ “revised base date" (as explained below) OR immediately after "base date"/ “revised base date" in continuation (i.e. during the period when PVC is not applicable):

1. Base date shall be revised: Revised base date =Previous base date+ duration of Force majeure. No PVC will be applicable for the work done till revised base date.

2. PVC will be applicable for the work done after "base date"/ “revised base date" as the case may be (during extended period when delay is not attributable to contractor). PVC shall be worked out on the basis of indices applicable for the respective month in which work is done with base index as on "base date"/"revised base date" as the case may be.

b) Force majeure is invoked after "base date"/ "revised base date" as the case may be (during extended period when delay is not attributable to contractor) -

1. PVC shall be applicable for the work done after revocation of force majeure.

2. PVC for the work done after revocation of force majeure shall be worked out on the basis of indices applicable for the respective month in which work is done excluding the effect of change in indices during total period of Force majeure(s) invoked after "base date"/ "revised base date" as the case may be. Base index shall be taken as on "base date"/ "revised base date" as the case may be.

iii. The total amount of PVC shall not exceed 15% of the cumulatively executed contract value. Executed contract value for this purpose is exclusive of PVC, ORC, Supplementary/Additional Items and Extra works except extra items due to quantity variation.

(g) Clause 2.2 of GCC (Law governing the contract and court jurisdiction) stands revised as follows:

"The contract shall be governed by the Law for the time being in force in the Republic of India. **Subject to Clause 2.21.1 or 2.21.2 of this Contract**, the Civil Court having original Civil Jurisdiction at Delhi for PSNR, at Kolkata for PSER, at Nagpur for PSWR and at Chennai for PSSR, shall alone have exclusive jurisdiction in regard to all **matters** in respect of the Contract."

(h) Existing Clause 2.21 "ARBITRATION" of GCC has been amended as follows:

2.21 ARBITRATION & CONCILIATION

2.21.1 ARBITRATION:

2.21.1.1 Except as provided elsewhere in this Contract, in case Parties are unable to reach amicable settlement (whether by Conciliation to be conducted as provided in Clause 2.21.2 herein below or otherwise) in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract; or. in any manner touching upon the Contract (hereinafter referred to as the 'Dispute'), then, either Party may, commence arbitration in respect of such Dispute by issuance of a notice in terms of section 21 of the Arbitration & Conciliation Act, 1996 (hereinafter referred to as the 'Notice'). The Notice shall contain the particulars of all claims to be referred to arbitration in sufficient detail and shall also indicate the monetary amount of such claim. The arbitration shall be conducted by a sole arbitrator to be appointed by the Head of the BHEL Power Sector Region issuing the Contract within 60 days of receipt of the complete Notice. The language of arbitration shall be English.

The Arbitrator shall pass a reasoned award.

Subject as aforesaid, the provisions of Arbitration and Conciliation Act 1996 (India) or statutory modifications or re-enactments thereof and the rules made thereunder as in force from time to time shall apply to the arbitration proceedings under this clause. The seat of arbitration shall be Kolkata (the place from where the contract is Issued). The Contract shall be governed by and be construed as per provisions of the laws of India. Subject to this provision 2.21.1.1 regarding ARBITRATION, the principal civil court exercising ordinary civil jurisdiction over the area where the seat of arbitration is located shall have exclusive jurisdiction over any DISPUTE to the exclusion of any other court.

2.21.1.2 In case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:

In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs)/ Port Trusts inter se and also between CPSEs and Government Departments/Organizations (excluding disputes concerning Railways, Income Tax, Customs & Excise Departments), such dispute or difference shall be taken up by either party for resolution through AMRCD (Administrative Mechanism for Resolution of CPSEs Disputes) as mentioned in DPE OM No. 4(1)/2013-DPE(GM)/FTS-1835 dated 22-05-2018 as amended from time to time.

2.21.1.3 The cost of arbitration shall initially be borne equally by the Parties subject to the final allocation thereof as per the award/order passed by the Arbitrator.

2.21.1.4 Notwithstanding the existence of any dispute or differences and/or reference for the arbitration, the Contractor shall proceed with and continue without hindrance the performance of its obligations under this Contract with due diligence and expedition in a professional manner unless the dispute inter-alia relates to cancellation, termination or short-closure of the Contract by BHEL.

2.21.2 CONCILIATION:

If at any time (whether before, during or after the arbitral or judicial proceedings), any Disputes (which term shall mean and include any dispute, difference, question or disagreement arising in connection with construction, meaning, operation, effect, interpretation or breach of the agreement, contract), which the Parties are unable to settle mutually, arise inter-se the Parties, the same may, be referred by either party to Conciliation to be conducted through Independent Experts Committee (IEC) to be appointed by competent authority of BHEL from the BHEL Panel of Conciliators.

Notes:

1. No serving or a retired employee of BHEL/Administrative Ministry of BHEL shall be included in the BHEL Panel of Conciliators.

2. Any other person(s) can be appointed as Conciliator(s) who is/are mutually agreeable to both the parties from outside the BHEL Panel of Conciliators.

The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in Procedure 2.3 to this GCC. The Procedure 2.3 together with its Formats will be treated as if the same is part and parcel hereof and shall be as effectual as if set out herein in this GCC.

The Contractor hereby agrees that BHEL may make any amendments or modifications to the provisions stipulated in the Procedure 2.3 to this GCC from time to time and confirms that it shall be bound by such amended or modified provisions of the Procedure 2.3 with effect from the date as intimated by BHEL to it.

2.21.3 No Interest payable to Contractor

Notwithstanding anything to the contrary contained in any other document comprising in the Contract, no interest shall be payable by BHEL to Contractor on any moneys or balances including but not limited to the Security Deposit, EMD, Retention Money, RA Bills or the Final Bill, or any amount withheld and/or appropriated by BHEL etc., which becomes or as the case may be, is adjudged to be due from BHEL to Contractor whether under the Contract or otherwise.

(i) Clause no. 2.7.2 and 2.7.3 of Volume-IB-GCC shall be revised as follows:

2.7.2.1 To terminate the contract or withdraw portion of work and get it done through other agency, at the risk and cost of the contractor after due notice of a period of 14 days' by BHEL in any of the following cases:

i). Contractor's poor progress of the work vis-à-vis execution timeline as stipulated in the Contract, backlog attributable to contractor including unexecuted portion of work does not appear to be executable within balance available period considering its performance of execution.

ii). Withdrawal from or abandonment of the work by contractor before completion of the work as per contract.

iii). Non-completion of work by the Contractor within scheduled completion period as per Contract or as extended from time to time, for the reasons attributable to the contractor.

iv). Termination of Contract on account of any other reason (s) attributable to Contractor.
v). Assignment, transfer, subletting of Contract without BHEL's written permission.
vi). Non-compliance to any contractual condition or any other default attributable to Contractor.

Risk & Cost Amount against Balance Work:

Risk & Cost amount against balance work shall be calculated as follows: Risk & Cost Amount= [(A-B) + (A x H/100)]
Where,
A= Value of Balance scope of Work (*) as per rates of new contract
B= Value of Balance scope of Work (*) as per rates of old contract being paid to the contractor at the time of termination of contract i.e. inclusive of PVC & ORC, if any.
H = Overhead Factor to be taken as 5

In case (A-B) is less than 0 (zero), value of (A-B) shall be taken as 0 (zero).

* Balance scope of work (in case of termination of contract):
Difference of Contract Quantities and Executed Quantities as on the date of issue of Letter for 'Termination of Contract', shall be taken as balance scope of Work for calculating risk & cost amount. Contract quantities are the quantities as per original contract. If, Contract has been amended, quantities as per amended Contract shall be considered as Contract Quantities.
Items for which total quantities to be executed have exceeded the Contract Quantities based on drawings issued to contractor from time to time till issue of Termination letter, then for these items total Quantities as per issued drawings would be deemed to be contract quantities.
Substitute/ extra items whose rates have already been approved would form part of contract quantities for this purpose. Substitute/ extra items which have been executed but rates have not been approved, would also form part of contract quantities for this purpose and rates of such items shall be determined in line with contractual provisions.
However, increase in quantities on account of additional scope in new tender shall not be considered for this purpose.

NOTE: Incase portion of work is being withdrawn at risk & cost of contractor instead of termination of contract, contract quantities pertaining to portion of work withdrawn shall be considered as 'Balance scope of work' for calculating Risk & Cost amount.

LD against delay in executed work in case of Termination of Contract:

LD against delay in executed work shall be calculated in line with LD clause no. 2.7.9 of GCC, for the delay attributable to contractor. For limiting the maximum value of LD, contract value shall be taken as Executed Value of work till termination of contract.

Method for calculation of "LD against delay in executed work in case of termination of contract" is given below.

i). Let the time period from scheduled date of start of work till termination of contract excluding the period of Hold (if any) not attributable to contractor = T1
ii) Let the value of executed work till the time of termination of contract= X
iii) Let the Total Executable Value of work for which inputs/fronts were made available to contractor and were planned for execution till termination of contract = Y
iv) Delay in executed work attributable to contractor i.e. T2=[1-(X/Y)] x T1
v) LD shall be calculated in line with LD clause (clause 2.7.9) of the Contract for the delay attributable to contractor taking "X" as Contract Value and "T2" as period of delay attributable to contractor.

2.7.2.2 In case Contractor fails to deploy the resources as per requirement, BHEL can deploy own/hired/otherwise arranged resources at the risk and cost of the contractor and recover the

expenses incurred from the dues payable to contractor. Recoveries shall be actual expenses incurred plus 5% overheads or as defined in TCC.

2.7.3 Recoveries arising out of Risk & Cost and LD or any other recoveries due from Contractor

Following sequence shall be applicable for recoveries from contractor:

a) Dues available in the form of Bills payable to contractor, SD, BGs against the same contract.
b) Demand notice for deposit of balance recovery amount shall be sent to contractor, if funds are insufficient to effect complete recovery against dues indicated in (a) above.
c) If contractor fails to deposit the balance amount to be recovered within the period as prescribed in demand notice, following action shall be taken for balance recovery:
   i) Dues payable to contractor against other contracts in the same Region shall be considered for recovery.
   ii) If recovery cannot be made out of dues payable to the contractor as above, balance amount to be recovered, shall be informed to other Regions/Units for making recovery from the Unpaid Bills/Running Bills/SD/BGs/Final Bills of contractor.
   iii) In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against contractor.

(j) Clause 2.24 of GCC (Performance Guarantee for Workmanship)

Term "**Special** Conditions of Contract" appearing in 3rdline of the current clause 2.24.1,is replaced by "**Technical** Conditions of Contract"

(k) Clause 4.2.1.7 of Special Condition of Contract (SCC)

At the end of Clause 4.2.1.7 (i.e. after the line "Decision of BHEL shall be final and binding on the contractor") following para is to be added

"It is not obligatory on the part of BHEL to provide any tools and tackles or other materials other than those specifically agreed to do so by BHEL. However, depending upon the availability, BHEL /BHEL's Customer handling equipment and other plants may be made available to the contractor on payment of hire charges as fixed, subject to the conditions laid down by BHEL/Customer from time to time. Unless paid in advance, such hire charges, if applicable, shall be recovered from contractor's bill / security deposit or any other due payment in one installment."

(l) Clause 9.61 of SCC (NON-COMPLIANCE)

Under NON-COMPLIANCE, at the end of Clause 9.61 (i.e. **after the line** "Also the amount will be spent for purchasing the safety appliances and supporting the safety activity at site.") following para is to be added:

"In case of any financial deduction made by Customer for lapses of safety other than what is provided above or elsewhere in the contract, the same shall be charged on back-to-back basis on the defaulting contractor without prejudice to any other right spelt anywhere in the tender / contract"

(m) Clause 9.1 & 9.2 to 9.62 of SCC (HSE & OHSAS Obligations)

Cl. no. 9.0	No change
Cl. no. 9.1	HSE (Health, safety & Environment): Contractor will comply with HSE (Health, safety & Environment) requirements of BHEL as per “HSE Plan for Site Operations by Sub-contractors” (Document no. HSEP:14, Rev.00) attached with this tender.
Cl. no. 9.2 to 9.62	Deleted

DOCUMENT NO: PS:MSX:GCC, REV 02, 16TH JUNE'2021

General Conditions of Contract

(Common for Power Sector Regions)

2021

BHARAT HEAVY ELECTRICALS LIMITED

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CHAPTER -1

1. GENERAL INSTRUCTION TO TENDERERS

1.1. DESPATCH INSTRUCTION

i) The General Conditions of Contract form part of the Tender specifications. **All pages of the tender documents shall be duly signed, stamped and submitted along with the offer in token of complete acceptance thereof. (For E-Tender, bidders shall use electronic Signature viz Digital Signature Certificate while uploading on the e-procurement portal.** The information furnished shall be complete by itself. The tenderer is required to furnish all the details and other documents as required in the following pages.

ii) Tenderers are advised to study all the tender documents carefully. Any submission of tender by the tenderer shall be deemed to have been done after careful study and examination of the tender documents and with the full understanding of the implications thereof. Should the tenderers have any doubt about the meaning of any portion of the Tender Specification or find discrepancies or omissions in the drawings or the tender documents issued are incomplete or shall require clarification on any of the technical aspect, the scope of work etc., he shall at once, contact the authority inviting the tender well in time (so as not to affect last date of submission) for clarification before the submission of the tender. Tenderer's request for clarifications shall be with reference to Sections and Clause numbers given in the tender documents. The specifications and terms and conditions shall be deemed to have been accepted by the tenderer in his offer. Non-compliance with any of the requirements and instructions of the tender enquiry may result in the rejection of the tender.

iii) Integrity pact (IP) shall be applicable for all tenders / contracts if indicated in NIT. This integrity pact shall be issued as part of the Tender documents and shall be submitted by the bidder along with Techno-commercial bid duly filled, signed and stamped by the authorized signatory who signs the bid. Only those vendors / bidders who have entered into such an IP with BHEL shall be considered qualified to participate in the bidding. Entering into this pact shall be a preliminary qualification.

1.2. SUBMISSION OF TENDERS

1.2.1 The tenderers must submit their tenders to Officer inviting tender as per instructions in the NIT.

1.2.2 Tenders submitted by post (i.e. by 'REGISTERED POST / by COURIER') shall be sent with due allowance for any postal/courier delays. BHEL takes no responsibility for delay, loss or non-receipt of tenders sent by post/courier. **The tenders received after the specified time of their submission are treated as 'Late Tenders' and shall not be considered under any circumstances.** Offers received by Email shall be considered as per terms of NIT. E-Tenders shall be submitted through E-Procurement portal as per instruction in NIT. Tenderers to upload offers well in advance in order to avoid last minute congestion in e-procurement website. However, after submission of the tender, the tenderer can re-submit revised tender but before due date and time of submission of tender as notified.

1.2.3 Tenders shall be opened by Officer of BHEL at the time and date as specified in the NIT, in the presence of such of those tenderers or their authorized representatives who would like to be present (In case of Manual Tenders). BHEL reserves the right to go ahead with opening of the

Tender even in case of no representative is present on the specified date and time. For e-tenders, bidders may mark their presence online through provisions available in e-procurement portal.

1.2.4 Tenderers whose bids are found techno commercially qualified shall be informed about the date and time of opening of the Price Bids and such Tenderers may depute their representatives to witness the opening of the price bids (In case of Manual Tenders). BHEL's decision in this regard shall be final and binding.

1.2.5 Before submission of Offer, the tenderers are advised to inspect the site of work and the environments and be well acquainted with the actual working and other prevalent conditions, facilities available, position of material and labour, means of transport and access to Site, accommodation etc. No claim will be entertained later on the grounds of lack of knowledge of any of these conditions.

The tenderer may get aware about weather conditions, contingencies & other circumstances which may influence or affect their tender prices. Invariable of inspection by the tenderer, the tenderer shall be considered deemed acquainted with all site conditions such as rain patterns, hazardous conditions, soil patterns, local factors etc. Tenderer to have satisfied himself in all respect before quoting his rates and no claim will be entertained later on the grounds of lack of knowledge of any of these conditions.

1.3. LANGUAGE

1.3.1 The tenderer shall quote the rates in English language and international numerals. These rates shall be entered in figures as well as in words. Tenderers are requested to refer the clauses of NIT/ Vol-II "Price Bid" for more details. For the purpose of the tenders, the metric system of units shall be used.

1.3.2 All entries in the tender shall either be typed or written legibly in ink. Erasing and over-writing is not permitted and may render such tenders liable for rejection. All cancellations and insertions shall be duly attested by the tenderer.

1.4 PRICE DISCREPANCY:

1.4.1 **Price Bid opening**: During opening of price bids (submitted through conventional method or through E-Procurement system), if there is any difference between the amount in figures and in words, the amount quoted by the bidder in words shall be taken as correct.

1.4.2 **Reverse Auction**: In case of Reverse Auction, the successful bidder shall undertake to execute the work as per overall price offered by him during the Reverse Auction process. (Guidelines as available on www.bhel.com on "**supplier registration page**".).

1.5 QUALIFICATION OF TENDERERS

i) Only tenderers who have previous experience in the work of the nature and description detailed in the Notice Inviting Tender and/or tender specification are expected to quote for this work duly detailing their experience along with offer.

ii) Offers from tenderers who do not have proven and established experience in the field shall not be considered.

iii) The offers of the bidders who are on the banned/ hold list and also the offer of the bidders, who engage the services of the banned/ hold firms, shall be rejected. The list of **banned/ hold firms** is available on BHEL web site www.bhel.com. (Refer clause 28.0 of NIT)

iv) Offers from tenderers who do not comply with the latest guidelines of Ministry/Commissions of Govt. of India shall not be considered.

1.6. EVALUATION OF BIDS

i) Technical Bids submitted by the tenderer will be opened first and evaluated for fulfilling the Pre-Qualification criteria and other conditions in NIT/Tender documents, based on documentary evidences submitted along with the offer

ii) In case the same qualifying experience is claimed by more than one agency, then:

a. The agency who has executed the work as per documentary evidence submitted shall only be qualified. Scope of qualifying work should be totally with the agency who has executed and in case it is only labour and consumables without T&P, then the credentials of execution is assigned to the first agency and not to the agency who has executed only as labour supply contractor. Further, BHEL reserves the right to ask for any other proof for the said job.

b. However, if the same is on account of subletting part of scope by one agency to another agency in a project of BHEL, experience of both the agencies may be considered for the sublet portion of the work provided subletting has been done with the approval of BHEL.

iii) In case the qualifying experience is claimed by private organizations (sub-agency) based on 'Work Order' and 'Experience Certificates' from a non-BHEL organization (main agency), then it shall be the responsibility of sub-agency to submit (in addition to the experience certificate from main agency) relevant certificate regarding qualifying experience from the end Customer or the Turnkey-Contractor (if any) who has awarded the work to main agency, as a proof for having executed subject qualifying work. BHEL reserves the right to ask for any other proof for the said job.

iv) Assessing Bidder's Capacity for executing the current tender shall be as per Notice Inviting Tender.

v) Price Bids of shortlisted bidders shall only be opened either through the conventional/electronic price bid opening with/without Reverse Auction, at the discretion of BHEL. Unless specified otherwise in the tender, the L1 bidder amongst all the shortlisted bidders shall be considered for award. However, the L1 bidder shall have no claim on the award & BHEL reserves the right to award the tender at its sole discretion.

vi) Price Bids of unqualified bidders shall not be opened. Reasons for rejection shall be intimated in due course after issue of LOI/LOA to successful bidder either through system generated e-mail or through letter/e-mail.

vii) Bidders are advised to also refer to clause no 2.9.4 regarding evaluation of their performance in ongoing projects for the current tender.

1.7. DATA TO BE ENCLOSED

Full information shall be given by the tenderer in respect of the following. Non-submission of this information may lead to rejection of the offer.

i) **INCOME TAX PERMANENT ACCOUNT NUMBER**

Certified copies of Permanent Account Numbers as allotted by Income Tax Department for the Company/Firm/Individual Partners etc. shall be furnished along with tender.

ii) **ORGANIZATION CHART**

The organization chart of the tenderer's organization, including the names, addresses and contact information of the Directors/Partners shall be furnished along with the offer.

iii) An attested copy of the Power of Attorney, in case the tender is signed by an individual other than the sole proprietor.

iv) **IN CASE OF INDIVIDUAL TENDERER:**

His / her full name, address, PAN and place & nature of business.

v) **IN CASE OF PARTNERSHIP FIRM:**

The names of all the partners and their addresses, A copy of the partnership deed/instrument of partnership dully certified by the Notary Public shall be enclosed.

vi) **IN CASE OF COMPANIES:**

a) Date and place of registration including date of commencement certificate in case of Public

Companies (certified copies of Memorandum and articles of Association are also to be furnished).

b) Nature of business carried on by the Company and the provisions of the Memorandum relating thereof.

1.8 AUTHORIZATION AND ATTESTATION

Tenders shall be signed by a person duly authorized/empowered to do so, for which a Power of Attorney is to be submitted along with the tender offer. For company, a Power of Attorney (as per format in Volume-I D) shall be submitted.

1.9 EARNEST MONEY DEPOSIT

1.9.1 Every tender must be accompanied by the prescribed amount of Earnest Money Deposit (EMD) in the manner described herein.

i) EMD shall be furnished before tender opening / along with the offer in full as per the amount indicated in the NIT.

ii) The EMD is to be paid only in the following forms:

a) Cash deposit as permissible under the extant Income Tax Act (before tender opening).

b) Electronic Fund Transfer credited in BHEL account (before tender opening).

c) Banker's cheque / Pay order / Demand draft, in favour of 'Bharat Heavy Electricals Limited' and payable at Regional HQ issuing the tender (along with offer).

d) Fixed Deposit Receipt (FDR) issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL) (along with offer). The Fixed Deposit in such cases shall be valid for at least six months from the due date of tender submission.

In case EMD amount is more than Rs. Two Lakhs, Tenderer has the option to submit Rs. Two lakhs in the forms described above in clause no. 1.9.1. (a) to (d) and the remaining amount over and above Rs. Two Lakhs in the form of Bank Guarantee from Scheduled Bank (along with the Offer). The Bank Guarantee in such cases shall be valid for at least six months from the due date of tender submission. The Bank Guarantee format for EMD shall be in the prescribed formats.

iii) No other form of EMD remittance shall be acceptable to BHEL.

1.9.2 EMD by the Tenderer will be forfeited as per NIT conditions, if:

i) After opening the tender and within the offer validity period, the tenderer revokes his tender or makes any modification in his tender which is not acceptable to BHEL.

ii) The Contractor fails to deposit the required Security deposit or commence the work within the period as per LOI/ LOA/ Contract.

EMD by the tenderer shall be withheld in case any action on the tenderer is envisaged under the provisions of extant "Guidelines on Suspension of business dealings with suppliers/ contractors" and forfeited/ released based on the action as determined under these guidelines.

1.9.3 EMD shall not carry any interest.

1.9.4 EMD given by all unsuccessful tenderers shall be refunded normally within fifteen days of award of work.

1.9.5 Cash portion of EMD of successful tenderer will be retained as part of Security Deposit. EMD submitted in the form of Bank Guarantee/ FDR shall be retained by BHEL until the receipt of at least 50% of the Security Deposit.

1.10 SECURITY DEPOSIT

1.10.1 Upon acceptance of Tender, the successful Tenderer should deposit the required amount of Security Deposit towards fulfilment of any obligations in terms of the provisions of the contract. The total amount of Security Deposit will be 5% of the contract value.

1.10.2 The security Deposit should be furnished before start of the work by the contractor.

Note: In case of small value contracts not exceeding Rs. 20 lakhs, work can be started before the required Security Deposit is collected. However, payment can be released only after collection/ recovery of initial 50% Security Deposit.

1.10.3 The balance amount to make up the required Security Deposit of 5% of the contract value may be accepted in the following forms.

i) Cash (as permissible under the extant Income Tax Act).
ii) Local cheques of Scheduled Banks (subject to realization)/ Pay Order/ Demand Draft/ Electronic Fund Transfer in favour of BHEL.
iii) Securities available from Indian Post offices such as National Savings Certificates, Kisan Vikas Patras etc. (held in the name of Contractor furnishing the security and duly endorsed/ hypothecated/ pledged, as applicable, in favour of BHEL).
iv) Bank Guarantee from Scheduled Banks/ Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format for Security Deposit shall be in the prescribed formats.
v) Fixed Deposit Receipt issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL).
vi) Security deposit can also be recovered at the rate of 10% of the gross amount progressively from each of the running bills of the contractor till the total amount of the required security deposit is collected. However, in such cases at least 50% of the required Security Deposit, including the EMD, should be deposited in any form as prescribed before start of the work and the balance 50% may be recovered from the running bills as described above.

Note: BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith.

1.10.4 The Security Deposit shall not carry any interest.

1.10.5 In case the value of work exceeds the awarded / accepted value, the Security Deposit shall be correspondingly enhanced as given below:
i) The enhanced part of the Security Deposit shall be immediately deposited by the Contractor or adjusted against payments due to the Contractor.
ii) Contract value for the purpose of operating the increased value of Security Deposit due to Quantity Variation, shall be exclusive of Price Variation Clause, Over Run Compensation and Extra works done on manday rates.
iii) The recoveries made from running bills (cash deduction towards balance SD amount) can be released against submission of equivalent Bank Guarantee in acceptable form, but only once, before completion of work, with the approval of competent authority of BHEL.

1.10.6 The validity of Bank Guarantees towards Security Deposit shall be initially up to the completion period as stipulated in the Letter of Intent/ Award + Guarantee Period + 3 months, and the same

shall be kept valid by proper renewal by the contractor till the acceptance of Final Bills of the Contractor by BHEL.

1.10.7 BHEL reserves the right of forfeiture of Security Deposit in addition to other claims and penalties in the event of the Contractor's failure to fulfill any of the contractual obligations or in the event of termination of contract as per terms and conditions of contract. BHEL reserves the right to set off the Security Deposit against any claims of other contracts with BHEL.

1.11 RETURN OF SECURITY DEPOSIT

Security Deposit shall be released to the contractor upon fulfillment of contractual obligations as per terms of the contract including completion of Guarantee Period after deducting all expenses / other amounts due to BHEL under the contract / other contracts entered into with them by BHEL.

1.12 BANK GUARANTEES

Where ever Bank Guarantees are to be furnished/submitted by the contractor, the following shall be complied with

i) Bank Guarantees shall be from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. Bank Guarantees issued by Co-Operative Banks/ Financial Institutions shall not be accepted.

ii) The Bank Guarantees shall be as per prescribed formats.

iii) It is the responsibility of the bidder to get the Bank Guarantees revalidated/extended for the required period as per the advice of BHEL Site Engineer / Construction Manager. BHEL shall not be liable for issue of any reminders regarding expiry of the Bank Guarantees.

iv) In case extension/further extensions of any Bank Guarantees are not required, the bidders shall ensure that the same is explicitly endorsed by the Construction Manager and submitted to the Regional HQ issuing the LOI/LOA.

v) In case the Bank Guarantees are not extended before the expiry date, BHEL reserves the right to invoke the same by informing the concerned Bank in writing, without any advance notice/communication to the concerned bidder.

vi) Bidders to note that any corrections to Bank Guarantees shall be done by the issuing Bank, only through an amendment in an appropriate non judicial stamp paper.

vii) The Original Bank Guarantee shall be submitted to Subcontracting Department of the respective Region of BHEL.

1.13 VALIDITY OF OFFER

The rates in the Tender shall be kept open for acceptance for a minimum period of **SIX MONTHS** from latest due date of offer submission (including extension, if any). In case BHEL (Bharat Heavy Electricals Ltd) calls for negotiations, such negotiations shall not amount to cancellation or withdrawal of the original offer which shall be binding on the tenderers.

1.14 EXECUTION OF CONTRACT AGREEMENT

The successful tenderer's responsibility under this contract commences from the date of issue of the Letter of Intent/ Award by Bharat Heavy Electricals Limited.

The successful tenderer shall be required to execute an agreement in the prescribed form, with BHEL, within a reasonable time after the acceptance of the Letter of Intent/Award, and in any case before releasing the first running bill. The contract agreement shall be signed by a person duly authorized/empowered by the tenderer. The expenses for preparation of agreement document shall be borne by BHEL.

1.15 REJECTION OF TENDER AND OTHER CONDITIONS

1.15.1 The acceptance of tender will rest with BHEL which does not bind itself to accept the lowest tender or any tender and reserves to itself full rights for the following without assigning any reasons whatsoever: -

a. To reject any or all of the tenders.
b. To split up the work amongst two or more tenderers as per NIT.
c. To award the work in part if specified in NIT.
d. In case of either of the contingencies stated in (b) and (c) above, the time for completion as stipulated in the tender shall be applicable.

1.15.2 Conditional tenders, unsolicited tenders, tenders which are incomplete or not in the form specified or defective or have been materially altered or not in accordance with the tender conditions, specifications etc. are liable to be rejected.

1.15.3 Tenders are liable to be rejected in case of unsatisfactory performance of the tenderer with BHEL or tenderer under suspension (hold/banning) by any unit / region / division of BHEL or tenderers who do not comply with the latest guidelines of Ministry/Commissions of Govt of India. BHEL reserves the right to not consider a bidder for further processing of tender in case it is observed that they are overloaded and may not be in a position to execute this job as per the required schedule in line with clause no. 9.0 of the 'NIT'. The decision of BHEL will be final in this regard.

1.15.4 If a tenderer who is a proprietor expires after the submission of his tender or after the acceptance of his tender, BHEL may at their discretion, cancel such tender. If a partner of a firm expires after the submission of tender or after the acceptance of the tender, BHEL may then cancel such tender at their discretion, unless the firm retains its character.

1.15.5 BHEL will not be bound by any Power of Attorney granted by changes in the composition of the firm made subsequent to the execution of the contract. BHEL may, however, recognize such power of Attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the contractor concerned.

1.15.6 If the tenderer deliberately gives wrong information in his tender, BHEL reserves the right to reject such tender at any stage or to cancel the contract if awarded and forfeit the Earnest Money/Security Deposit/any other money due.

1.15.7 Canvassing in any form in connection with the tenders submitted by the Tenderer shall make his offer liable to rejection.

1.15.8 In case the Proprietor, Partner or Director of the Company/Firm submitting the Tender, has any relative or relation employed in BHEL, the authority inviting the Tender shall be informed of the fact as per specified format, along with the Offer. Failing to do so, BHEL may, at its sole discretion, reject the tender or cancel the contract and forfeit the Earnest Money/Security Deposit.

1.15.9 The successful tenderer (Contractor) should not sub-contract any portion of work detailed in the tender specification undertaken by him without prior written permission of BHEL's Construction Manager/ Site In-Charge. BHEL, at its discretion, may consider the written request from the Contractor and permit subletting of part scope. However, the Contractor is solely responsible to BHEL for the work awarded to him.

1.15.10 The Tender submitted by a techno commercially qualified tenderer shall become the property of BHEL who shall be under no obligation to return the same to the bidder. However unopened price bids and late tenders shall be returned to the bidders, in case of Conventional/ Paper bid.

1.15.11 Unsolicited discount received after the due date and time of Bid Submission shall not be considered for evaluation. However, if the party who has submitted the unsolicited discount/rebate becomes the L-1 party, then the awarded price i.e. contract value shall be worked out after considering the discount so offered.

1.15.12 BHEL shall not be liable for any expenses incurred by the bidder in the preparation of the tender irrespective of whether the tender is accepted or not.

1.16 INTIMATION OF CHANGE OF NAME/RE-CONSTITUTION OF THE ORGANIZATION

In the event of the organization (Proprietorship/Partnership/Company) undergoing any change of name or reconstitution, prior intimation of the same shall be given to BHEL. Upon such changes coming into effect, the same is to be intimated to BHEL immediately with supporting documents as applicable.

Further, the new entity has to intimate BHEL in writing that they will honor all the earlier commitments in respect of the subject contract.

CHAPTER-2

2.1 **DEFINITION:** The following terms shall have the meaning hereby assigned to them except where the context otherwise requires

i) BHEL shall mean Bharat Heavy Electricals Limited (of the respective Power Sector Region inviting the Tender), a company registered under Indian Companies Act 1956, with its Registered Office at BHEL HOUSE, SIRI FORT, NEW DELHI – 110 049, or its Power Sector Regional Offices or its Authorized Officers or its Site Engineers or other employees authorized to deal with any matters with which these persons are concerned on its behalf.

ii) "EXECUTIVE DIRECTOR" or "GENERAL MANAGER (In- charge)" or "GENERAL MANAGER" shall mean the Officer in Administrative charge of the respective Power Sector Region.

iii) "COMPETENT AUTHORITY" shall mean BHEL Officers who are empowered to act on behalf of BHEL.

iv) "ENGINEER" or "ENGINEER IN CHARGE" shall mean an Officer of BHEL as may be duly appointed and authorized by BHEL to act as "Engineer" on his behalf for the purpose of the Contract, to perform the duty set forth in this General Conditions of Contract and other Contract documents. The term also includes 'CONSTRUCTION MANAGER' or 'SITE INCHARGE' as well as Officers at Site or at the Headquarters of the respective Power Sector Regions.

v) "SITE" shall mean the places or place at which the plants/equipments are to be erected and services are to be performed as per the specification of this Tender.

vi) "CLIENT OF BHEL" or "CUSTOMER" shall mean the project authorities with whom BHEL has entered into a contract for supply of equipments or provision of services.

vii) "CONTRACTOR" shall mean the successful Bidder/Tenderer who is awarded the Contract and shall include the Contractor's successors, heirs, executors, administrators and permitted assigns.

viii) "CONTRACT" or "CONTRACT DOCUMENT" shall mean and include the Agreement of Work Order, the accepted appendices of Rates, Schedules, Quantities if any, Offer submitted by contractor including acceptance to General Conditions of Contract, Special Conditions of Contract, Instructions to the Tenderers, Drawings, Technical Specifications, the Special Specifications if any, the Tender documents, subsequent amendments /corrigendum to Tender mutually agreed upon and the Letter of Intent/Award/Acceptance issued by BHEL. Any conditions or terms stipulated by the contractor in the tender documents or subsequent letters shall not form part of the contract unless, specifically accepted in writing by BHEL in the Letter of Intent/Award and incorporated in the agreement or amendment thereof.

ix) "GENERAL CONDITIONS OF CONTRACT" shall mean the 'Instructions to Tenderers' and 'General Conditions of Contract' pertaining to the work for which above tenders have been called for.

x)	"TENDER SPECIFICATION" or "TENDER" or "TENDER DOCUMENTS" shall mean General Conditions, Common Conditions, Special Conditions, Price Bid, Rate Schedule, Technical Specifications, Appendices, Annexures, Corrigendums, Amendments, Forms, Procedures, Site information etc. and drawings/documents pertaining to the work for which the tenderers are required to submit their offers. Individual specification number will be assigned to each Tender Specification.
xi)	"LETTER OF INTENT/ AWARD" shall mean the intimation by a Letter/Fax/email to the tenderer that the tender has been accepted in accordance with provisions contained in the letter. The responsibility of the contractor commences from the date of issue of this letter and all terms and conditions of the contract are applicable from this date.
xii)	"COMPLETION TIME" shall mean the period by 'date/month' specified in the 'Letter of Intent/Award' or date mutually agreed upon for handing over of the intended scope of work, the erected equipment/plant which are found acceptable by the Engineer, being of required standard and conforming to the specifications of the Contract.
xiii)	"PLANT" shall mean and connote the entire assembly of the plant and equipments covered by the contract.
xiv)	"EQUIPMENT" shall mean equipment, machineries, materials, structural, electricals and other components of the plant covered by the contract.
xv)	"TESTS" shall mean and include such test or tests to be carried out on the part of the contractor as are prescribed in the contract or considered necessary by BHEL in order to ascertain the quality, workmanship, performance and efficiency of the contractor or part thereof.
xvi)	"APPROVED", "DIRECTED" or "INSTRUCTED" shall mean approved, directed or instructed by BHEL.
xvii)	"WORK or CONTRACT WORK" shall mean and include supply of all categories of labour, specified consumables, tools and tackles and Plants required for complete and satisfactory site transportation, handling, stacking, storing, erecting, testing and commissioning of the equipments to the entire satisfaction of BHEL.
xviii)	"SINGULAR AND PLURALS ETC" words carrying singular number shall also include plural and vice versa, where the context so requires. Words imparting the masculine Gender shall be taken to include the feminine Gender and words imparting persons shall include any Company or Associations or Body of Individuals, whether incorporated or not.
xix)	"HEADING" – The heading in these General Conditions are solely for the purpose of facilitating reference and shall not be deemed to be part thereof or be taken as instructions thereof or of the contract.
xx)	"MONTH" shall mean calendar month unless otherwise specified in the Tender.
xxi)	'Day' or 'Days' unless herein otherwise expressly defined shall mean calendar day or days of twenty-four (24) hours each. A Week shall mean continuous period of seven (7) days.

xxii)	"COMMISSIONING" shall mean the synchronization testing and achieving functional operation of the Equipment with associated system after all initial adjustments, trials, cleaning, re-assembly required at site if any, have been completed and Equipment with associated system is ready for taking into service.
xxiii)	"WRITING" shall include any manuscript type written or hand written or printed statement or electronically transmitted messages, under the signature or seal or transmittal of BHEL.
xxiv)	"TEMPORARY WORK" shall mean all temporary works for every kind required in or for the execution, completion, maintenance of the work.
xxv)	'CONTRACT PRICE' or 'CONTRACT VALUE' shall mean the sum mentioned in the LOI/LOA/Contract Agreement subject to such additions thereto or deductions there from as may be made under provisions hereinafter contained.
xxvi)	'EXECUTED CONTRACT VALUE' shall mean actual value of works executed by the contractor and certified by BHEL. This value shall not include PVC, ORC, Extra Works and Taxes.
xxvii)	"COMMENCEMENT DATE" or "START DATE" shall mean the commencement/start of work at Site as per terms defined in the Tender.
xxviii)	"SHORT CLOSING" or "FORE CLOSING" of Contract shall mean the premature closing of Contract, for reasons not attributable to the contractor and mutually agreed between BHEL and the contractor.
xxix)	"TERMINATION" of Contract shall mean the pre mature closing of contract due to reasons as mentioned in the contract.
xxx)	"DE MOBILIZATION" shall mean the temporary winding up of Site establishment by Contractor leading to suspension of works temporarily for reasons not attributable to the contractor.
xxxi)	"RE MOBILIZATION" shall mean the resumption of work with all resources required for the work after demobilization.

2.2 LAW GOVERNING THE CONTRACT AND COURT JURISDICTION

The contract shall be governed by the Law for the time being in force in the Republic of India. Subject to clause 2.21.1.1 of this contract, the Civil Court having original Civil Jurisdiction at Delhi for PSNR, at Kolkata for PSER, at Nagpur for PSWR and at Chennai for PSSR, shall alone have exclusive jurisdiction in regard to all matters in respect of the Contract.

2.3 ISSUE OF NOTICE

2.3.1 <u>Service of notice on Contractor</u>

Any notice to be given to the Contractor under the terms of the contract shall be served by sending the same by **Registered Post/Speed Post to or leaving the same at** the Contractor's last known address of the principal place of business (or in the event of the contractor being a company, to or at its Registered Office). In case of change of address, the notice shall be served at changed address as notified in writing by the Contractor to BHEL. Such posting or leaving of the notice shall be deemed to be good service of such notice and the time mentioned to the condition for doing any act after notice shall be reckoned from the date so mentioned in such notice.

2.3.2 **Service of notice on BHEL**

Any notice to be given to BHEL in-charge/Region under the terms of the Contract shall be served by sending the same by post to or leaving the same at BHEL address or changed address as notified in writing by BHEL to the Contractor.

2.4 USE OF LAND

No land belonging to BHEL or their Customer under temporary possession of BHEL shall be occupied by the contractor without written permission of BHEL.

2.5 COMMENCEMENT OF WORK

2.5.1 The contractor shall commence the work as per the time indicated in the Letter of Intent/Award from BHEL and shall proceed with the same with due expedition without delay.

2.5.2 If the contractor fails to start the work within stipulated time as per LOI/ LOA or as intimated by BHEL, then BHEL at its sole discretion will have the right to cancel the contract. The Earnest Money and/or Security Deposit with BHEL will stand forfeited without any further reference to him without prejudice to any and all of BHEL's other rights and remedies in this regard.

2.5.3 All the work shall be carried out under the direction and to the satisfaction of BHEL.

2.6 MEASUREMENT OF WORK AND MODE OF PAYMENT:

2.6.1 All payments due to the contractors shall be made by e mode only, unless otherwise found operationally difficult for reasons to be recorded in writing.

2.6.2 For progress running bill payments: - The Contractor shall present detailed measurement sheets in triplicate, duly indicating all relevant details based on technical documents and connected drawings for work done during the month/period under various categories in line with terms of payment as per contract. The basis of arriving at the quantities, weights shall be relevant documents and drawings released by BHEL. These measurement sheets shall be prepared jointly with BHEL Engineers and signed by both the parties.

2.6.3 These measurement sheets will be checked by BHEL Engineer and quantities and percentage eligible for payment under various groups shall be decided by BHEL Engineer. The abstract of quantities and percentage so arrived at based on the terms of payment shall be entered in Measurement Book and signed by both the parties.

2.6.4 Based on the above quantities, contractor shall prepare the bills, along with statutory documents, in prescribed format and work out the financial value. These will be entered in Measurement Book and signed by both the parties. Payment shall be made by BHEL after effecting the recoveries due from the contractor.

2.6.5 All recoveries due from the contractor for the month/period shall be effected in full from the corresponding running bills unless specific approval from the competent authorities is obtained to the contrary.

2.6.6 Measurement shall be restricted to that portion of work for which it is required to ascertain the financial liability of BHEL under this contract.

2.6.7 The measurement shall be taken jointly by persons duly authorized on the part of BHEL and by the Contractor.

2.6.8 The Contractor shall bear the expenditure involved if any, in making the measurements and testing of materials to be used/ used in the work. The contractor shall, without extra charges, provide all the assistance with appliances and other things necessary for measurement.

2.6.9 If at any time due to any reason whatsoever, it becomes necessary to re-measure the work done in full or in part, the expenses towards such re measurements shall be borne by the contractor unless such re measurements are warranted solely for reasons not attributable to contractor.

2.6.10 Passing of bills covered by such measurements does not amount to acceptance of the completion of the work measured. Any left out work has to be completed, if pointed out at a later date by BHEL.

2.6.11 Final measurement bill shall be prepared in the final bill format prescribed for the purpose based on the certificate issued by BHEL Engineer that entire works as stipulated in tender specification has been completed in all respects to the entire satisfaction of BHEL. Contractor shall give unqualified "No Claim" Certificate. All the tools and tackles loaned to him should be returned in satisfactory condition to BHEL. The abstract of final quantities and financial values shall also be entered in the Measurement Books and signed by both parties to the contract. The Final Bill shall be prepared and paid within a reasonable time after completion of work.

2.7 RIGHTS OF BHEL

BHEL reserves the following rights in respect of this contract during the original contract period or its extensions if any, as per the provisions of the contract, without entitling the contractor for any compensation.

2.7.1 To withdraw any portion of work and/or to restrict/alter quantum of work as indicated in the contract during the progress of work and get it done through other agencies to suit BHEL's commitment to its customer or in case BHEL decides to advance the date of completion due to other emergent reasons/ BHEL's obligation to its customer.

In case of inadequate manpower deployed by the contractor, BHEL reserves the right to deploy additional manpower through any other agency for expediting activities in the interest of the project. Supplied manpower shall be put on job by the contractor and payments and other statutory compliances related to manpower shall be the contractor's responsibility. In case of contractor's failure to fulfill his obligations in respect of such manpower, BHEL reserves the right to take necessary action as per contract conditions.

2.7.2.1 To terminate the contract or withdraw portion of work and get it done through other agency, at the risk and cost of the contractor after due notice of a period of 14 days' (this period can be reduced in case of urgency or increased otherwise) by BHEL in any of the following cases:

i). Contractor's poor progress of the work vis-à-vis execution timeline as stipulated in the Contract, backlog attributable to contractor including unexecuted portion of work does not appear to be executable within balance available period considering its performance of execution.

ii). Withdrawal from or abandonment of the work by contractor before completion of the work as per contract.

iii). Non-completion of work by the Contractor within scheduled completion period as per Contract or as extended from time to time, for the reasons attributable to the contractor.

iv). Termination of Contract on account of any other reason (s) attributable to Contractor.
v). Assignment, transfer, subletting of Contract without BHEL's written permission.
vi). Non-compliance to any contractual condition or any other default attributable to Contractor.

Risk & Cost Amount against Balance Work:

Risk & Cost amount against balance work shall be calculated as follows:

Risk & Cost Amount= [(A-B) + (A x H/100)]

Where,

A= Value of Balance scope of Work (*) as per rates of new contract

B= Value of Balance scope of Work (*) as per rates of old contract being paid to the contractor at the time of termination of contract i.e. inclusive of PVC & ORC, if any.

H = Overhead Factor to be taken as 5

In case (A-B) is less than 0 (zero), value of (A-B) shall be taken as 0 (zero).

* Balance scope of work (in case of termination of contract):

Difference of Contract Quantities and Executed Quantities as on the date of issue of Letter for 'Termination of Contract', shall be taken as balance scope of Work for calculating risk & cost amount.

Contract quantities are the quantities as per original contract. If, Contract has been amended, quantities as per amended Contract shall be considered as Contract Quantities.

Items for which total quantities to be executed have exceeded the Contract Quantities based on drawings issued to contractor from time to time till issue of Termination letter, then for these items total Quantities as per issued drawings would be deemed to be contract quantities.

Substitute/ extra items whose rates have already been approved would form part of contract quantities for this purpose. Substitute/ extra items which have been executed but rates have not been approved, would also form part of contract quantities for this purpose and rates of such items shall be determined in line with contractual provisions.

However, increase in quantities on account of additional scope in new tender shall not be considered for this purpose.

NOTE: Incase portion of work is being withdrawn at risk & cost of contractor instead of termination of contract, contract quantities pertaining to portion of work withdrawn shall be considered as 'Balance scope of work' for calculating Risk & Cost amount.

LD against delay in executed work in case of Termination of Contract:

LD against delay in executed work shall be calculated in line with LD clause no. 2.7.9 of GCC, for the delay attributable to contractor. For limiting the maximum value of LD, contract value shall be taken as Executed Value of work till termination of contract.

Method for calculation of "LD against delay in executed work in case of termination of contract" is given below.

i). Let the time period from scheduled date of start of work till termination of contract excluding the period of Hold (if any) not attributable to contractor = T1
ii). Let the value of executed work till the time of termination of contract= X
iii). Let the Total Executable Value of work for which inputs/fronts were made available to contractor and were planned for execution till termination of contract = Y
iv). Delay in executed work attributable to contractor i.e. T2=[1-(X/Y)] x T1
v). LD shall be calculated in line with LD clause (clause 2.7.9) of the Contract for the delay attributable to contractor taking "X" as Contract Value and "T2" as period of delay attributable to contractor.

2.7.2.2 In case Contractor fails to deploy the resources as per requirement, BHEL can deploy own/hired/otherwise arranged resources at the risk and cost of the contractor and recover the expenses incurred from the dues payable to contractor. Recoveries shall be actual expenses incurred plus 5% overheads or as defined in TCC.

2.7.3 **Recoveries arising out of Risk & Cost and LD or any other recoveries due from Contractor**

Following sequence shall be applicable for recoveries from contractor:

a) Dues available in the form of Bills payable to contractor, SD, BGs against the same contract.
b) Demand notice for deposit of balance recovery amount shall be sent to contractor, if funds are insufficient to effect complete recovery against dues indicated in (a) above.
c) If contractor fails to deposit the balance amount to be recovered within the period as prescribed in demand notice, following action shall be taken for balance recovery:
   i) Dues payable to contractor against other contracts in the same Region shall be considered for recovery.
   ii) If recovery cannot be made out of dues payable to the contractor as above, balance amount to be recovered, shall be informed to other Regions/Units for making recovery from the Unpaid Bills/Running Bills/SD/BGs/Final Bills of contractor.
   iii) In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against contractor.

2.7.4 To terminate the contract or to restrict the quantum of work and pay for the portion of work executed in case BHEL's contract with their customer are terminated for any reason, as per mutual agreement.

2.7.5 To effect recovery from any amounts due to the contractor under this or any other contract or in any other form, the moneys BHEL is statutorily forced to pay to anybody, due to contractor's failure to fulfill any of his obligations. BHEL shall levy overheads of 5% on all such payments along with interest as defined elsewhere in the GCC.

2.7.6 While every endeavor will be made by BHEL to this end, they (BHEL) cannot guarantee uninterrupted work due to conditions beyond their control. The Contractor will not be normally entitled for any compensation/extra payment on this account unless otherwise specified elsewhere in the contract.

2.7.7 BHEL may permit or direct contractor to demobilize and remobilize at a future date as intimated by BHEL in case of following situations for reasons other than Force majeure conditions and not attributable to contractor:

i) suspension of work(s) at a Project either by BHEL or Customer,
   or
ii) where work comes to a complete halt or reaches a stage wherein worthwhile works cannot be executed and there is no possibility of commencement of work for a period of not less than three months

In such cases, charges towards demobilization and remobilization shall be as decided by BHEL after successful remobilization by contractor at site, and decision of BHEL shall be final and binding on the contractor. After remobilization, all conditions as per contract shall become applicable. In case Contractor does not remobilize with adequate resources or does not start the work within the period as intimated, then BHEL reserves the right to get the balance works done at the Risk & Cost of the Contractor. Duration of the contract/time extension shall be revised suitably. In case of any conflict, BHEL decision in this regard shall be final and binding on the contractor.

2.7.8 In the unforeseen event of inordinate delay in receipt of materials, drawings, fronts etc. due to which inordinate discontinuity of work is anticipated, BHEL on its own or contractor's request at its discretion may consider to short close the contract in any of the following cases:

a) The balance works (including but not limited to Trial Operation, PG Test etc.) are minor vis a vis the scope of work envisaged as per the contract.
b) There has been no significant work in past 6 months OR no significant work is expected in next 6 months (example in Hydro projects or in projects where work has stopped due to reasons beyond the control of BHEL).
c) The balance works cannot be done within a reasonable period of time as they are dependent on unit shut down or on other facilities of customer or any other such reasons not attributable to the contractor.

At the point of requesting for short closure, contractor shall establish that he has completed all works possible of completion and he is not able to proceed with the balance works due to constraints beyond his control. In such a case, the estimated value of the unexecuted portion of work (or estimated value of services to be provided for carrying out milestone/stage payments like Trial Operation/PG Test etc.) as decided by BHEL, shall however be reduced from the final contract value.

Note: The Contractor shall not be eligible for any compensation on account of Quantity Variation arising out of short-closure of contract as per clause no. 2.7.8 (b) above.

2.7.9 LIQUIDATED DAMAGES/PENALTY

At the end of total work completion as certified by BHEL Engineer, and upon analysis of the total delay, the portion of time extensions attributable to (i) Contractor alone, (ii) Force majeure conditions, and (iii) BHEL, shall be worked out. The total period of time extensions shall be the sum of (i), (ii) and (iii) above and shall be equal to period between the scheduled date of completion and the actual date of completion of contract. LD shall be imposed/levied for the portion of time extensions solely attributable to contractor and recoverable from the dues payable to the contractor.

If the contractor fails to maintain the required progress of work which results in delay in the completion of the work as per the contractual completion period, BHEL shall have the right to impose Liquidated Damage/Penalty at the rate of 0.5% of the contract value, per week of delay or part thereof subject to a maximum of 10% of the contract value. For this purpose, the period for which LD is applicable shall be worked out based on portion of time extension granted solely attributable to contractor at the end of the contract. Contract Value for this purpose, shall be the final executed value exclusive of ORC, Extra Works executed on Manday rate basis, Supplementary/ Additional Items and PVC.

~~In case of LD recovery, the applicable GST shall also be recovered from contractor.~~

2.8 RESPONSIBILITIES OF THE CONTRACTOR IN RESPECT OF LOCAL LAWS, EMPLOYMENT OF WORKERS ETC.

The following are the responsibilities of the contractor in respect of observance of local laws, employment of personnel, payment of taxes etc. The subcontractor shall fully indemnify BHEL against any claims of whatsoever nature arising due to the failure of the contractor in discharging any of his responsibilities hereunder:

2.8.1 As far as possible, Unskilled Workers shall be engaged from the local areas in which the work is being executed.

2.8.2 The contractor at all times during the continuance of this contract shall, in all his dealings with local labour for the time being employed on or in connection with the work, have due regard to all local festivals and religious and other customs.

2.8.3 The contractor shall comply with all applicable State and Central Laws, Statutory Rules, Regulations, Notifications etc. such as Payment of Wages Act, Minimum Wages Act, Workmen Compensation Act, Employer's Liability Act, Industrial Disputes Act, Employers Provident Act, Employees State Insurance Scheme, Contract Labour (Regulation and Abolition) Act, 1970, Payment of Bonus & Gratuity Act, Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act 1996, The Building and Other Construction Workers' Welfare Cess Act 1996 and other Acts, Rules, and Regulations for labour/workers as applicable and as may be enacted by the State Government and Central Govt. during the tenure of the Contract and having force or jurisdiction at Site. The Contractor shall also comply with provisions of and give all such notices to the local Governing Body, Police and other relevant Authorities as may be required by the Law.

2.8.4 The Contractor shall obtain independent License under the Contract Labour (Regulations and Abolition) Act, 1970 for engaging contract labour as required from the concerned Authorities based on the certificate (Form- V or as applicable) issued by the Principal Employer/Customer.

2.8.5 The contractor shall pay and bear all taxes, fees, license charges, Cess, duties, deposits, tolls, royalties, commission or other charges which may be leviable on account of his operations in executing the contract.

2.8.6 While BHEL would pay the inspection fees and Registration fees of Boiler/Electrical Inspectorate, all other arrangements for site visits periodically by the Inspectorate to site, Inspection certificate etc. will have to be made by contractor. However, BHEL will not make any payment to the Inspectorate in connection with contractor's Welders/Electricians qualification tests etc.

2.8.7 Contractor shall be responsible for provision of Health and Sanitary arrangements (more particularly described in Contract Labour Regulation & Abolition Act), Safety precautions etc. as may be required for safe and satisfactory execution of contract.

2.8.8 The contractor shall be responsible for proper accommodation including adequate medical facilities for personnel employed by him.

2.8.9 The contractor shall be responsible for the proper behavior and observance of all regulations by the staff employed by him.

2.8.10 The contractor shall ensure that no damage is caused to any person/property of other parties working at site. If any such damage is caused, it is responsibility of the contractor to make good the losses or compensate for the same.

2.8.11 All the properties/equipments/components of BHEL/their Client loaned with or without deposit to the contractor in connection with the contract shall remain properties of BHEL/their Client.

2.8.12 The contractor shall use such properties for the purpose of execution of this contract. All such properties/equipments/components shall be deemed to be in good condition when received by the contractor unless he notifies within 48 hours to the contrary. The contractor shall return them in good condition as and when required by BHEL/their Client. In case of non-return, loss, damage, repairs etc. the cost thereof as may be fixed by BHEL Engineer will be recovered from the contractor.

2.8.13 In case the contractor is required to undertake any work outside the scope of this contract, the rates payable shall be those mutually agreed upon if the item rates are not mentioned in existing contract.

2.8.14 Any delay in completion of works/or non-achievement of periodical targets due to the reasons attributable to the contractor, the same may have to be compensated by the contractor either by increasing manpower and resources or by working extra hours and/or by working more than one shift. All these are to be carried out by the contractor at no extra cost.

2.8.15 The contractor shall arrange, coordinate his work in such a manner as to cause no hindrance to other agencies working in the same premises.

2.8.16 All safety rules and codes applied by the Client/BHEL at site shall be observed by the contractor without exception. The contractor shall be responsible for the safety of the equipment/material and works to be performed by him and shall maintain all light, fencing guards, slings etc. or other protection necessary for the purpose. Contractor shall also take such additional precautions as may be indicated from time to time by the Engineer with a view to prevent pilferage, accidents, fire hazards. Due precautions shall be taken against fire hazards and atmospheric conditions. Suitable number of Clerical staff, watch and ward, store keepers to take care of equipment/materials and construction tools and tackles shall be posted at site by the contractor till the completion of work under this contract.

The contractor shall arrange for such safety devices as are necessary for such type of work and carry out the requisite site tests of handling equipment, lifting tools, tackles etc. as per prescribed standards and practices.

Contractor has to ensure the implementation of Health, Safety and Environment (HSE) requirements as per directions given by BHEL/Customer. The contractor has to assist in HSE audit by BHEL/Customer and submit compliance Report. The contractor has to generate and submit record/reports as per HSE plan/activities as per instruction of BHEL/Customer.

2.8.17 The contractor will be directly responsible for payment of wages to his workmen. A pay roll sheet giving all the payments given to the workers and duly signed by the contractor's representative should be furnished to BHEL site for record purpose, if so called for.
Contractor shall create awareness amongst their workforce by helping & encouraging in opening bank accounts and to encourage them to adopt digital mode of transactions. While releasing wages/ salary to their workers/ supervisors/ staff, Contractor shall comply with the GOI's guidelines for maximizing such transactions through Non-Cash / digital means.

2.8.18 In case of any class of work for which there is no such specification as laid down in the contract, such work shall be carried out in accordance with the instructions and requirements of the Engineer.

2.8.19 Also, no idle charges will be admissible in the event of any stoppage caused in the work resulting in contractor's labour and Tools & Plants being rendered idle due to any reason at any time.

2.8.20 The contractor shall take all reasonable care to protect the materials and work till such time the plant/equipment has been taken over by BHEL or their Client whichever is earlier.

2.8.21 The contractor shall not stop the work or abandon the site for whatsoever reason of dispute, excepting force majeure conditions. All such problems/disputes shall be separately discussed and settled without affecting the progress of work. Such stoppage or abandonment shall be treated as breach of contract and dealt with accordingly.

2.8.22 The contractor shall keep the area of work clean and shall remove the debris etc. while executing day-to-day work. Upon completion of work, the contractor shall remove from the vicinity of work, all scrap, packing materials, rubbish, unused and other materials and deposit them in places specified by the Engineer. The contractor will also demolish all the hutments, sheds, offices etc. constructed and used by him and shall clean the debris. In the event of his failure to do so, the same will be arranged to be done by the Engineer and the expenses recovered from the contractor.

2.8.23 The contractor shall execute the work in the most substantial and workman like manner in the stipulated time. Accuracy of work and timely execution shall be the essence of this contract. The contractor shall be responsible to ensure that the quality, assembly and workmanship conform to the dimensions and clearance given in the drawings and/ or as per the instructions of the Engineer.

2.8.24 The Contractor to note that some of BHEL's T&Ps/MMDs may not be insured. The Contractor will take necessary precautions and due care to protect the same while in his custody from any damage/ loss till the same is handed over back to BHEL. In case the damage / loss is due to carelessness/ negligence on the part of the contractor, the Contractor is liable to get them repair/ replaced immediately and in case of his failure to do so within a reasonable time, BHEL will reserve the right to recover the loss from the contractor.

2.8.25 For all works having contract value of Rs. 5,00,000/- or above, BHEL shall recover the amount of compensation paid to victim(s) by BHEL towards loss of life/ permanent disability due to an accident which is attributable to the negligence of contractor, agency or firm or any of its employees as detailed below.

a) Victim: Any person who suffers permanent disablement or dies in an accident as defined below.

b) Accident: Any death or permanent disability resulting solely and directly from any unintended and unforeseen injurious occurrence caused during the manufacturing/ operation and works incidental thereto at BHEL factories/ offices and precincts thereof, project execution, erection and commissioning, services, repairs and maintenance, trouble shooting, serving, overhaul, renovation and retrofitting, trial operation, performance guarantee testing undertaken by the company or during any works/ during working at BHEL Units/ Offices/ townships and premises/ Project Sites.

c) Compensation in respect of each of the victims:

i. In the event of death or permanent disability resulting from Loss of both limbs: Rs. 10,00,000/- (Rs. Ten Lakh).
ii. In the event of other permanent disability: Rs.7,00,000/- (Rs. Seven Lakh)

d) Permanent Disablement: A disablement that is classified as a permanent total disablement under the proviso to section 2 (I) of the Employee's Compensation Act, 1923.

2.8.26 Contractor shall be fully responsible for their T&Ps and other material mobilized at site. In any case, BHEL shall not be liable for any damage/loss/misuse of any item(s) belong to the contractor.

2.9 EXECUTION PLAN, PROGRESS MONITORING, MONTHLY REVIEW AND PERFORMANCE EVALUATION

2.9.1 A tentative plan/ programme for completion of the contractual scope of work as per the time schedule given in the contract shall be made jointly by BHEL and Contractor, before commencement of work. The above programme shall be supported by month wise deployment of resources viz Manpower, T&P, Consumables, etc. Progress will be reviewed periodically (Daily/Weekly/Monthly) vis-à-vis this jointly agreed programme.
Subsequently, every month, quarterly rolling plan will be made by BHEL based on budgeted targets.
Monthly plan in F-14 format shall be drawn from this Quarterly plan. Monthly plan shall necessarily include activities required for achieving targets/ milestones unless inputs/ fronts are not available. While planning and arriving on asking rate all available inputs shall be taken into consideration.
Vendor will be required to execute the monthly plan in that month in addition to make full efforts to minimize the cumulative shortfall attributable to him up to the month.
BHEL may require monthly work plan up to one and half times of average monthly value and demand matching manpower.
Where, Average Monthly Value = Total Contract Value (as per latest revision) / Period of Contract (in months)
Provided, this requirement is reflected in the rolling quarterly plan two months in advance.

If the Contractor refuses to sign the F-14 format, those F-14 formats requiring Contractor's signature shall be deemed to have been signed and accepted by the Contractor, if communicated to the Contractor through email or any other mode as stated in clause 2.3.1.

The Contractor shall submit periodical progress reports (Daily/Weekly/Monthly) and other reports/information including manpower, consumables, T&P mobilization etc. as desired by BHEL.

2.9.2 Monthly progress review between BHEL and Contractor shall be based on the agreed programme as above, availability of inputs/fronts etc., and constraints if any, as per prescribed formats (i.e. Form F-14). Manpower, T&P and consumable reports as per prescribed formats shall be submitted by contractor every month. Release of RA Bills shall be contingent upon certification by BHEL Site Engineer of the availability of the above prescribed formats duly filled in and signed.

2.9.3 The burden of proof that the causes leading to any shortfall is not due to any reasons attributable to the contractor is on the contractor himself. The monthly progress review shall record shortfalls attributable to (i) Contractor, (ii) Force Majeure Conditions, and (iii) BHEL

2.9.4 Performance of the Contractor shall be assessed as per prescribed formats and shall form the basis for 'Assessment of Capacity of Bidder' for Tenders where the Contractor is a bidder. BHEL reserves the right to revise the evaluation formats during the course of execution of the works.

2.10 TIME OF COMPLETION

2.10.1 The time schedule shall be as prescribed in the Contract. The time for completion shall be reckoned from the date of commencement of work at Site as certified by BHEL Engineers.

2.10.2 Time being the essence of the contract, the entire work shall be completed by the contractor within the time schedule or within such extended periods of time as may be allowed by BHEL under clause 2.11.

2.11 EXTENSION OF TIME FOR COMPLETION

2.11.1 If the completion of work as detailed in the scope of work gets delayed beyond the contract period, the contractor shall request for an extension of the contract and BHEL at its discretion may extend the Contract.

2.11.2 Based on the F-14 formats, the works balance at the end of original contract period less the backlog attributable to the contractor shall be quantified, and the number of months of 'Time extension' required for completion of the same shall be jointly worked out. Within this period of 'Time extension', the contractor is bound to complete the portion of backlog attributable to the contractor. Any further 'Time extension' or 'Time extensions' at the end of the previous extension shall be worked out similarly.

2.11.3 However, if any 'Time extension' is granted to the contractor to facilitate continuation of work and completion of contract, due to backlog attributable to the contractor alone, then it shall be without prejudice to the rights of BHEL to impose penalty/LD for the delays attributable to the contractor, in addition to any other actions BHEL may wish to take at the risk and cost of contractor.

2.11.4 Planning, progress monitoring, monthly review and performance monitoring shall be carried out as per Clause 2.9 of GCC.

2.12 OVERRUN COMPENSATION

2.12.1 **ORC during original contract period:** No ORC shall be applicable during the original contract period.

2.12.2 **ORC during extended period for the reasons solely attributable to contractor:** No ORC shall be applicable during the extended period granted for the reasons solely attributable to contractor and work executed during this period shall be paid as per original contract rates.

2.12.3 **ORC during extended period for the reasons not attributable to contractor:** ORC shall be payable as per following procedure:

2.12.3.1 For initial period of twelve months of extended period, ORC rate applicable over executed value shall be 5%. For every subsequent period of twelve months, ORC rate shall be further increased by 5% over the previous rate. For example, ORC rates applicable for initial period of 12 months and subsequent period of 12 months are given below.

Sl. No.	Extended Period for the reasons attributable to BHEL	ORC rate applicable over executed value
1	First 12 months	5%
2	13^{th}-24^{th} month and so on	10.25%

		{[(1.05 x 1.05)-1] x 100}

This process of increasing ORC rate for each subsequent period of 12 months shall continue till applicability of ORC.

2.12.3.2 On completion of original contract period as well as on completion of each subsequent period of twelve months i.e. at the time of change in applicable ORC rate, Delay Analysis shall be carried out and percentage shortfall attributable to both BHEL & Contractor shall be calculated.

2.12.3.3 For the purpose of calculation of ORC, executed value of work in the month shall be divided in Part-1 and Part-2 in proportion of percentage shortfall attributable to BHEL and contractor respectively, based on the last delay analysis as worked out in 2.12.3.2.

ORC shall be payable only on Part-1 and no ORC shall be payable on Part-2.

Value of Part-1 shall be further limited to the value of actual inputs provided by BHEL i.e. "Plan - Shortfall attributable to BHEL" for the month, as per Form-14 for calculation of ORC.

2.12.3.4 Payment of ORC amount shall be further regulated as follows:

(i) 50% of the ORC is allocated for deployment of matching resources (with weightages) agreed as per the joint programme drawn vide 2.11.4. ORC Payment against resources shall be calculated in proportion to percentage of resources actually deployed w.r.t. planned resources, as per Form-14.

(ii) 50% of ORC is allocated for achieving of planned progress agreed as per the joint programme drawn vide 2.11.4. ORC Payment shall be reduced in proportion to percentage shortfall attributable to contractor w.r.t."Plan - Shortfall attributable to BHEL" for the month, as per Form-14.

2.12.3.5 The maximum amount of ORC payable for the month shall be limited to Rs. 10,00,000/-.

2.12.3.6 In case, there is no shortfall attributable to contractor for the month and also contractor has deployed the resources as agreed in Form-14 but ORC amount payable for the month worked out as per procedure mentioned in clause 2.12.3.3, 2.12.3.4 and 2.12.3.5, is less than Rs.1,00,000/-, then ORC amount payable for the month shall be Rs.1,00,000/- otherwise ORC amount payable for the month shall remain same.

2.12.3.7 In case execution is on **HOLD** (Other than Force Majeure), ORC shall be payable as per following:

i). Contractor has not been permitted by BHEL to de-mobilize

a) ORC amount of Rs. 1,00,000/- per month shall be applicable during the period of HOLD provided resources as planned are deployed (not demobilised) during the period of hold.

b) Subsequent to lifting of HOLD, Period of HOLD shall not be excluded in calculation of period for deciding applicable ORC rate as per clause 2.12.3.1.

ii). Contractor has been permitted to demobilize and to remobilize after lifting of HOLD

a) No ORC shall be payable to contractor for the period of HOLD.

b) Subsequent to lifting of HOLD, Period of HOLD shall not be excluded in calculation of period for deciding applicable ORC rate as per clause 2.12.3.1.

2.12.3.8 In case **Force Majeure** is invoked:

i). No ORC shall be applicable during the period of Force Majeure.

ii). Subsequent to revocation of Force Majeure, period of Force Majeure shall be excluded in calculation of period for deciding applicable ORC rate as per clause 2.12.3.1.

2.12.4 Applicability of ORC: ORC shall not be applicable for following activities.

i). Area cleaning, removal of temporary structures and return of scrap.
ii). Punch list points / pending points liquidation pending due to reasons attributable to contractor
iii). Submission of "As built Drawing"
iv). Material Reconciliation
v). Completion of Contract Closure formalities like HR Clearance/ No dues from various dept./ Statutory Authorities etc.

2.12.5 Total Over Run Compensation shall be limited to 10% of the cumulatively executed contract value till the month (excluding Taxes and Duties if payable extra). For this purpose, executed contract value excludes PVC, ORC and Extra/Supplementary Works.

2.13 SECURED RECOVERABLE ADVANCES:

2.13.1 INTEREST FREE MOBILIZATION ADVANCE: Competent Authority of BHEL may approve proposals for payment of Interest Free Secured Mobilization Advance (limited to a maximum of 5% of the Contract Value) only in Installation Works in Power Plants under exceptional circumstances.

Interest Free Mobilization Advance shall be disbursed in specifically mentioned stages of major resource mobilization in the beginning of the contract, as specified in the TCC, in three or more instalments with the value of any instalment not more than 2.5% of the Contract Value. The next instalment will be due only on completion of the activities linked to the previous instalment.

Each such instalment is to be secured through BG of 100% of the instalment amount.

Recovery of Interest Free Secured Advance shall be made @ 10% of Running Bill Amount. As and when the total recovered amount exceeds any of the BG value submitted against the advance, that BG shall be returned.

In any case, Interest Free Advance shall be fully recovered by the time the contract reaches 50% of the original contract period either from Running Bills or by the Contractor directly depositing the amount. If the Contractor fails to deposit the total amount by the stipulated date, the recovery shall be made by encashing BGs/ Securities available with BHEL for the balance amount.

2.13.2 INTEREST BEARING ADVANCE:

2.13.2.1 INTEREST BEARING MOBILIZATION ADVANCE: Competent authority may also approve need based Interest Bearing Mobilization advance after a certification from the Contractor for having achieved a financial progress of 10% of the original contract price. However, the total mobilization advance (including Interest Free Mobilization Advance) shall not exceed 10% of the Contract Value. Bank Guarantee towards 'Interest Bearing Recoverable Advance' shall be 110% of the advance so as to enable recovery of not only principle amount but also the interest portion, if so required.

2.13.2.2 INTEREST BEARING SECURED ADDITIONAL INTERIM ADVANCE: In exceptional circumstances, with due justification, Competent Authority of BHEL may approve proposals for payment of additional interim interest bearing advance against Bank Guarantee, for resource augmentation towards expediting work for project implementation. Contractor shall establish the utilization of advance drawn in the form of Utilization Certificate before the release of next installment.

Bank Guarantee shall be 110% of the advance so as to enable recovery of not only principle amount but also the interest portion, if so required. Unadjusted amount of advances (including

Interest Free Mobilization Advance) paid shall not exceed 10% of the total contract value at any point of time.

NOTES for INTEREST BEARING ADVANCE:

(a) Recovery of Interest Bearing Advances shall be made from the Running Bills progressively. Recovery rate per month for Interest Bearing Advances shall be the sum of:

i) Not less than 10% of Running Bill amount
ii) Simple interest up to the date of RA Bill on the outstanding Principle amount/amounts

(b) In any case, Interest Bearing Advance shall be fully recovered by the time the contractor's billing reaches 90% of contract value either from Running Bills or by the Contractor directly depositing the amount. If the Contractor fails to deposit the total amount by the stipulated date, the recovery shall be made by encashing BGs/ Securities available with BHEL for the balance amount along with interest.

(c) Payment and recovery of any of the above advance(s) shall be at the sole discretion of BHEL and shall not be a subject matter of arbitration.

(d) The rate of interest applicable for the above advances shall be the repo rate prevailing on the date of release of advance plus 4%, and such rate will remain fixed till the total advance amount is recovered.

(e) Contractor to submit Bank Guarantee as per prescribed formats for each of the advance and shall be valid for at least one year or the recovery duration whichever is earlier. In case the recovery of dues does not get completed within the aforesaid BG period, the contractor shall renew the BG or submit fresh BG for the outstanding amount, valid for at least one year or the remaining recovery duration whichever is earlier. For each advance, the Contractor will be allowed to submit more than one BG so that the BGs can be returned progressively based on recovered amount. In case, the Contractor prefers to submit single BG against an advance, the amount of BG may be progressively reduced by the amount repaid by the Contractor.

(f) BHEL is entitled to make recovery of the entire outstanding amount in case the contractor fails to comply with the BG requirement.

2.13.3 SECURED ADVANCE AGAINST MATERIAL BROUGHT TO SITE:

Secured advance on the security of materials (which are not combustible, fragile or perishable in nature) brought to the site but not yet incorporated in the works will be made up to 75% of Invoice value, or the 75% of the corresponding value of the materials determined on the basis of BOQ rates, whichever is less, subject to the condition that their quantities are not excessive and shall be used within a period of 90 days and subject to the stipulations, as mentioned below:

(i) Contractor shall obtain prior permission of Engineer-in-charge before procurement of materials against which advance is being sought. Engineer-in-charge shall ensure formal approval of Construction Manager before communicating the permission to Contractor.

(ii) Secured advance shall not be allowed/ payable for materials procured by Contractor before the date of such permission.

(iii) Secured Advance shall be allowed only once against a single invoice. Multiple Secured Advance against single invoice is not allowed.

(iv) Secured advance against materials shall be paid only against non-perishable items. Engineer-in-charge to ensure that such items are adequately covered under insurance cover (to be taken by the Contractor if not covered under BHEL Insurance Policy).

(v) At any point of time, the unadjusted secured payments against material brought to site shall not be more than 5% of the Contract Value.

(vi) The advance will be repaid from each succeeding Running bill(s) to the extent materials for which advance has been previously paid have been incorporated into the works. In any case, such advance payment shall be fully recovered maximum from 3-4 subsequent RA bills whether the material is consumed in the work or not. In absence of sufficient value of RA bills for making the required recovery, the Contractor shall deposit the balance amount. If the Contractor fails to deposit the total amount by the stipulated date, the recovery shall be made by encashing the Securities available with BHEL for the balance amount.

(vii) Contractor has to give a formal deed of hypothecation, drawn up on non-judicial stamp paper under which the BHEL secures a lien on the materials and is safeguarded against losses, due to the contractor postponing the execution of the work or due to the shortage or misuse of materials and against the expenses incurred on their watch and safe custody.

2.14 QUANTITY VARIATION

2.14.1 Variation in Final Executed Contract Value

The quantities given in the contract are tentative and may change to any extent (both in plus side and minus side). No compensation becomes payable in case the variation of the final executed contract value is within the limits of Minus (-) 15% of awarded contract value. Also, no compensation becomes payable in case the contract gets partially executed/ short closed/ terminated/ work withdrawn under Rights of BHEL mentioned in Clause 2.7 of GCC. In case of work terminated / short closed under clause 2.7.4 of GCC, compensation may be considered only if BHEL receives compensation from customer.

Compensation due to variation of final executed contract value in excess of the limits defined in clause above, shall be as follows:

i) In case the finally executed contract value reduces below the lower limit of awarded Contract Value due to quantity variation specified above, the Contractor will be eligible for compensation @ 15% of the difference between the lower limit of the awarded contract value and the actual executed contract value.

ii) In case the finally executed contract value increases above the awarded Contract Value due to quantity variation, the Contractor is not eligible for any compensation

2.14.2 Variation in Individual Quantities of BOQ Item(s)

The quantities given in the contract are tentative and may change to any extent (both in plus side and minus side). No compensation becomes payable in case the variation of the quantity of individual BOQ item(s) is within the limits of Plus (+) 100% of the quantity in the original price schedule.

In case executed quantity for a particular BOQ item(s) exceeds two times the quantity in the original price schedule (100% increase), then the revision in rates for such BOQ item(s) for the quantity in excess of two times the quantity in the original price schedule including any subsequent increase in quantity, may be considered based on request from the Contractor, however, BHEL decision in this regard shall be final. Revised rates for subject BOQ item (s) shall be worked out on the basis of prevailing market rates mutually agreed between BHEL and Contractor. PVC/ ORC will

not be applicable for these revised rates.
BHEL, however, retains the right to arrange the excess quantity through any other source for expediting activities in the interest of the Project.

Note: (a) Revision in rates under clause 2.14.2 will remain admissible in those cases also, where, the Contractor is eligible for compensation under clause 2.14.1 i).
(b) The value of work executed at revised rates due to variation in Individual Quantities of BOQ Item(s) shall be included while calculating the finally executed contract value in clause no. 2.14.1 above.

2.15 EXTRA WORKS

2.15.1 All rectifications/modifications, revamping and reworks required for any reasons not due to the fault of the contractor, or needed due to any change in deviation from drawings and design of equipments, operation/maintenance requirements, mismatching or due to damages in transit, storage and erection/commissioning and other allied works which are not very specifically indicated in the drawings, but are found essential for satisfactory completion of the work, will be considered as extra works.

2.15.2 Extra works arising on account of the contractor's fault, irrespective of time consumed in rectification of the damage/loss, will have to be carried out by the contractor free of cost. Under such circumstances, any material and consumable required for this purpose will also have to be arranged by the contractor at his cost.

2.15.3 All the extra work should be carried out by a separately identifiable gang, without affecting routine activities. Daily log sheets in the pro-forma prescribed by BHEL should be maintained and shall be signed by the contractor's representative and BHEL engineer. No claim for extra work will be considered/entertained in the absence of the said supporting documents i.e. daily log sheets. Signing of log sheets by BHEL engineer does not necessarily mean the acceptance of such works as extra works.

2.15.4 BHEL retains the right to award or not to award any of the major repair/ rework/ modification/ rectification/ fabrication works to the contractor, at their discretion without assigning any reason for the same.

2.15.5 After eligibility of extra works is established and finally accepted by BHEL engineer/designer, payment will be released on competent authority's approval at the following rate.

MAN-HOUR RATE FOR ELIGIBLE EXTRA WORKS: Single composite average labour man-hour rate, including overtime if any, supervision, use of tools and tackles and other site expenses and incidentals, consumables for carrying out any major rework/ repairs/ rectification/ modification/ fabrication as certified by site as may arise during the course of erection, testing, commissioning or extra works arising out of transit, storage and erection damages, payment, if found due will be at Rs 139/- per man hour.

2.15.6 The above composite labour man hour rate towards extra works shall remain firm and not subject to any variation during execution of the work. PVC will not be applicable for extra works. Rate revision, Over Run Charges/compensation etc. will not be applicable due to on extra works.

2.15.7 **Extra Works for Civil Packages** shall be regulated as follows –

i) Rates for Extra Works arising due to (1) non availability of BOQ (Rate Schedule), OR (2) change in Specifications of materials/works (3) rectification/modification/dismantling & re-erecting etc. due to no fault of Contractor, shall be in the order of the following:

a) Item rates are to be derived from similar nature of items in the BOQ (Rate Schedule) with applicable escalation derived from All India Consumer Price Index for Whole Sale Commodities.

b) As per latest edition of CPWD-DSR with applicable escalation derived from All India Consumer Price Index for Whole Sale Commodities OR Notification issued by the office of CPWD for 'Cost Index' in that Region where the project is being executed with applicable escalation derived from All India Consumer Price Index for Whole Sale Commodities, whichever is less.

c) Item rates are to be worked out on the basis of market rates prevailing on the date of execution mutually agreed between BHEL and Contractor.

ii) PVC and ORC will not be applicable for (i) above.

2.16 SUPPLEMENTARY ITEMS

2.16.1 For NON Civil Works

Supplementary items are items/works required for completion of entire work but not specified in the scope of work. Subject to certification of such items/works as supplementary items by BHEL Engineer, rates shall be derived on the basis of any one of the following on mutual agreement:

i) Based on percentage breakup/rates indicated for similar/nearby items.

ii) In case (i) above does not exist, then BHEL/site may derive the percentage breakup/rates to suit the type of work.

2.16.2 For Civil Works

i) Rates for Supplementary Works/Additional Works arising out due to additions/alterations in the original scope of works as per contract subject to certification of BHEL Engineer shall be worked out as under:

a) Item rates which are available in existing BOQ (Rate Schedule) shall be operated with applicable escalation derived from All India Consumer Price Index for Whole Sale Commodities

b) Items of works which are not available in existing BOQ shall be operated as an 'Extra Works' and rate shall be derived as per clause no 2.15.7

ii) Execution of Supplementary Works/Additional Works through the Contractor shall be at the sole discretion of BHEL, and shall be considered as part of executed contract value for the purpose of Quantity Variation as per clause 2.14

iii) BHEL Engineer's decision regarding fixing the rate as above is final and binding on the contractor.

iv) PVC and ORC will not be applicable for (i) above.

2.17 PRICE VARIATION COMPENSATION

2.17.1 In order to take care of variation in cost of execution of work on either side, due to variation in the index of LABOUR, HIGH SPEED DIESEL OIL, WELDING ROD, CEMENT, STEEL, MATERIALS, Price Variation Formula as described herein shall be applicable

2.17.2 85% component of Contract Value shall be considered for PVC calculations and remaining 15% shall be treated as fixed component. The basis for calculation of price variation in each category, their component, Base Index, shall be as under:

SL NO.	CATEGORY	INDEX/ AVERAGE MINIMUM WAGE	PERCENTAGE COMPONENT ('K')				
			CIVIL PACKAGES (See Note A/B/C)			MECHANICAL PACKAGES	Electrical , C&I Material Management/ Handling and other labour oriented packages
			A	B	C		
i)	LABOUR (ALL CATEGORIES)	(a) 'MONTHLY ALL-INDIA AVERAGE CONSUMER PRICE INDEX NUMBERS FOR INDUSTRIAL WORKERS' published by Labour Bureau, Ministry of Labour and Employment, Government of India. (50% weightage out of component 'K') (Website: labourbureau.nic.in)	40	25	30	65	80
		(b) Arithmetical average of minimum wages of Unskilled, Semi-skilled, Skilled and Highly skilled workers as applicable at project site location (50% weightage out of component 'K')					
ii)	HIGH SPEED DIESEL OIL	Name of Commodity: HSD Commodity Code: 1202000005 (**See Note E**)	5	3	5	5	5
iii)	WELDING ROD	Name of Commodity: MANUFACTURE OF BASIC METALS Commodity Code: 1314000000 (**See Note E**)				15	
iv)	CEMENT	Name of Commodity: ORDINARY PORTLAND CEMENT Commodity Code: 1313050003 (**See Note E**)		20	30		
v)	STEEL (Structural and Reinforcement Steel)	Name of Commodity: MILD STEEL: LONG PRODUCTS Commodity Code: 1314040000 (**See Note E**)		25			
vi)	All OTHER MATERIALS (Other than Cement & Steel)	Name of Commodity: ALL COMMODITIES Commodity Code:1000000000 (**See Note E**)	40	12	20		

Note: A) Cement & Steel: Free Issue (BHEL Scope)
B) Cement & Steel: In Contractor Scope
C) Cement in Contractor Scope, and Steel is Free Issue (BHEL Scope)
D) For Composite packages (i.e. Civil+Mechanical+Electrical and/or C&I or Civil+Mechanical or Mechanical+Electrical and/or C&I), the COMPONENT ('K') for various categories shall be as per respective packages as above.
E) As per the 'MONTHLY WHOLE SALE PRICE INDEX' for the respective Commodity and Type, published by Office of Economic Adviser, Ministry of Commerce and Industry, Government of India. (Website: eaindustry.nic.in). Revisions in the index or commodity will be re-adjusted accordingly.

2.17.3 #

2.17.4 Payment/recovery due to variation in index shall be determined on the basis of the following notional formula in respect of the identified COMPONENT ('K') viz LABOUR, HIGH SPEED DIESEL OIL,

WELDING ROD, CEMENT, STEEL, MATERIALS.

$$P = K \times R \times \frac{(X_N - Xo)}{Xo}$$

Where,

P	=	Amount to be paid/recovered due to variation in the Index for Labour, High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials
K	=	Percentage COMPONENT ('K') applicable for Labour, High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials
R	=	Value of work done for the billing month (Excluding Taxes and Duties if payable extra)
X_N	=	Revised Index for Labour, Revised Average Minimum Wages for Labour, Revised Index for High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials for the billing month under consideration
Xo	=	Index for Labour, Average Minimum Wages for Labour, Index for High Speed Diesel Oil, Welding Rod, Cement, Steel and Materials as on the Base date

2.17.5 PVC shall not be payable for the ORC amount, Supplementary/Additional Items, Extra works. However, PVC will be payable for items executed under quantity variation of BOQ items under originally awarded contract.

2.17.6 Base date shall be calendar month of the 'last date of submission of Tender'.

2.17.7 The contractor shall furnish necessary monthly bulletins in support of the requisite indices from the relevant websites along with his Bills.

2.17.8 The contractor will be required to raise the bills for price variation payments on a monthly basis along with the running bills irrespective of the fact whether any increase/decrease in the index for relevant categories has taken place or not. In case there is delay in publication of bulletins (final figure), the provisional values as published can be considered for payments and arrears shall be paid/recovered on getting the final values.

2.17.9 PVC shall be applicable for the entire original contract period plus the extended period, i.e. for the complete execution period, as follows:

For PVC computation of the n^{th} month:

Let the cumulative delay attributable to the Contractor is D_n in the n^{th} month as per Form-14.

Considering R_n as the billing value for the n^{th} month, PVC for the n^{th} month shall be calculated as follows:

a) PVC for the portion of R_n for an amount of $D_{(n-1)}$ shall be payable as per indices for the $(n-1)^{th}$ month.
b) PVC for the balance portion of R_n shall be payable as per indices for the n^{th} month

In case $D_{(n-1)}$ is greater than R_n, then entire R_n shall be payable as per indices for the $(n-1)^{th}$ month and the balance portion of $D_{(n-1)}$ shall be adjusted from $R_{(n+1)}$ of the $(n+1)^{th}$ month and will be payable as per indices for the $(n-1)^{th}$ month. The above process shall be continued for subsequent month(s) also till full $D_{(n-1)}$ is consumed.

i) For milestones mentioned in the contract, PVC shall be applicable as per average of the indices from the month of base date till the month of execution of milestone.

ii) PVC shall not be applicable for time extension provided for the delays solely attributable to the contractor. No PVC is payable during the period of Provisional Time Extension till grant of final time extension. Applicability of PVC will be decided at the time of grant of final time extension.

iii) The total amount of PVC shall not exceed 15% of the cumulatively executed contract value. Executed contract value for this purpose is exclusive of PVC, ORC, Supplementary/Additional Items and Extra works except items due to quantity variation.

Note: Work Planning in F-14 format to be meticulously done as per Clause 2.9 of this GCC

2.18 INSURANCE

2.18.1 BHEL/their customer shall arrange for insuring the materials/properties of BHEL/customer covering the risks during transit, storage, erection and commissioning.

2.18.2 It is the sole responsibility of the contractor to insure his materials, equipment, workmen etc. against accidents and injury while at work and to pay compensation, if any, to workmen as per Workmen's compensation Act. The work will be carried out in a protected area and all the rules and regulations of the client /BHEL in the area of project which are in force from time to time will have to be followed by the contractor.

2.18.3 If due to negligence and or non-observation of safety and other precautions by the contractors, any accident/injury occurs to the property / manpower belong to third party, the contractor shall have to pay necessary compensation and other expense, if so decided by the appropriate authorities.

2.18.4 The contractor will take necessary precautions and due care to protect the material, while in his custody from any damage/ loss due to theft or otherwise till the same is taken over by BHEL or customer. For lodging / processing of insurance claim, the contractor will submit necessary documents. BHEL will recover the loss including the deductible franchise from the contractor, in case the damage / loss is due to carelessness / negligence on the part of the contractor. In case of any theft of material under contractor's custody, matter shall be reported to Police by the contractor immediately and copy of FIR and subsequently police investigation report shall be submitted to BHEL for taking up with insurance. However, this will not relieve the contractor of his contractual obligation for the material in his custody.

2.19 STRIKES & LOCKOUT

2.19.1 The contractor will be fully responsible for all disputes and other issues connected with his labour. In the event of the contractor's labour resorting to strike or the Contractor resorting to lockout and if the strike or lockout declared is not settled within a period of one month, BHEL shall have the right to get the work executed through any other agencies at risk and cost of contractor under Clause 2.7.

2.19.2 For all purposes whatsoever, the employees of the contractor shall not be deemed to be in the employment of BHEL.

2.20 FORCE MAJEURE

2.20.1 "Force Majeure" shall mean circumstance which is: a) beyond a party's control, b) The party could not reasonably have provided against before entering into the contract, c) Having arisen, such party could not reasonably have avoided or overcome, and d) Is not substantially attributable to the other party. Such circumstances include but not limited to

i) Exceptionally adverse climatic conditions at the site which are unforeseeable having regard to climate data available or published in the country for the geographical location of the site.
ii) War, hostilities (whether war be declared or not), invasion, act of foreign enemies.
iii) Rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war.
iv) Riot, commotion or disorder by persons other than the contractor's personnel and other employees of the contractor and sub-contractors.
v) Strike or lockout not solely involving the contractor's personnel and other employees of the contractor and sub-contractors.
vi) Encountering munitions of war, explosive materials, ionizing radiation or contamination by radio-activity, except as may be attributable to the contractor's use of such munitions, explosives, radiation or radio- activity.
vii) Natural catastrophes such as earthquake, tsunami, volcanic activity, hurricane or typhoon, flood, fire, cyclones etc.

2.20.2 The following events are explicitly excluded from Force Majeure and are solely the responsibilities of the non-performing party: a) any strike, work-to-rule action, go-slow or similar labour difficulty (b) late delivery of equipment or material (unless caused by Force Majeure event) and (c) economic hardship.

2.20.3 If either party is prevented, hindered or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within 15 (fifteen) days after the occurrence of such event.

2.20.4 The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered or delayed. The Time for Completion shall be extended by a period of time equal to period of delay caused due to such Force Majeure event.

2.20.5 Delay or non-performance by either party hereto caused by the occurrence of any event of Force Majeure shall not

i) Constitute a default or breach of the Contract.
ii) Give rise to any claim for damages or additional cost expense occasioned thereby, if and to the extent that such delay or non-performance is caused by the occurrence of an event of Force Majeure.

2.20.6 BHEL at its discretion may consider short closure of contract after 1 year of imposition of Force Majeure in line with extant guidelines. In any case, Contractor cannot consider deemed short-closure after 1 year of imposition of Force Majeure.

2.21 ARBITRATION & CONCILIATION

2.21.1 **ARBITRATION:**

2.21.1.1 Except as provided elsewhere in this Contract, in case Parties are unable to reach amicable settlement (whether by Conciliation to be conducted as provided in Clause 2.21.2 herein below or

otherwise) in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract; or. in any manner touching upon the Contract (hereinafter referred to as the 'Dispute'), then, either Party may, commence arbitration in respect of such Dispute by issuance of a notice in terms of section 21 of the Arbitration & Conciliation Act, 1996 (hereinafter referred to as the 'Notice'). The Notice shall be addressed to the Head of the Power Sector Region issuing the Contract and shall contain the particulars of all claims to be referred to arbitration in sufficient detail and shall also indicate the monetary amount of such claim. Within 60 days of receipt of the complete Notice, the Head of the BHEL Power Sector Region issuing the Contract shall offer names of three proposed Arbitrators to the invoking Party advising to choose any one of the three names to be appointed as Sole Arbitrator. On getting confirmation from the invoking Party regarding the Arbitrator chosen from among the names so offered, the Head of the BHEL Power Sector Region issuing the Contract, shall appoint such chosen person as the Sole Arbitrator for conducting the arbitration. The language of arbitration shall be English.

The Arbitrator shall pass a reasoned award.

Subject as aforesaid, the provisions of Arbitration and Conciliation Act 1996 (India) or statutory modifications or re-enactments thereof and the rules made thereunder as in force from time to time shall apply to the arbitration proceedings under this clause. The seat of arbitration shall be _____ (the place from where the contract is Issued). The Contract shall be governed by and be construed as per provisions of the laws of India. Subject to this provision 2.21.1.1 regarding ARBITRATION, the principal civil court exercising ordinary civil jurisdiction over the area where the seat of arbitration is located shall have exclusive jurisdiction over any DISPUTE to the exclusion of any other court.

2.21.1.2 In case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:

In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs)/ Port Trusts inter se and also between CPSEs and Government Departments/Organizations (excluding disputes concerning Railways, Income Tax, Customs & Excise Departments), such dispute or difference shall be taken up by either party for resolution through AMRCD (Administrative Mechanism for Resolution of CPSEs Disputes) as mentioned in DPE OM No. 4(1)/2013-DPE(GM)/FTS-1835 dated 22-05-2018 as amended from time to time.

2.21.1.3 The cost of arbitration shall initially be borne equally by the Parties subject to the final allocation thereof as per the award/order passed by the Arbitrator.

2.21.1.4 Notwithstanding the existence of any dispute or differences and/or reference for the arbitration, the Contractor shall proceed with and continue without hindrance the performance of its obligations under this Contract with due diligence and expedition in a professional manner unless the dispute inter-alia relates to cancellation, termination or short-closure of the Contract by BHEL.

2.21.2 **CONCILIATION**:

If at any time (whether before, during or after the arbitral or judicial proceedings), any Disputes (which term shall mean and include any dispute, difference, question or disagreement arising in connection with construction, meaning, operation, effect, interpretation or breach of the

agreement, contract), which the Parties are unable to settle mutually, arise inter-se the Parties, the same may, be referred by either party to Conciliation to be conducted through Independent Experts Committee (IEC) to be appointed by competent authority of BHEL from the BHEL Panel of Conciliators.

Notes:

1. No serving or a retired employee of BHEL/Administrative Ministry of BHEL shall be included in the BHEL Panel of Conciliators.

2. Any other person(s) can be appointed as Conciliator(s) who is/are mutually agreeable to both the parties from outside the BHEL Panel of Conciliators.

The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in Procedure 2.3 to this GCC. The Procedure 2.3 together with its Formats will be treated as if the same is part and parcel hereof and shall be as effectual as if set out herein in this GCC.

The Contractor hereby agrees that BHEL may make any amendments or modifications to the provisions stipulated in the Procedure 2.3 to this GCC from time to time and confirms that it shall be bound by such amended or modified provisions of the Procedure 2.3 with effect from the date as intimated by BHEL to it.

2.21.3 **No Interest payable to Contractor**

Notwithstanding anything to the contrary contained in any other document comprising in the Contract, no interest shall be payable by BHEL to Contractor on any moneys or balances including but not limited to the Security Deposit, EMD, Retention Money, RA Bills or the Final Bill, or any amount withheld and/or appropriated by BHEL etc., which becomes or as the case may be, is adjudged to be due from BHEL to Contractor whether under the Contract or otherwise.

2.22 RETENTION AMOUNT

2.22.1 Retention Amount shall be 5% of executed contract value and shall be recovered at the rate of 5% from each Running Bill admitted, including PVC Bills. Alternatively, BG, in line with clause 1.12 of GCC, equivalent to 5% of Contract Value against Retention Amount can also be submitted before payment of first RA Bill. The validity of the said BG shall be initially for the contract period & shall be extended, if so required, up to acceptance of final bill. In case of increase in contract value, additional BG for 5% of differential amount shall be submitted by Contractor before payment of next RA Bill due. In case, contractor opts cash deduction from RA bills in the beginning & subsequently offers to submit BG later on, then refund of deducted retention amount may be permitted against submission of equivalent BG only once during the contract period.

2.22.2 Refund of retention amount shall be as follows:

100% of Retention Amount/ BG against Retention Amount shall be released along with Final Bill after deduction all expenses/ other amounts due to BHEL under the contract/ other contracts entered into with them (contractor) by BHEL.

2.23 PAYMENTS

Payments to Contractors are made in any one of the following forms: -

2.23.1 **Running Account Bills (RA Bills)**

i) These are for interim payments when the contracts are in progress. The bills for such interim payments are to be prepared by Contractor in prescribed formats (RA Bill forms).

ii) Payments shall be made according to the extent of work done as per measurements taken up to the end of the calendar month and in line with the terms of payments described in the Tender documents.

iii) Recoveries on account of electricity, water, statutory deductions etc. are made as per terms of contract.

iv) Full rates for the work done shall be allowed only if the quantum of work has been done as per the specifications stipulated in the contract. If the work is not executed as per the stipulated specifications, BHEL may ask the contractor to redo the work according to the required specifications, without any extra cost. However, where this is not considered necessary 'OR' where the part work is done due to factors like non-availability of material to be supplied by BHEL 'OR' non availability of fronts 'OR' non availability of drawings, fraction payment against full rate, as is considered reasonable, may be allowed with due regard for the work remaining to be done. BHEL decision in this regard will be final and binding on the contractor.

v) In order to facilitate part payment, BHEL at its discretion may further split the contracted rates/percentages to suit site conditions, cash flow requirements according to the progress of work, subject to following:

a) Provided no 'part' payment is recommended till 25% of work in the item rate is executed.

b) Payment of item rate to be made in not more than three instalments, last stage payment to be not lower than 20% of the item rate.

2.23.2 **Final Bill**

Final Bill' is used for final payment on closing of Running Account for works or for single payment after completion of works. 'Final Bill' shall be submitted as per prescribed format after completion of works as per scope and upon material reconciliation, along with the following:

i) 'No Claim Certificate' by Contractor

ii) Clearance certificates where ever applicable viz. Clearance Certificates from Customer, various Statutory Authorities like Labour department, PF Authorities, Commercial Tax Department etc.

iii) Indemnity Bond as per prescribed format.

BHEL shall settle the final bills after deducting all liabilities of Contractor to BHEL.

2.24 PERFORMANCE GUARANTEE FOR WORKMANSHIP

2.24.1 Even though the work will be carried out under the supervision of BHEL Engineers the Contractor will be responsible for the quality of the workmanship and shall guarantee the work done for a period of Twelve months from the date of commencement of guarantee period as defined in Technical Conditions of Contract, for good workmanship and shall rectify free of cost all defects due to faulty erection detected during the guarantee period. In the event of the Contractor failing to repair the defective works within the time specified by the Engineer, BHEL may proceed to undertake the repairs of such defective works at the Contractor's risk and cost, without prejudice to any other rights and recover the same from the Security Deposit.

2.24.2 BHEL shall release the Security Deposit subject to the following

i) Contractor has submitted 'Final Bill'

ii) Guarantee period as per contract has expired
iii) Contractor has furnished 'No Claim Certificate' in specified format
iv) BHEL Site Engineer/Construction Manager has furnished the 'No Demand Certificate' in specified format
v) Contractor has carried out the works required to be carried out by him during the period of Guarantee and all expenses incurred by BHEL on carrying out such works is included for adjustment from the Security Deposit refundable.

2.25 CLOSING OF CONTRACTS

The Contract shall be considered completed and closed upon completion of contractual obligations and settlement of Final Bill or completion of Guarantee period whichever is later. Upon closing of Contract, BHEL shall issue a performance/ experience certificate as per standard format, based on specific request of Contractor as per extant BHEL guidelines.

2.26 SUSPENSION OF BUSINESS DEALINGS

BHEL reserves the right to take action against Contractors who either fail to perform or Tenderers/Contractor who indulge in malpractices, by suspending business dealings with them in line with BHEL guidelines issued from time to time.

2.27 LIMITATION ON LIABILITY:

Notwithstanding anything to the contrary in this Agreement or the Work Order or any other mutually agreed document between the parties, the maximum liability, for damages, of the contractor, its servants or agents, shall under no circumstances exceed an amount equal to the Price of the Agreement or the Work Order. The Supplier shall not in any case be liable for loss of profit or special, punitive, exemplary, indirect or consequential losses whatsoever. This shall not be applicable on the recoveries arising out of Risk and Cost, recoveries made by Customer from BHEL on account of Contractor, any other type of recoveries for workmanship, material, T&P etc. due from the contractor.

2.28 OTHER ISSUES

2.28.1 Value of Non judicial Stamp Paper for Bank Guarantees and for Contract Agreement shall be not less than Rs 100/- unless otherwise required under relevant statutes.
2.28.2 In case of any conflict between the General Conditions of Contract and Special Conditions of Contract, provisions contained in the Special Conditions of Contract shall prevail.
2.28.3 Unless otherwise specified in NIT, offers from consortium/ JVs shall not be considered.
2.28.4 BHEL may not insist for signing of Contract Agreements in respect of low value and short time period contracts like providing services for Hot water flushing, Chemical Cleaning, Transportation, Geo-Technical works, Hiring of T&Ps/ Vehicles/ Equipments etc. and work shall be executed as per the terms of LOI/LOA/Work Order. BHEL may not insist for signing of Contract Agreements in respect of works costing upto Rs. 2 lakhs (upto Rs. 5 lakhs in case scheduled completion period is not more than 3 months**).**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

PSER

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CONTENTS

Sl. No.	Description	Details
1	**Project Title**	2X800MW Koderma Thermal Power Station,Stage-II
2	**Customer**	Damodar Valley Corporation (DVC)
3	**Location**	Near Benjhidih Village of Koderma District in Jharkhand. The Site can be approached from District Head Quarters through National Highway NH-20 and thereafter the internal road of the town
4	**Nearest Railway Station**	Koderma within 2 Km) .
5	**Nearest Airport**	Gaya Airport, Gaya within 108 Km
6	**Access By Road/Major Cities**	The project site is approachable from National Highway NH-19 about 25 Km from the Site and also National Highway NH- 20 about 8 Km from the site
7	**Temperature**	Mean of daily minimum temperature = 13.2°C Mean of daily maximum temperature = 41.8°C
8	**Wind Speed**	Design wind speed is 39 m/sec as per IS: 875 Part III

Above information furnished are for general guidance of Contractor. However, Contractor has advised to visit the site and appraise himself about the conditions of site and infrastructure available in the area for fulfilling their commitments under the contract.

A. INTRODUCTION

Tender enquiry for supply and E&C of Electrical & Illumination Items including Air-conditioning and Ventilation System for Safety Control Room of 2x800MW DVC Koderma Thermal Power Project, Jharkhand.

B.1. SCOPE

1.1 The Bidder scope shall include supply and E&C of Electrical & Illumination Items including Air-conditioning and Ventilation System receipt, in-plant transportation, handling at site, erection including associated civil and structural works, testing and commissioning of the Electrical equipment/ system and works as indicated in this chapter. The Electrical scope shall be as described briefly in the following clauses but not limited to it.

1.2 Transit insurance till receipt of material at site, is under supplier scope.

1.3 Unloading & storage shall be in BHEL scope. The storage and responsibility of the material after the issue from BHEL's store shall be under the purview of the vendor.

1.4 Indicative Quality Plan & tentative make list of the items are attached with this tender. Bidder to refer attached indicative quality plan & make list before quoting the rates. Vendor to adhere with make of the items as indicated in list.

B.2. EQUIPMENT & SERVICES TO BE PROVIDED BY BIDDER:

2.1. Any item/ work either supplies of equipment or erection material which have not been specifically mentioned but are necessary to complete the work for trouble free and efficient operation of the system shall be deemed to be included within the scope of this specification. The same shall be provided by the bidder without any extra charge.

2.2. Erection & Maintenance tools & tackles.

2.3. All equipment shall be suitable for the power supply fault levels and other climatic conditions mentioned in the enclosed project information.

2.4. Bidder to furnish list of makes for each equipment after placement of purchase order, which shall be subject to customer/ BHEL approval without any commercial and delivery implications to BHEL.

2.5. Various drawings, data sheets as per required format, Quality plans, calculations, test reports, test certificates, operation and maintenance manuals etc. shall be furnished as specified at contract stage. All documents shall be subject to customer/ BHEL approval without any commercial implication to BHEL.

2.6. All equipment shall meet the requirements stipulated in the technical specification.

B.3. EXCLUSIONS: Supply and Erection of Incoming cables from BHEL's scope MCC to Vendor scope LDB are excluded from vendor scope. However, supply of cable glands and lugs for incoming cables to Vendor scope LDB shall be in vendor scope.

B.4. DOCUMENTS TO BE SUBMITTED ALONG WITH BID

4.1. Bidder shall confirm total compliance to the electrical specification without any deviation from the technical/quality assurance requirements stipulated.

4.2. No technical submittal such as copies of data sheets, drawings, write-up, quality plans, type test certificates, technical literature, etc., is required during the tender stage. Any such submission, even if made, shall not be considered as part of offer.

B.5. LIST OF ENCLOSURES:

5.1. Quality Plans for reference.
5.2. Tentative Approved makes.
5.3. Drawing for electrical equipment and cabling layout safety park switchgear room.

B.6. DELIVERY PERIOD:

6.1. Vendor has to submit the Revision 00 of drawing/documents after detailed engineering within 07 days from the date of PO. Subsequent revisions (if any) shall be submitted within 07 days from the date of last communication of BHEL.
6.2. Supply and erection & commissioning to be completed within 30 days from the date of approved documents.

B.7. MATERIAL WARRANTY/ REPLACEMENT TERMS:

The successful bidder shall provide a material warranty/ Replacement covering mechanical/ electrical works against any Manufacturing/ Design/ Installation defects. The equipment supplied shall be guaranteed for defects in material and poor workmanship for a period of 18 months from the date of receipt of material at site or 12 months from the date of commissioning, whichever is earlier.

B.8. QUANTITY VARIATION

The quantity variation on overall package may be ±30% of total contract value. This will depend on the detailed engineering which is part of the scope of this tender.

B.9. TERMS OF DELIVERY

F.O.R. Destination basis.

B.10. SPECIAL CONDITON

Vendor to quote supply and Erection/Commissioning (including design) for all the items as per BOQ. Partial items quotation will not be accepted.

B.11. GENERAL:

a. DVC would like to visit the works of vendor if felt necessary for tying up the quality and inspection requirements, after PO placement and before start of manufacturing.
b. The vendor has to submit the consolidated list of makes of all the items from which the vendor intends to supply the items for final approval from the customer within 07 days from the date of Purchase Order.
c. Vendor has to co-ordinate with DVC for approval of all drawings and documents. Total responsibilities lie with the vendor for approval of designing/drawing/documents/QP etc from DVC. Vendor has to submit the drawings/documents etc and get them approved from DVC. Vendor has to take care of this while submission of bid.

Notes:

A. This BOQ is tentative. Vendor to design the system and submit the final BOQ along with drawing/documents after assessment of work.

B. Material shall be dispatched only after receipt of MDCC (Material dispatch clearance certificate) from BHEL/customer.

B.12. Payment Terms:

A. The individual item rates are further divided in the ratio of 80% for supply part and balance 20% for E&C part.

B. 95% Payment shall be made upon completion of each activity on pro-rata basis on submission of following documents:

C. Supply Portion:

a) GST Complaint Invoice (1 Original + 2 copies)
b) MDCC
c) Test Certificates
d) Delivery Challan
e) Cancelled Cheque
f) SRV from site
g) Material warranty certificate as per terms & condition mentioned above.
h) Any other document as per requirement.

D. E&C Portion:

a) GST Complaint Invoice (1 Original + 2 copies)
b) Measurement as certified by site engineer.
c) Any other document as per requirement.

E. Final 5% of balance payment of both Supply portion and E&C portion shall be released after submission of as built drawings and final completion certificate from BHEL.

C. Electrical System and Equipments

C.1 SWITCHGEAR/LDB /Lighting Panel with Timer

All Switchgears, Motor Control Centres (MCCs) & AC/DC distribution boards, etc. shall have at least twenty per cent (20%) or minimum two (whichever is higher) fully equipped switch fuse modules of each rating as spares, uniformly distributed over different vertical sections. In addition, all Switchgears, MCCs and AC distribution boards shall have as spares at least twenty per cent (20%) of starter modules/MCCB modules or at least one module (whichever is higher) of each rating range of the selection tables equipped for the rating of the largest auxiliary fed from that range. It is preferable to supply LT Switchgears and LT Bus ducts from one/ two manufacturers. Contractor's scope also includes the Insulating mats for laying in front of LT Switchgears in switchgear rooms.

A. 50KVA AC LIGHTING DISTRIBUTION BOARD (2I/C & 1 B/C, 2) (Including 2 no's lighting transformer encapsulated type (50 KVA) - 8 Outgoing (63 A Each)
LDBs consisting of dry-type isolation transformer housed in LDB with proper separation from distribution panels as per details indicated below are envisaged:
Transformer rating: 50 kVA
Transformer voltage ratio: 415 / 415 Volt, taps of +5% to -5% in steps of 2.5%.
Transformer type: Non- Encapsulated
Vector group of transformers: Dyn11
Nos of Transformer: Two Nos
Distribution Panel type: Single front fixed type, Floor Mounted
Cable Entry : bottom
Degree Of protection : IP 54 (Main Panel)
IP -42 (TRF Cubicle)
Enclosure: 2 mm CRCA
Door/ Cover:2mm CRCA
Type of Gland Plate: 3mm Removable
Base Frame:3 mm
Base Plate:3 mm
Door: Hinged & Lockable
Bus Bar : Aluminium of E91 E with sleeves insulated
Current density : 0.8A/SQMM
LDB Configuration: Two incomers and a Bus-coupler with Two incomer isolation MCCB
Incomer & Bus coupler type: TPN MCCB
Incomer & Bus coupler rating: As per lighting transformer rating
Outgoing feeder type: TPN MCCB
Outgoing feeder rating: 63A
Number of Outgoing Feeder: 8 nos
Cable termination in the cable alley of LDB shall confirm to Form IVb design
Paint: 7 Tank, powder coated with colour shade RAL9002

B. AC Lighting panel (ACLP)

ACLP shall be fabricated out of MS sheet of 2mm thickness and hot-dipped galvanised. The boxes shall be provided with two nos. earthing terminals, a gasket to achieve IP55 degree of protection, terminal blocks for loop-in loop-out for cable of specified sizes, mounting brackets suitable for surface mounting on wall/column/structure, gland plate etc.

1. AC normal lighting panel
as per the details given below is envisaged:
Incomer type: TPN MCB
Incomer rating: 63A
Outgoing feeder type: SPN MCB
Outgoing feeder rating: 20A
Short circuit rating: 9kA
No. of outgoing feeders: 6

2. Street lighting panel

as per the details given below is envisaged:
Incomer type: TPN MCB
Incomer rating: 63A
Outgoing feeder type: TPN MCB
Outgoing feeder rating: 20A
Short circuit rating: 9kA
ON/ OFF control With Astronomical Digital Timer & photocell
No. of outgoing feeders: 6
C.

C.2 CABLING

The scope of the contractor includes safety control room including their interconnection:

a) Laying of cables.
b) Supply and installation of Cable trays, fittings and their accessories, along with support system.
c) Supply and installation of Cable glands and lugs.
d) Supply and installation of Straight-through jointing kits for LT power and control cables (if required).
e) Supply and installation of Welding receptacles. RC type shall be welding receptacles.
f) Supply and installation of Trefoil cable clamps.
g) Supply and installation of Junction boxes.
h) Supply and installation of Galvanised steel pipes/ HDPE/ Hume pipes/ PVC pipes.
i) Supply and installation of Miscellaneous items like M.S. sections etc. as required.
j) Supply and installation of Fireproof cable penetration sealing system of Type-A and Type-B for cable galleries, cable exits etc.
k) The Contractor shall provide complete detailed cable tray layout drawings for contractor scope of area. The detail cable tray layout includes tray layout of different platforms, floors, cable shafts, inter connection of buildings/ interplant cable tray layout for feeding all the electrical loads viz HT motors, LT motors, DC motors, panels, instruments, JB's etc. The cable tray layout comprises of sufficient/ exact number of cable trays, size, elevation, distances, clear view, sectional detail, cable tray numbering etc. as per the contractor equipment of Electrical/ C&I loads etc.

l) The cable tray layout drawing shall indicate cable routes in contractor scope of area. The contractor shall supply and install these cable routes for contractor's cable covered in Electrical and C&I sections.
m) The cable tray Routes shall be supported at an interval of 2Mtr from floor beams/ structures and shall be routed with minimum bends along with shortest route.
n) Complete cable erection includes supply and erection of all the accessories such as rigid/ flexible conduits, fittings, junction boxes, tying materials, cable tags, and markers, support structures, cable trays, cable termination, junction boxes etc. shall be under the scope of contractor.

o) Contractor shall provide Auto cad drawings, for all buildings under his scope along with equipment layout/ sections. The preliminary drawing in AutoCAD format shall be provided by BHEL. The same shall be utilized for preparing the illumination drawings and equipment layouts. Apart from the approved drawings, the drawings in AutoCAD format shall also be shared with BHEL.

p) The contractor shall furnish the complete and consolidated feeder list for DC system, LT system and HT system for all loads and drives under the scope of supply of contractor to Employer. Contractor shall indicate the location of his equipment in feeder load list.

q) Contractor shall furnish the cable schedule as per mutually agreed format for all the cables under his scope of supply under Electrical and C&I section.

r) Control interconnection charts/ diagram/ equipment layout/ layout for cables between Contractor's equipment's shall also be prepared by bidder.

s) The contractor shall provide trestle in the Cable trestle layout Drawing.

C.3 CABLES (LT Power and Control Cables)

Supply of LT Power cables and protection cabling, necessary termination, lugs & glands as required for all systems covered under this package.

C.4 EARTHING AND LIGHTNING PROTECTION

Below and above ground earthing, Grounding and lightning protection for the safety control room and their equipment are in the contractor's scope.

C.5 STATION LIGHTING (ILLUMINATION)

Design and Supply of Station lighting system for the plant, buildings and equipment under Bidder's area is in the bidder's scope. Lighting fixtures complete with lamps & accessories, LED lighting fixture complete with driver circuit & accessories, Lighting Panels, Receptacles, Switch boxes, Conduits, Lighting Wires, Ceiling fans, Wall mounted fans with regulators, Earth wires and rods, Junction boxes, Battery operated automatic self-contained lighting fixture. The system shall cover all interior and exterior lighting of safety control room in the contractor's scope of area. Contractor shall prepare complete lighting layout drawings of all the areas under the bidder's scope.

C.6 TYPE TEST

Contractor shall meet the requirements of type tests on electrical equipment as stipulated in relevant chapters of technical specifications.

a) The Contactor shall carry out the type tests as listed in the specifications of respective equipment. The type test's charges are considered to be included in the scope of work. Separate payment shall not be given for type tests.

b) The type tests shall be carried out in presence of the Employer's (BHEL/ DVC) representative, for which minimum 07 days' notice shall be given by the Contactor. The Contactor shall obtain the Employer's approval for the type test procedure before conducting the type test. The type test procedure shall clearly specify the test set–up, instruments to be used, procedure, acceptance norms, recording of different

parameters, interval of recording, precautions to be taken etc. for the type test(s) to be carried out.

c) In case the Contactor has conducted such specified type test(s) within period as per Table-A (mentioned below) , he may submit during detailed engineering the type test reports to the Employer for waiver of conductance of such test(s). These reports should be for the tests conducted on the equipment similar to those proposed to be supplied under this contract and test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. The Employer reserves the right to waive conducting of any or all the specified type test(s) under this contract.

d) Further the Contractor shall only submit the reports of the type tests as listed in "LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED" and carried out within period as per Table -A. Such type tests shall be under “Report category”. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. However, if the Contactor is not able to submit report of the type test(s) conducted within period as mentioned in Table -A , or in the case of type test report(s) are not found to be meeting the specification requirements, the Contactor shall conduct all such tests under this contract at no additional cost to the Employer either at third party lab or in presence of Client/ Employers representative and submit the reports for approval.

TABLE-A:

S. No.	Equipment	Type test report validity (in years)
1	LT Switchgear	10
2	LT Power Cables	10
3	Control Cables	10
4	Cable tray support	10
5	Lighting: a. LED b. Other equipment	10

E. LT POWER CABLES

E.1. CODES AND STANDARDS

All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions as on date of opening of bid. In case of conflict between this specification and those (IS: codes, standards, etc.) referred to herein, the former shall prevail. All the cables shall conform to the requirements of the following standards and codes:

IS:7098 (Part -II)	Specification for Cross linked polyethylene insulated PVC sheathed cables. Part-II: For working voltages from 3.3kV upto and including 33kV.
IS : 3975	Low Carbon Galvanized steel wires, formed wires and tapes for armouring of cables.
IS:4905	Methods for random sampling.
IS : 5831	PVC insulation and sheath of electrical cables.
IS : 8130	Conductors for insulated electrical cables and flexible cords.
IS : 10418	Specification for drums for electric cables.
IS : 10810	Methods of tests for cables.
ASTM-D - 2843	Standard test method for density of smoke from the burning or decomposition of plastics.
IEC-754 (Part-I)	Tests on gases evolved during combustion of electric cables.
IS :1554 - I	PVC insulated (heavy duty) electric cables for working voltages up to and including 1100V.
IS : 3961	Recommended current ratings for cables
IEC- 332	Tests on electric cables under fire conditions. Part-3: Tests on bunched wires or cables (Category-B).
IS:7098 (Part -I)	Cross linked polyethylene insulated PVC sheathed cables for working voltages up to and including 1100V.

E.2. TECHNICAL REQUIREMENTS

E.2.1 All cables (LT power) shall be armoured type only irrespective of anything contrary mentioned elsewhere in the specification. All cables including EPR cables shall be flame retardant, low smoke (FRLS) type designed to withstand all mechanical, electrical and thermal stresses developed under steady state and transient operating conditions as specified elsewhere in this specification.

E.2.2 Aluminium conductor used in power cables shall have tensile strength of more than 100 N/sq.mm. Conductors shall be multi stranded.

E.2.3 XLPE insulation shall be suitable for a continuous conductor temperature of 90 deg. C and short circuit conductor temperature of 250°C. PVC insulation shall be suitable for continuous conductor temperature of 70°C and short circuit conductor temperature of 160°C.

E.2.4 The cable cores shall be laid up with fillers between the cores wherever necessary. It shall not stick to insulation and inner sheath. All the cables, other than single core unarmoured cables, shall have distinct extruded PVC inner sheath of black colour as per IS: 5831.

E.2.5 For single core armoured cables, armouring shall be of aluminium wires. For multicore armoured cables armouring shall be of galvanised steel as follows: -

S. No.	Calculated nominal dia of cable under armour	Size and Type of armour

I	Up to 13 mm	1.4mm dia GS wire
Ii	Above 13 & up to 25mm	0.8 mm thick GS formed wire / 1.6 mm dia GS wire
Iii	Above 25 & up to 40 mm	0.8mm thick GS formed wire / 2.0mm dia GS wire
Iv	Above 40 & up to 55mm	1.4 mm thick GS formed wire/2.5mm dia GS wire
V	Above 55 & up to 70mm	1.4 mm thick GS formed wire/3.15mm dia GS wire
Vi	Above 70mm	1.4 mm thick GS formed wire / 4.0 mm dia GS wire

E.2.6 The aluminium used for armouring shall be of H4 grade as per IS: 8130 with maximum resistivity of 0.028264 ohm-sq.mm/mtr at 20°C. The types and sizes of aluminium armouring shall be same as mentioned for galvanised steel at 2.05.00 above.

E.2.7 The gap between armour wires / formed wires shall not exceed one armour wire / formed wire space and there shall be no cross over / over-riding of armour wire / formed wire. The minimum area of coverage of armouring shall be 90%. The breaking load of armour joint shall not be less than 95% of that of armour wire / formed wire. Zinc rich paint shall be applied on armour joint surface of G.S. wire/ formed wire.

E.2.8 Distinct extruded PVC inner sheath of black colour as per IS:5831 shall be provided for the cables as follows:

a. For all multicore cables.

b. For single core armoured cables, where armouring is not being used as metallic screen.

E.2.9 Outer sheath shall be of PVC black in colour. In addition to meeting all the requirements of Indian standards referred to, outer sheath of all the cables shall have the following FRLS properties.

a. Oxygen index of min. 29 (Test method as per IS 10810 Part-58)

b. Acid gas emission of max. 20% as per IEC-754 (Part-I)

c. Smoke density rating shall not be more than 60% during Smoke Density Test as per ASTMD-2843.

E.2.10 Allowable tolerances on the overall diameter of the cables shall be +\-2 mm maximum over the declared value in the technical data sheets.

E.2.11 Cable lengths shall be considered in such a way that straight through cable joints is avoided.

E.2.12 All Cables shall be armoured type only.

E.2.13 All LT power cables of sizes more than 120 sq.mm. shall be XLPE insulated and sizes shall be of 1Cx150, 1Cx300, 1Cx630, 3Cx150 & 3Cx240 sq.mm However for cable sizes up to 120 sq.mm. both XLPE insulated & PVC insulated LT power cables are acceptable. For LT Cables, same cable sizes to be used for same type & rating of motor i.e. if there are three pumps for one application, all three pumps motor should be provided with same cables sizes.

E.2.14 Cores of the cables shall be identified by colouring of insulation. Following colour scheme shall be adopted:

1 core -	Red, Black, Yellow or Blue
2 core -	Red & Black
3 core -	Red, Yellow & Blue
4 core -	Red, Yellow, Blue and Black

E.2.15 For reduced neutral conductors, the core shall be black.

E.2.16 In plant repairs to the cables shall not be accepted. Pimples, fish eye, blow holes etc. are not acceptable.

E.2.17 The cross-sectional area of the metallic screen strip/tape/wires shall be considered in sizing calculations.

E.2.18 The eccentricity of the core shall not exceed 10% and ovality not to exceed 2%.

E.3.CABLE SELECTION & SIZING

- Cables shall be sized based on the following considerations:
  a. Rated current of the equipment.
  b. The voltage drop in the cable, during motor starting condition, shall be limited to 10% and during full load running condition, shall be limited to 3% of the rated voltage.
  c. Short circuit withstand capability.
- Derating Factors
  Derating factors for various conditions of installations including the following shall be considered while selecting the cable sizes:
  a. Variation in ambient temperature for cables laid in air.
  b. Grouping of cables.
  c. Variation in ground temperature and soil resistivity for buried cables.

The bidder shall furnish detailed cable selection/sizing criteria for Employer's approval.

E.4. CONSTRUCTIONAL FEATURES (1.1 kV Grade Power Cables)

E.4.1. 1.1 kV grade XLPE power cables shall have compacted aluminium conductor, XLPE insulated, PVC inner-sheathed (as applicable), armoured PVC outer-sheathed conforming to IS: 7098. (Part-I).

E.4.2. 1.1kV grade PVC power cables shall have aluminium conductor (compacted type for sizes above 10 sq.mm), PVC Insulated, PVC inner sheathed (as applicable) armoured, PVC outer-sheathed conforming to IS:1554 (Part-I).

E.4.3. 1.1 kV grade Trailing cables shall have tinned copper (class 5) conductor, insulated with heat resistant elastomeric compound based on Ethylene Propyline Rubber(EPR) suitable for withstanding 90°C continuous conductor temperature and 250°C during short circuit, inner-sheathed with heat resistant elastomeric compound, nylon cord reinforced, outer-sheathed with heat resistant, oil resistant and flame retardant heavy duty elastomeric compound conforming to IS 9968.

E.5.CABLE DRUMS

E.5.1. Cables shall be supplied in steel drums of heavy construction. The drum shall be designed on the basis of weight, diameter, bending radius and length of cable. The surface of the drum and the outer most cable layer shall be covered with water proof

cover. Both the ends of the cables shall be properly sealed with heat shrinkable PVC/ rubber caps secured by 'U' nails so as to eliminate ingress of water during transportation, storage and erection.

E.5.2. Each drum shall carry manufacturer's name, purchaser's name, address and contract number, item number and type, size and length of cable and net gross weight stenciled on both sides of the drum. A tag containing same information shall be attached to the leading end of the cable. An arrow and suitable accompanying wording shall be marked on one end of the reel indicating the direction in which it should be rolled.

E.5.3. The standard drum length of LT power cable with a maximum tolerance of +/- 5% may be decided by the bidder subject to condition that there shall not be any joint in cable, where application length of cable is up to & including 1000 meter for single core cable excluding 630 sqmm size, and 750 meter for multicore cable & single core 630 sqmm. The standard drum length for Control cables with a maximum tolerance of +/- 5% may be decided by the bidder subject to condition that there shall not be any joint in cable, where application length of cable is up to & including 1000-meter One drum length of each cable size can be of non-standard length (not less than 250 meter) so as to match the ordered quantity subject to condition that there shall not be any joint in cable.

E.6.TYPE, ROUTINE AND ACCEPTANCE TESTS

E.6.1. Type Tests

The reports for the following type tests shall be submitted for one size each of LT XLPE, LT PVC Power. Size shall be decided by the employer during detailed engineering.

S. No.	Type Test	Remarks
1	Resistance test	
	For Armour Wires / Formed Wires	
2	Measurement of Dimensions	
3	Tensile Test	
4	Elongation test	
5	Torsion test	For round wires only
6	Wrapping test	
7	Resistance test	
8 (a)	Mass & uniformity of Zinc Coating tests	For GS wires/formed wires only.
8 (b)	Adhesion test	For GS wires/formed wires only
	For XLPE insulation & PVC Sheath	
9	Test for thickness	
10	Tensile strength and elongation test before ageing and after ageing	
11	Ageing in air oven	
12	Loss of mass test	For PVC outer sheath only.
13	Hot deformation test	For PVC outer sheath only.

14	Heat shock test	For PVC outer sheath only
15	Shrinkage test	
16	Thermal stability test	For PVC outer sheath only
17	Hot set test	For XLPE insulation only
18	Water absorption test	For XLPE insulation only
19	Oxygen index test	For PVC outer sheath only
20	Smoke density test	For PVC outer sheath only
21	Acid gas generation test	For PVC outer sheath only
22	Flammability test as per IEC-332 Part-3 (Category -B)	For completed cable only

E.6.2. Indicative list of tests/ checks, Routine and Acceptance tests shall be as per Quality Assurance & Inspection table.

F. CABLING EARTHING AND LIGHTNING PROTECTION

F.1 CODES AND STANDARDS

F.1.1. All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions as on date of opening of bid. In case of conflict between this specification and those (IS codes, standards, etc.) referred to herein, the former shall prevail. All work shall be carried out as per the following standards/ codes as applicable.

IS:513	Cold rolled low carbon steel sheets and strips.
IS:802	Code of practice for the use of Structural Steel in Overhead Transmission Line Towers.
IS:1079	Hot Rolled carbon steel sheet & strips
IS:1239	Mild steel tubes, tubulars and other wrought steel fittings
IS:1255	Code of practice for installation and maintenance of power cables up to and including 33kV rating
IS:1367 Part-13	Technical supply conditions for threaded Steel fasteners. (Hot dip galvanized coatings on threaded fasteners).
IS:2147	Degree of protection provided by enclosures for low voltage switchgear and control gear
IS:2309	Code of Practice for the protection of building and allied structures against lightning.
IS:2629	Recommended practice for hot dip galvanising of iron & steel
IS:2633	Method for testing uniformity of coating on zinc coated articles.
IS:3043	Code of practice for Earthing
IS:3063	Fasteners single coil rectangular section spring washers.
IS:6745	Methods for determination of mass of zinc coating on zinc coated iron & steel articles.

IS:8308	Compression type tubular in- line connectors for aluminium conductors of insulated cables
IS:8309	Compression type tubular terminal ends for aluminium conductors of insulated cables.
IS:9537	Conduits for electrical installation.
IS:9595	Metal - arc welding of carbon and carbon manganese steels - recommendations.
IS:13573	Joints and terminations for polymeric cables.
BS:476	Fire tests on building materials and structures
IEEE:80	IEEE guide for safety in AC substation grounding
DIN 46267 (Part-II)	Non tension proof compression joints for Aluminium conductors.
DIN 46329	Cable lugs for compression connections, ring type, for Aluminium conductors
BS:6121	Specification for mechanical Cable glands for elastomers and plastic insulated cables.
	Indian Electricity Act.
	Indian Electricity Rules.

F.1.2. Equipment complying with other internationally accepted standards such as IEC, BS, DIN, USA, VDE, NEMA etc. will also be considered if they ensure performance and constructional features equivalent or superior to standards listed above. In such a case, the Bidder shall clearly indicate the standard(s) adopted, furnish a copy in English of the latest revision of the standards along with copies of all official amendments and revisions in force as on date of opening of bid and shall clearly bring out the salient features for comparison.

F.2 DESIGN AND CONSTRUCTIONAL FEATURE

F.2.1. Trenches

F.2.2. PCC flooring of built-up trenches shall be sloped for effective drainage with sump pits and sump pumps.

F.2.3. No sub-zero level cable vault/ trenches shall be provided below control building/ switchgear rooms in main plant.

F.2.4. The cable slits to be used for motor/ equipment power/ control supply shall be sand filled & covered with PCC after cabling.

F.2.5. Sizing criteria, derating factors for the cables shall be met as per respective chapters. However, for the power cables, the minimum conductor size shall be 6 sqmm for aluminium conductor and 2.5 sqmm for copper conductor cable.

F.2.6. Conscious exceptions to the above guidelines may be accepted under special conditions but suitable measures should be taken at such location to:

- Meet all safety requirements
- Safeguard against fire hazards, mechanical damage, flooding of water, oil accumulation, electrical faults/interferences, etc.

F.3 EQUIPMENT DESCRIPTION

F.3.1 Cable trays, Fittings & Accessories

F.3.1.1. Cable trays shall be ladder/perforated type as specified complete with matching fittings (like brackets, elbows, bends, reducers, tees, crosses, etc.) accessories (like side coupler plates, etc. and hardware (like bolts, nuts, washers, G.I. strap, hook etc.) as required. Cable tray shall be ladder type for power & control cables and perforated for instrumentation cables.

F.3.1.2. Cable trays, fittings and accessories shall be fabricated out of rolled mild steel sheets free from flaws such as laminations, rolling marks, pitting etc. These (including hardware) shall be hot dip galvanized.

F.3.1.3. Cable trays shall have standard width of 150 mm, 300 mm & 600 mm and standard lengths of 2.5 metre. Thickness of mild steel sheets used for fabrication of cable trays and fittings shall be 2 mm. The thickness of side coupler plates shall be 3 mm.

F.3.1.4. Cable troughs shall be required for branching out few cables from main cable route. These shall be U-shaped, fabricated of mild steel sheets of thickness 2 mm and shall be hot dip galvanised. Troughs shall be standard width of 50 mm & 75 mm with depth of 25 mm.

F.3.1.5. The tolerance for cable tray and accessories shall be as per IS 2102 (Part-1). Tolerance Class: - Coarse.

F.3.1.6. Cable tray shall be of reputed make and subject to approval of DVC/BHEL during detailed engineering.

F.3.2 Support System for Cable Trays

F.3.2.1. Cable tray support system shall be pre-fabricated out of single sheet.

F.3.2.2. Support system for cable trays shall essentially comprise of the two components i.e. main support channel and cantilever arms. The main support channel shall be of two types: (i) C1: - having provision of supporting cable trays on one side and (ii) C2: - having provision of supporting cable trays on both sides. The support system shall be the type described hereunder:

a. Cable supporting steel work for cable racks/cables shall comprise of various channel sections, cantilever arms, various brackets, clamps, floor plates, all hardwares such as lock washers, hexagon nuts, hexagon head bolt, support hooks, stud nuts, hexagon head screw, channel nut, channel nut with springs, fixing studs, etc.

b. The system shall be designed such that it allows easy assembly at site by using bolting. All cable supporting steel work, hardwares fittings and accessories shall be prefabricated factory galvanised.

c. The main support and cantilever arms shall be fixed at site using necessary brackets, clamps, fittings, bolts, nuts and other hardware etc. to form various arrangements required to support the cable trays. Welding of the components shall not be allowed. However, welding of the bracket (to which the main support channel is bolted) to the overhead beams, structural steel, insert plates or reinforcement bars will be permitted. Any cutting or welding of the galvansied surface shall be brushed and red lead primer, oil primer & aluminium paint shall be applied.

d. All steel components, accessories, fittings and hardware shall be hot dip galvanised after completing welding, cutting, drilling and other machining operation.

e. The typical arrangement of flexible support system is shown in the enclosed drawings and described briefly below: The main support channel and cantilever arms shall be fabricated out of 2.5 thick rolled steel sheet conforming to IS 1079.

f. Cantilever arms of 320 mm, 620mm and 750 mm in length are required, and shall be as shown in the enclosed drawing. The arm portion shall be suitable for assembling the complete arm assembly on to component constructed of standard channel section. The back plate shall allow sufficient clearance for fixing bolt to be tightened with tray in position.

g. Support system shall be able to withstand:

- weight of the cable trays
- weight of the cables (75 kg/metre run of each cable tray)
- Concentrated load of 75 kg between every support span.
- Factor of safety of minimum 1.5 shall be considered.

F.3.2.3. The size of structural steel members or thickness of sheet steel of main support channel and cantilever arms and other accessories as indicated above or in the enclosed drawings are indicative only. Nevertheless, the support system shall be designed by the bidder to fully meet the requirements of type tests as specified. In case the system fails in the tests, the components design modification shall be done by the Bidder without any additional cost to the Employer.

F.3.2.4. Four-legged structure shall be provided wherever there is change in elevation and change in direction.

F.3.3 Pipes, Fittings & Accessories

F.3.3.1. Pipes offered shall be complete with fittings and accessories (like tees, elbows, bends, check nuts, bushings, reducers, enlargers, coupling caps, nipples etc.) The size of the pipe shall be selected on the basis of maximum 40% fill criteria.

F.3.3.2. GI Pipes shall be of medium duty as per IS: 1239

F.3.3.3. Duct banks shall be High Density PE pipes encased in PCC (10% spare of each size, subject to minimum one) with suitable water-proof manholes.

F.3.3.4. Hume pipes shall be NP3 type as per IS 458.

F.3.3.5. TERNE Coated Flexible Steel Conduits shall be water proof and rust proof made of heat resistant lead coated steel. Conduit diameter shall be uniform throughout its length. Internal surface of the conduit shall be free from burrs and sharp edges. Conduits shall be complete with necessary accessories for proper termination of the conduit with junction boxes and lighting fixtures.

F.3.3.6. HDPE pipes and conduits shall be PE-80, PN-10 type as per IS 4984/IS 8008 part-I.

F.3.4 Junction Boxes

F.3.4.1. Junction box shall be made of Fire-retardant material. Material of JB shall be Thermoplastic or thermosetting or FRP type. The box shall be provided with the terminal blocks, mounting bracket and screws etc. The cable entry shall be through galvanized steel conduits of suitable diameter. The JB shall have suitable for installing glands of suitable size on the bottom of the box. The JB shall be suitable for surface mounting on ceiling/structures. The JB shall be of grey color RAL 7035. All the metal

parts shall be corrosion protected. Junction box surface should be such that it is free from crazings, blisterings, wrinkling, colour blots/striations. There should not be any mending or repair of surface. JB's will be provided with captive screws so that screws don't fall off when cover is opened. JB's mounting brackets should be of powder coated MS. Type test reports for the following tests shall be furnished: -

a. Impact resistance for impact energy of 2 Joules (IK07) as per BS EN50102
b. Thermal ageing at 70°C for 96 hours as per IEC60068-2-2Bb.
c. Class of protection shall be IP 55.
d. HV test.

F.3.4.2. Terminal blocks shall be 1100V grade, of suitable current rating, made up of unbreakable polyamide 6.6 grade. The terminals shall be screw type or screw-less (spring loaded) / cage clamp type with lugs. Marking on terminal strips shall correspond to the terminal numbering in wiring diagrams. All metal parts shall be of non-ferrous material. In case of screw type terminals, the screw shall be captive, preferably with screw locking design. All terminal blocks shall be suitable for terminating on each side the required cables/wire size. All internal wiring shall be of cu. Conductor PVC wire.

F.3.5 Cable glands

Cable shall be terminated using double compression type cable glands. Testing requirements of Cable glands shall conform to BS:6121 and gland shall be of robust construction capable of clamping cable and cable armour (for armoured cables) firmly without injury to insulation. Cable glands shall be made of heavy-duty brass machine finished and nickel chrome plated. Thickness of plating shall not be less than 10 microns. All washers and hardware shall also be made of brass with nickel chrome plating Rubber components shall be of neoprene or better synthetic material and of tested quality. Cable glands shall be suitable for the sizes of cable supplied/erected.

F.3.6 Cable lugs/ferrules

F.3.6.1 Cable lugs/ferrules shall be solderless crimping type suitable for power and control cables as per the DIN 46239. Aluminium solderless crimping lugs/ ferrules shall be used for Aluminium cables and Copper lugs/ferrules shall be used for copper cables. Bimetallic washers or bimetallic type lugs shall be used for bimetallic connections.

F.3.6.2 Crimping tool for crimping (from 1.5sqmm cable to 630sqmm cables) above mentioned lugs shall be of Hexagonal Type crimp profile, with suitable die of crimp match code.

Characteristics of crimping tool:

a. To should generate enough pressure to pass pull out test as per IEC 61238-1. Relevant type test to be produced for the sizes specified in the tender.
b. Tool die shall be replaceable for assorted sizes and crimp code to be mentioned on both part the die.
c. Tool should be compliant of testing according to IEC, UL and GS standards.
d. Tool shall have features such as:

- Auto retraction system

- Manual retraction stops.
- Feedback signals for improper pressure
- Better battery capacity and with status display
- Flexible and rotating head for easy crimping.

F.3.7 Trefoil clamps

3.07.01 Trefoil clamps for single core cables shall be pressure die cast aluminum or fibre glass or nylon and shall include necessary fixing accessories like G.I. nuts, bolts, washers, etc. Trefoil clamps shall have adequate mechanical strength, when installed at 1 mtr intervals, to withstand the forces generated by the peak value of maximum system short circuit current.

F.3.8 Cable Clamps & Ties

The cable clamps/ties required to clamp multicore cables shall be of SS-316 material, 12mm wide, polyster coated ladder lock type. The clamps/ties shall have self-locking arrangement & shall have sufficient strength. The cable clamps/ties shall be supplied in finished individual pieces of suitable length to meet the site requirements.

F.3.9 Receptacles

Receptacles boxes shall be fabricated out of MS sheet of 2mm thickness and hot dipped gavanised or of die-cast aluminium alloy of thickness not less than 2.5 mm. The boxes shall be provided with two nos. earthing terminals, gasket to achieve IP55 degree of protection, terminal blocks for loop-in loop-out for cable of specified sizes, mounting brackets suitable for surface mounting on wall/column/structure, gland plate etc. The ON-OFF switch shall be rotary type heavy duty, double break, AC23 category, suitable for AC supply. Plug and Socket shall be shrouded Die-cast aluminium. Socket shall be provided with lid safety cover. Robust mechanical interlock shall be provided such that the switch can be put ON only when the plug is fully engaged and plug can be withdrawn only when the switch is in OFF position. Also cover can be opened only when the switch is in OFF position. Wiring shall be carried out with 1100 V grade PVC insulated stranded aluminium/copper wire of adequate size. The Terminal blocks shall be of 1100 V grade. The Terminal blocks shall be of 1100 V grade made up of unbreakable polymide 6.6 grade with adequate current rating and size. The welding receptacles shall be provided with RCCB/RCD of 30mA sensitivity having facility for manual testing/checking of operation of RCCB/RCD.

F.3.10 Cable Drum Lifting Jack

The jack for cable drum lifting shall be of screw type with 10-ton capacity. The cable drum jacks shall be manufactured from fabricated steel. The spindles supplied with the cable drum jack shall be manufactured using BSEN-24 grade steel bar with locking collars. Jack nests shall be of SG cast steel. Cable drum jack supplied shall have undergone load testing and reports for the same shall be submitted. Contractor has to make arrangements for his own jacks for cable reeling/unreeling under his scope of installation.

F.3.11 Galvanising

F.3.11.1 Galvanising of steel components and accessories shall conform to IS:2629, IS4759 & IS:2633. Additionally, galvanising shall be uniform, clean smooth, continuous and free from acid spots.

F.3.11.2 The amount of zinc deposit over threaded portion of bolts, nuts, screws and washers shall be as per IS:1367. The removal of extra zinc on threaded portion of components shall be carefully done to ensure that the threads shall have the required zinc coating on them as specified.

F.3.12 Welding

The welding shall be carried out in accordance with IS:9595. All welding procedures and welders' qualification shall also be followed strictly in line with IS:9595.

F.4 INSTALLATION

F.4.1. Cable tray and Support System Installation

F.4.1.1 Cables shall run in cable trays mounted horizontally or vertically on cable tray support system which in turn shall be supported from floor, ceiling, overhead structures, trestles, pipe racks, trenches or other building structures.

F.4.1.2 Horizontally running cable trays shall be clamped by bolting to cantilever arms and vertically running cable trays shall be bolted to main support channel by suitable bracket/clamps on both top and bottom side rails at an interval of 2000 mm in general. For vertical cable risers/shafts cable trays shall be supported at an interval of 1000mm in general. Fixing of cable trays to cantilever arms or main support channel by welding shall not be accepted. Cable tray installation shall generally be carried out as per the approved guidelines/ drawings. Vendor shall design the support system along with tray, spacing etc in line with tray loadings/drawings.

F.4.1.3 The cantilever arms shall be positioned on the main support channel with a minimum vertical spacing of 300 mm unless otherwise indicated.

F.4.1.4 The contractor shall fix the brackets/ clamps/ insert plates using anchor fasteners. Minimum size of anchor fasteners shall be M 8 X 50 and material shall be stainless steel grade 316 or better. Anchor fastener shall be fixed as recommended by manufacturer and as approved by site engineer. For brick wall suitable anchor fasteners shall be used as per the recommendations of manufacturer. Make of anchor fasteners subject to QA approval and the same shall be finalized at pre-award stage.

F.4.1.5 All cable way sections shall have identification, designations as per cable way layout drawings and painted/stenciled at each end of cable way and where there is a branch connection to another cable way. Minimum height of letter shall be not less than 75 mm. For long lengths of trays, the identification shall be painted at every 10 meters. Risers shall additionally be painted/stenciled with identification numbers at every floor.

F.4.1.6 In certain cases, it may be necessary to site fabricate portions of trays, supports and other non-standard bends where the normal prefabricated trays, supports and accessories may not be suitable. Fabricated sections of trays, supports and accessories to make the installation complete at site shall be neat in appearance and shall match with the prefabricated sections in the dimensions. They shall be applied with one coat

of red lead primer, one coat of oil primer followed by two finishing coats of aluminium paint.

F.4.1.7 In fire prone areas, like Boiler, TG, fuel oil area and any other strategic location etc, fire retardant paint to be applied after installation cables.

F.4.2. Conduits/ Pipes/ Ducts Installation

F.4.2.1 The Contractor shall ensure for properly embedding conduit pipe sleeves wherever necessary for cabling work. All openings in the floor/roof/wall / cable tunnel/cable trenches made for conduit installation shall be sealed and made water proof by the Contractor.

F.4.2.2 GI pull wire of adequate size shall be laid in all conduits before installation. Metallic conduit runs at termination shall have two lock nuts wherever required for junction boxes etc.

F.4.2.3 Conduit runs/ sleeves shall be provided with PVC bushings having round edge at each end. All conduits/pipes shall have their ends closed by caps until cables are pulled. After cables are pulled, the ends of conduits/pipes shall be sealed with Glass wool/ Cement Mortar/ Putty to prevent entrance of moisture and foreign material.

F.4.2.4 Exposed conduit/ pipe shall be adequately supported by racks, clamps, straps or by other approved means. Conduits /pipe support shall be installed square and true to line and grade with an average spacing between the supports as given below, unless specified otherwise:

Conduit /pipe size (dia).	Spacing
Upto 40 mm	1.0 M
50 mm	2.0 M
65-85 mm	2.5 M
100 mm and above	3.0 M

F.4.2.5 For bending of conduits, bending machine shall be arranged at site by the contractor to facilitate cold bending. The bends formed shall be smooth.

F.4.3. Junction Boxes Installation

Junction boxes shall be mounted at a height of 1200mm above floor level or as specified in the drawings and shall be adequately supported/mounted on masonry wall by means of anchor fasteners/ expandable bolts or shall be mounted on an angle, plate or other structural supports fixed to floor, wall, ceiling or equipment foundations.

F.4.4. Cable Installation

F.4.4.1 Cable installation shall be carried out as per IS:1255 and other applicable standards.

F.4.4.2 For Cable unloading, pulling etc. following guidelines shall be followed in general:

a. Cable drums shall be unloaded, handled and stored in an approved manner on hard and well drained surface so that they may not sink. In no case shall be drum be stored flat i.e., with flange horizontal. Rolling of drums shall be avoided as far as possible. For short distances, the drums may be rolled provided they are rolled slowly and in proper direction as marked on the drum. In absence of any indication, the drums may be rolled in the same direction as it was rolled during taking up the cables. For unreeling the cable, the drum shall be mounted on suitable jacks or on cable wheels and shall be

rolled slowly so that cable comes out over the drum and not from below. All possible care shall be taken during unreeling and laying to avoid damage due to twist, kink or sharp bends. Cable ends shall be provided with sealed plastic caps to prevent damage and ingress of moisture.

b. While laying cable, ground rollers shall be used at every 2-meter interval to avoid cable touching ground. The cables shall be pushed over the rollers by a gang of people positioned in between the rollers. Cables shall not be pulled from the end without having intermediate pushing arrangements. Pulling tension shall not exceed the values recommended by cable manufacturer. Selection of cable drums for each run shall be so planned so as to avoid using straight through joints. Care should be taken while laying the cables so as to avoid damage to cables. If any particular cable is damaged, the same shall be repaired or changed to the satisfaction of Project Manager.

F.4.4.3 Cables shall be laid on cable trays strictly in line with cable schedule.

F.4.4.4 Power and control cables shall be laid on separate tiers in line with the approved guidelines/ drawings. The laying of different voltage grade cables shall be on different tiers according to the voltage grade of the cables. In horizontal tray stacks, H.T. cables shall be laid on top most tier and cables of subsequent lower voltage grades on lower tiers of trays. Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every one metre. All multicore cables shall be laid in touching formation. Power and control cables shall be secured fixed to trays/ support with cable clamps/ ties with self-locking arrangement. For horizontal trays arrangements, multicore power cables and control cables shall be secured at every five-meter interval. For vertical tray arrangement, individual multicore power cables and control cables shall be secured at every one meter. After completion of cable laying work in the particular vertical tray, all the control cables shall be binded to trays/supports by cable clamps/ties with self-locking arrangement at every five-meter interval and at every bend. Fibre Optical cable shall be laid in trenches/trays or as decided by Employer.

F.4.4.5 Bending radii for cables shall be as per manufacturer's recommendations and IS:1255.

F.4.4.6 Where cables cross roads/rail tracks, the cables shall be laid in hume pipe/ HDPE pipe.

F.4.4.7 No joints shall be allowed in trip circuits, protection circuits and CT/PT circuits. Also joints in critical equipment in main plant area shall not be permitted. Vendor shall identify and accordingly procure the cable drum length.

F.4.4.8 In each cable run some extra length shall be kept at suitable point to enable one LT/two HT straight through joints to made, should the cable develop fault at a later stage. Control cable termination inside equipment enclosure shall have sufficient lengths so that shifting of termination in terminal blocks can be done without requiring any splicing.

F.4.4.9 Wherever few cables are branching out from main trunk route troughs shall be used.

F.4.4.10 Wind loading shall be considered for designing support as well Cable trays wherever required.

F.4.4.11 Where there is a considerable risk of steam, hot oil or mechanical damage cable routes shall be protected by barriers or enclosures.

F.4.4.12 The installation work shall be carried out in a neat workman like manner & areas of work shall be cleaned of all scraps, water, etc. after the completion of work in each

area every day. Contractor shall replace RCC/Steel trench covers after the Installation work in that particular area is completed or when further work is not likely to be taken up for some time.

F.4.4.13 Separation

F.4.4.14 At least 300mm clearance shall be provided between:

- HT power & LT power cables,
- LT power & LT control/instrumentation cables,

F.4.4.15 Segregation

1) Segregation means physical isolation to prevent fire jumping.
2) All cables associated with the unit shall be segregated from cables of other units.
3) Interplant cables of station auxiliaries and unit critical drives shall be segregated in such a way that not more than half of the drives are lost in case of single incident of fire. Power and control cables for AC drives and corresponding emergency AC or DC drives shall be laid in segregated routes. Cable routes for one set of auxiliaries of same unit shall be segregated from the other set.
4) In switchyard, control cables of each bay shall be laid on separate racks/trays.

F.4.4.16 Minimum number of spare cores required to be left for interconnection in control cables shall be as follows:

No. of cores in cable	No. of spare cores
2C,3C	NIL
5C	1
7C-10C	2
14C and above	3

F.4.4.17 Directly Buried Cables

Cable trenches shall be constructed for directly buried cables. Construction of cable trench for cables shall include excavation, preparation of sieved sand bedding, riddled soil cover, supply and installation of brick or concrete protective covers, back filling and compacting, supply and installation of route markers and joint markers. Laying of cables and providing protective covering shall be as per IS:1255 and the enclosed drawings showing cabling details.

F.4.4.18 RCC cable route and RCC joint markers shall be provided wherever required. The voltage grade of the higher voltage cables in route shall be engraved on the marker. Location of underground cable joints shall be indicated with cable marker with an additional inscription "Cable Joint". The marker shall project 150 mm above ground and shall be spaced at an interval of 30 meters and at every change in direction. They shall be located on both sides of road crossings and drain crossings. Top of cable marker/ joint marker shall be sloped to avoid accumulation of water/ dust on marker.

F.4.4.19 Cable tags shall be provided on all cables at each end (just before entering the equipment enclosure), on both sides of a wall or floor crossing, on each duct/conduit entry, and at every 20 meters in cable tray/trench runs. Cable tags shall also be provided inside the switchgear, motor control centers, control and relay panels etc. where a number of cables enter together through a gland plate. Cable tag shall be of rectangular shape for power cables and control cables. Cable tag shall be of 2 mm thick aluminum with number punched on it and securely attached to the cable by not less than two turns of 20 SWG GI wire conforming to IS:280. Alternatively, the Contractor

may also provide cable tags made of nylon, cable marking ties with cable number heat stamped on the cable tags. The cable tag requirements mentioned above shall prevail over Tag requirements mentioned elsewhere in this document for HT power, LT power & control cables.

F.4.4.20 While crossing the floors, unarmoured cables shall be protected in conduits up to a height of 500 mm from floor level if not laid in tray.

F.4.5. Cable Terminations & Connections

F.4.5.1 The termination and connection of cables shall be done strictly in accordance with cable termination kit manufacturer'' instructions, drawings and/or as directed by Project Manager. Cable jointer shall be qualified to carryout satisfactory cable jointing/termination. Contractor shall furnish for review documentary evidence/experience reports of the jointers to be deployed at site.

F.4.5.2 Work shall include all clamps, fittings etc. and clamping, fitting, fixing, plumbing, soldering, drilling, cutting, taping, preparation of cable end, crimping of lug, insulated sleeving over control cable lugs, heat shrinking (where applicable), connecting to cable terminal, shorting and grounding as required to complete the job to the satisfaction of the Project Manager.

F.4.5.3 The equipment will be generally provided with undrilled gland plates for cables/conduit entry. The Contractor shall be responsible for punching of gland plates, painting and touching up. Holes shall not be made by gas cutting. The holes shall be true in shape. All cable entry points shall be sealed and made vermin and dust proof. Unused openings shall be effectively sealed by 2mm thick aluminium sheets.

F.4.5.4 Control cable cores entering control panel/switchgear/MCC/miscellaneous panels shall be neatly bunched, clamped and tied with self-locking type nylon cable ties with de interlocking facility to keep them in position.

F.4.5.5 All the cores of the control cable to be terminated shall have identification by providing ferrules at either end of the core, each ferrule shall be indelible, printed single tube ferrule and shall include the complete wire number and TB number as per the drawings. The ferrule shall fit tightly on the core. Spare cores shall have similar ferrules with suffix sp1, sp2, ---etc. along with cable numbers and coiled up after end sealing.

F.4.5.6 All cable terminations shall be appropriately tightened to ensure secure and reliable connections.

F.5 EARTHING SYSTEM

F.5.1. Earthing system shall be in strict accordance with IS:3043 and Indian Electricity Rules/Acts. The earthing system shall be designed for a life expectancy of at least forty (40) years, for a system fault current of 63 kA for 1.0 sec. The minimum rate of corrosion of steel for selection of earthing conductor shall be 0.12mm per year. Earthing system network/ earth mat shall be interconnected mesh of mild steel rods buried in ground in the plant. All areas under contractor scope of supply shall be interconnected together by minimum two parallel conductors. The Contractor shall furnish the detailed design and calculations for Employer's approval. Contractor shall obtain all necessary statutory approvals for the system. All the columns shall be earthed by nearby risers and earth mat grid spacing shall be maximum 10 mts.

Minimum two nos of risers shall be provided for each equipment in SG area. Separate dedicated riser shall be provided for C&I earthing purpose and also for Lightning down conductor connection purpose. Sufficient nos of risers near the equipment shall be provided as per the system requirement. Ring type earthing around the offsite building shall be provided with interconnection of with main grid at minimum two points.

F.5.2. The earth conductors shall be free from pitting, laminations, rust, scale and other electrical, mechanical defects.

F.5.3. The material of the earthing conductors shall be as follows:

1) Conductors above ground level and in built up trenches. - Galvanized steel
2) Conductors buried in earth - Mild steel
3) Earth electrodes - Mild steel rod

F.5.4. The sizes of earthing conductors for various electrical equipments shall be as below:

Equipment	Earth conductor buried in earth	Earth conductor above ground level & in built-up trenches
Main earth grid	Min 40 mm dia. MS rod or as per actual calculation whichever is more.	65 x 8mm GS flat
33kV/11kV/6.6kV/3.3kV/ switchgear equipment and 415V switchgear	---	65 x 8mm GS flat
415 V MCC/ Distribution boards / Transformers	---	50 x 6mm GS flat
LT Motors above 125kW 25kW to 125kW 1kW to 25kW Fractional Horse power motor	---	50 x 6mm GS flat 25 x 6mm GS flat 25 x 3mm GS flat 8 SWG GS wire
Control panel & control desk	---	25 x 3 mm GS flat
Push button station / Junction Box	---	8 SWG GI wire
Columns, structures, cable trays and bus ducts enclosures	---	50 x 6mm GS flat
Crane, rails, rail tracks & other non-current carrying metal parts	---	25 x 6mm GS flat

F.5.5. Metallic frame of all electrical equipment shall be earthed by two separate and distinct connections to earthing system, each of 100% capacity, Crane rails, tracks, metal pipes and conduits shall also be effectively earthed at two points. Steel RCC columns, metallic stairs, and rails etc. of the building housing electrical equipment shall be connected to the nearby earthing grid conductor by one earthing ensured by bonding the different sections of hand rails and metallic stairs. Metallic sheaths/screens, and armour of

multi-core cables shall be earthed at both ends. Metallic Sheaths and armour of single core cables shall be earthed at switchgear end only unless otherwise approved. Every alternate post of the switchyard fence shall be connected to earthing grid by one GS flat and gates by flexible lead to the earthed post. Railway tracks within the plant area shall be bonded across fish plates and connected to earthing grid at several locations. Portable tools, appliances and welding equipment shall be earthed by flexible insulated cable.

F.5.6. Each continuous laid lengths of cable tray shall be earthed at minimum two places by G.S. flats to earthing system, the distance between earthing points shall not exceed 30 meter. Wherever earth mat is not available, necessary connections shall be done by driving an earth electrode in the ground.

F.5.7. Neutral points of HT transformer shall be earthed through NG resistors. The Contractor shall connect the NGR earthing point to earth electrodes by suitable earth conductors.

F.5.8. Neutral connections and metallic conduits/pipes shall not be used for the equipment earthing. Lightning protection system down conductors shall not be connected to other earthing conductors above the ground level.

F.5.9. Connections between earth leads and equipment shall normally be of bolted type. Contact surfaces shall be thoroughly cleaned before connections. Equipment bolted connections after being tested and checked shall be painted with anti-corrosive paint/compound.

F.5.10. Suitable earth risers as approved shall be provided above finished floor/ground level, if the equipment is not available at the time of laying of main earth conductor.

F.5.11. Connections between equipment earthing leads and between main earthing conductors shall be of welded type. For rust protection the welds should be treated with red lead compound and afterwards thickly coated with bitumen compound. All welded connections shall be made by electric arc welding.

F.5.12. Resistance of the joint shall not be more than the resistance of the equivalent length of conductors.

F.5.13. Earthing conductors buried in ground shall be laid minimum 600 mm below grade level unless otherwise indicated in the drawing. Back filling material to be placed over buried conductors shall be free from stones and harmful mixtures. Back filling shall be placed in layers of 150 mm.

F.5.14. Earthing conductors embedded in the concrete floor of the building shall have approximately 50 mm concrete cover.

F.5.15. A minimum earth coverage of 300 mm shall be provided between earth conductor and the bottom of trench/foundation/underground pipes at crossings. Earthing conductors crossings, the road can be installed in pipes. Wherever earthing conductor crosses or runs at less than 300 mm distance along metallic structures such as gas, water, steam pipe lines, steel reinforcement in concrete, it shall be bonded to the same.

F.5.16. Earthing conductors along their run on columns, walls, etc. shall be supported by suitable welding / cleating at interval of 1000mm and 750mm respectively.

F.5.17. Earth pit shall be of treated type & shall be constructed as per IS:3043. Electrodes shall be embedded below permanent moisture level. Minimum spacing between electrodes shall be 600mm. Earth pits shall be treated with salt and charcoal as per IS:3043. Test

links shall be provided with bolted arrangement along with each earth pit, in order to facilitate measurement of earth resistance as & when required.

F.5.18. On completion of installation continuity of earth conductors and efficiency of all bonds and joints shall be checked. Earth resistance at earth terminations shall be measured and recorded. All equipment required for testing shall be furnished by contractor.

F.5.19. Earthing conductor shall be buried at least 2000mm outside the fence of electrical installations. Every alternate post of the fences and all gates shall be connected to earthing grid by one lead.

F.5.20. Other Requirements of Earthing System:

Standard/Code	IEEE 80, IS 3043
Earthing System	
Life expectancy	40 Years
System Fault Level	System Fault Level 63kA for 1 sec
Soil resistivity	Actual as per site conditions.
Min. Steel corrosion	0.12mm/year
Depth of burial of main earth conductor	600mm below grade level; where it crosses trenches, pipes, ducts, tunnels, rail tracks, etc., it shall be at least 300mm below them.
Conductor joints	By electric arc welding, with resistance of joint not more than that of the conductor.

Welds to be treated with red lead for rust protection and then coated with bitumen compound for corrosion protection.

Surface resistivity	
Gravel	3000 ohm-meter
Concrete	500 ohm-meter

F.6 LIGHTNING PROTECTION SYSTEM

F.6.1. Lightning protection system shall be in strict accordance with IEC: 62305 and latest IS standards.

F.6.2. Lightning conductor shall be of 25x6mm GS strip when used above ground level and shall be connected through test link with earth electrode/earthing system.

F.6.3. Lightning system shall comprise of air terminations, down conductors, test links, earth electrode etc. as per approved drawings.

F.6.4. Down Conductors

1. Down conductors shall be as short and straight as practicable and shall follow a direct path to earth electrode.
2. Each down conductor shall be provided with a test link at 1000 mm above ground level for testing but it shall be in accessible to interference. No connections other than the one direct to an earth electrode shall be made below a test point.
3. All joints in the down conductors shall be welded type.
4. Down conductors shall be cleated on outer side of building wall, at 750 mm interval or welded to outside building columns at 1000 mm interval.

5. Lightning conductor on roof shall not be directly cleated on surface of roof. Supporting blocks of PCC/insulating compound shall be used for conductor fixing at an interval of 1500 mm.
6. All metallic structures within a vicinity of two meters of the conductors shall be bonded to conductors of lightning protection system.
7. Lightning conductors shall not pass through or run inside GI Conduits.
8. Testing link shall be made of galvanized steel of size 25x 6mm.
9. Pulser system for lightning shall not be accepted.
10. Hazardous areas handling inflammable/explosive materials and associated storage areas shall be protected by a system of aerial earths.

F.7 TESTS

F.7.1 Type Test reports shall be furnished for the following

F.7.1.1 Type tests on Cable Trays support system

a. Test 1A:

On main support channel type-C2 for cantilever arms fixed on one side only. A 3.5-meter length of main support channel shall be fixed vertically at each end to a rigid structure as per the fixing arrangement. Eight (8) nos. 750 mm cantilever arms shall be fixed to the main channel and each arm shall be loaded over the outboard 600 mm with a uniform working load of 100 kg. Subsequently a point load of 100 kg shall be applied on arm 2. A uniform proof load on all the arms equal to twice the working load shall be then be applied. Deflections shall be measured at the points shown in the enclosed drawings and at the following load intervals:

i) Working load
ii) Working load + point load
iii) Off load
iv) Proof load + point load
v) Off load

The deflection measured at working loads shall not exceed 16mm. The permanent deflection after removing the combination of working load and point load shall not exceed 10 mm at the arm tips and 6 mm on the channel. No collapse of the structure shall occur with a combination of proof load and point load applied.

b. Test 1B:

Test 1A shall be repeated with Eight Cantilever arms uniformly loaded and with the same point load on arm 2.

Test 2: On Main support channel type -C2 for cantilever arms fixed on both sides

a. Test 2A: A 3.5 m length of main support channel C2 for cantilever arms fixing on both sides shall be fixed at each end to rigid structure as per the fixing arrangement as shown in the enclosed drawing. Six (6), 750 mm cantilever arms shall be attached to each sides and each arm uniformly loaded to a working load of 100 kg over the out board 600 mm. A point load of 100 kg shall than be applied to arm 2, followed by a uniform proof load of twice the working load on all the arms; deflection shall be measured at points shown in the enclosed drawings at the following load intervals.

i) Working load
ii) Working load + Point load
iii) Off load
iv) Proof load + Point load
v) Off load

The deflection measured at working loads shall not exceed 16mm. The permanent deflection after removing the combination of working load and point load shall not exceed 10 mm at the arm tips and 6 mm on the channel. No collapse of the structure shall occur with a combination of proof load and point load applied.

b. Test 2 B: The test 2 A shall be repeated with the assembly but with an asymmetrical load on the C2 column and point load applied to arm 8. The 100 kg and 200 kg uniformly distributed loads shall be applied to the upper three arms on one side and the lower three arms on the opposite side.

Test 3: Tests on Channel Fixed on Beam/Floor

A length of main support channel section shall be fixed to steel structure/floor and have loads applied as shown in the drawing enclosed and as detailed below

a. Test 3A: A length of steel structure shall be rigidly supported. It should be fitted on a meter length of channel section using beam clamps welded/bolted. A point load of 1200 kg shall be applied to the centre point via two brackets. No distortion or pulling of the components shall take place.

b. Test 3B: With the components assembled as in Test 3A, two perpendicular point loads of 600 kg shall be simultaneously applied at positions 150 mm either side of the centre line, no distortion or pulling of the components shall take place.

c. Test 3C: With the components assembled as in Test 3A, a perpendicular point load shall be applied at a point 150 mm on one side of the centre line.

The load shall be gradually increased to the maximum value that can be applied without causing distortion or pulling of the components. This value shall be recorded.

Test 4: Channel Insert Test

A 2.5 m length of C1 channel fixed to the concrete wall/ steel structure as per actual site installation conditions. 6 nos. of 750 mm cantilever arms shall be attached to C1 channel as shown in enclosed drawing. Each arm uniformly loaded to a working load of 100 kg over the out board 600 mm. A point load of 100 kg shall than be applied to arm 2, followed by a uniform proof load of twice the working load on all the arms; deflection shall be measured at points shown in the enclosed drawings at the following load intervals.

i) Working Load
ii) Working Load + Point Load
iii) Off Load
iv) Proof Load + Point Load
v) Off load

The deflection measured at working loads shall not exceed 16mm. The permanent deflection after removing the combination of working load and point load shall not exceed 10 mm at the arm tips and 6 mm on the channel. Nocollapse of the structure shall occur with a combination of proof load and point load applied.

Test 5: Channel nut slip characteristics (whatever applicable)

a. Tests 5A1,5A2,5A3: A length of channel C1 section 200mm long shall have fitted bracket with the two bolt fixing as shown in drawing enclosed. With loads applied at the position shown in drawing enclosed nut slip shall be determined with bolt torque of 30NM, 50 NM and 65 NM No fewer than three measurements shall be made for each torque setting. A minimum loading of 720 kg shall be obtained before nut slip with bolt torque of 65 NM.

b. Tests 5B1,5B2,5B3: The length of channel C1 section 200 mm long shall have fitted bracket with the one bolt fixing as shown in drawing enclosed. With loads applied at the position shown in drawing, nut slip shall be determined with bolt torques of 30 NM, 50 NM and 65 NM. No fewer than three measurements shall be made for each torque setting.
A minimum loading of 350 kg shall be obtained before nut slip with a bolt torque of 65NM.

F.7.2 Routine/ Acceptance Tests

F.7.2.1 Routine Tests

a. Routine tests as per specification and applicable standards shall be carried out on all requirements/items covered in the specification.
b. Physical & dimensional check on all equipments as per approved drawings/standards.
c. HV/IR as applicable.
d. Check/measurement of thickness of paint/zinc coating/nickel-chrome plating as per specification & applicable standard.

F.7.2.2 Acceptance Test

a. Galvanising Tests as per applicable standards
b. Welding checks
c. Deflection tests on cable trays:
One piece each of 2.5m length of cable tray of 300mm & above shall be taken as sample from each offered lot. It shall be supported at both end & loaded with uniform load of 76kg/meter along the length of cable tray. The maximum deflection at the mid-span of each size shall not exceed 7mm.
d. Proof load tests on cable tray support system

i. Tests on Main Support Channel shall be done if only C1 Channel are in scope of supply and cantilever arms shall be fitted on one side. This test shall be same as test 4 of type test.
ii. Test on Main Support Channel shall be done with C2 channel and cantilever arms fitted on both sides, if C2 channels are in scope of supply. This test shall be same as test 2A of type test. Then test (i) above shall not be done.
iii. Nut slip characteristic test (it shall support minimum load of 350kg before nut slips with a bolt torque of 65 NM). This test shall be same as test 5B3 of type test.
The procedure for carrying out tests at "d" above shall be as per details given in Type Tests in specification thereafter Die-Penetration test shall be carried out to check weld integrity.

e. The above acceptance tests shall be done only on one sample from each offered lot.

F.8 COMMISSIONING

F.8.1 The Contractor shall carry out the following commissioning tests and checks after installation at site. In addition, the Contractor shall carry out all other checks and tests as recommended by the Manufacturers or else required for satisfactory performance.

F.8.2 Cables

a. Check for physical damage.
b. Check for insulation resistance before and after termination/jointing.
c. HT cables shall be pressure tested (test voltage as per IS:7098) before commissioning.
d. Check of continuity of all cores of the cables.
e. Check for correctness of all connections as per relevant wiring diagrams. Any minor modification to the panel wiring like removing/inserting, shorting, change in terminal connections, etc., shall be carried out by the Contractor.
f. Check for correct polarity and phasing of cable connections.
g. Check for proper earth connections for cable glands, cable boxes, cable armour, screens, etc.
h. Check for provision of correct cable tags, core ferrules, tightness of connections.

F.8.3 Cable trays / supports and accessories

a. Check for proper galvanizing/painting and identification number of the cable trays/supports and accessories.
b. Check for continuity of cable trays over the entire route.
c. Check that all sharp corners, burrs, and waste materials have been removed from the trays supports.
d. Check for earth continuity and earth connection of cable trays.

F.8.4 Earthing and Lightning protection system

a. Earth continuity checks.
b. Earth resistance of the complete system as well as sub-system.

F.9 ELECTRICAL LAYOUT PHILOSOPHY

While developing the layout the bidder must give due consideration to the following requirements:

Layout requirements for Electrical MCC/switchgear rooms.

The following clearances shall be maintained for LT Switchboard.

a.) Front Clearance

i) For one Row of Swgr - 1.5M (Min)
ii) For two Rows of Swgr - 1.5/1.75M depending upon the depth of panels etc.

b.) Back Clearance

i) For single front - 1.0M (Min)
ii) For double front - 1.5M (Min)

c.) Side Clearance: Min 800 mm, however provision to be made for any additional panel in future at both ends. Therefore, end clearance shall be 800 mm + width of panel.

G. LIGHTING

G.1 GENERAL

1.01.00 This specification covers the general description of design, manufacture and construction features, testing, supply, installation and commissioning of the Station Lighting system equipment.

G.2 CODES AND STANDARDS

G.2.1 All standards and codes of practice referred to herein shall be the latest edition including all applicable official amendments & revisions as on date of bid opening. In case of conflict between this specification and those (IS codes, standards etc.) referred to herein, the former shall prevail. All work shall be carried out as per the following standards & codes.

G.2.2 Lighting Fixtures and Accessories

IS:1913	General and safety requirements for luminaries.
IS:2148	Flame proof enclosures of electrical apparatus.
IS:1534	Ballast for fluorescent lamps.
IS:1777	Industrial luminaire with metal reflectors.
IS:2418	Tubular fluorescent lamps for general lighting services.
IS:4013	Dust-tight electric lighting fittings.
IS:8224	Electric Lighting fittings for Division 2 areas.
IS:10276	Edison screw lamp holders.
IS:10322	Luminaires.
IS:13021	AC Supplied Electronic Ballasts for tubular fluorescent lamps.
IS 16103	LED Luminaire Standards

G.2.3 Lighting Panels, Switch-boxes, Receptacles and Junction Boxes

IS:2147	Degree of protection provided by enclosures for low-voltage switchgear and control gear.
IS:1293	Plugs & socket outlets of rated voltage up to and Including 250volts & rated current up to and including 16 Amps.
IS:2551	Danger notice plates.
IS:13947	Low voltage switchgear and control-gear
IS:3854	Switches for domestic and similar purposes.
IS:6875	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages up to and including 1000 V AC and 1200 V DC.
IS:13703	Low voltage fuses for voltages not exceeding 1000V AC or 1500 V DC.

G.2.4 Conduits, Pipes and Accessories

IS:2667	Fittings for rigid steel conduit for electrical wiring.
IS:3837	Accessories for rigid steel conduits for electrical wiring.
IS:9537	Conduits for electrical installations.

G.2.5 Lighting Wires/Cables

IS:694	PVC insulated cables for working voltages up to and including 1100 V
IS:3961	Recommended current ratings for cables. (PVC Insulated and PVC sheathed heavy duty cables and light duty cables).
IS:8130	Conductors for insulated electric cables and flexible cords.
IS:10810	Methods of tests for cables.

G.2.6 LED Luminaries

16101:2012	General Lighting. LEDs and LED modules Terms and definitions
16102(Part 1):2012	Self-Ballasted LED Lamps for General Lighting Services. Part-1 Safety Requirements.
16102(Part 2):2012	Self-Ballasted LED Lamps for General Lighting Services. Part-2 Performance Requirements.
16103(Part I):2012	LED modules for General lighting Safety Requirements.
15885(Part 2/Sec. 13) :2012	Lamp control gear Part 2 particular Requirements Section 13 d.c. or a.c. Supplied Electronic control gear for LED modules
16104:2012	d.c. or a.c. Supplied Electronic control gear for LED modules – Performance Requirements.
16105:2012	Method of Measurement of Lumen maintenance of Solid-state Light (LED) Sources.
16106:2012	Method of Electrical and photometric Measurements of Solid State Lighting (LED) Products
16107:2012	Luminaires Performance
16108:2012	Photo-biological safety of Lamps and Lamp Systems
IS 513	Cold rolled low carbon steel sheets and strips
IS 12063	Classification of degree of protection provided by enclosures.
IS 14700	Electromagnetic compatibility (EMC) – Limits (Part 3/Sec. 2) for Harmonic current emission – THD < 15% (equipment, input current < 16 Amps. per phase.
IS 9000 (Part 6)	Environment testing: Test Z – AD: composite temperature/humidity cyclic test.

IS 15885	Lamp control gear: particular requirements for (Part 2/Sec. 13) DC or AC supplied electronic control gear IS 16004 – 1 and 2) for LED modules.
IS 4905	Method for random sampling.

G.2.7 Electrical Installation Practices & Miscellaneous

IS:1944	Code of practice for lighting of public thorough fare
IS:3646	Code of practice for interior illumination.
IS:5572	Classification of Hazardous areas (other than Mines) having flammable gases and Vapours for electrical installation
IS:6665	Code of practice for industrial lighting.
	National Electrical Code
	Indian Electricity Rules.
	Indian Electricity Act
IS:5	Colour for ready mixed paints & enamels.
IS:280	Mild steel wires for general engineering purposes.
IS:374	Electric ceiling type fans & regulators.
IS:732	Code of practice for electrical wiring installations.
IS:1255	Code of practice for installation and maintenance of power cables Upto and including 33kV rating.
IS:2062	Steel for general structural purposes
IS:2629	Recommended practice for hot-dip galvanizing of iron and steel.
IS:2633	Methods for testing uniformity of coating of zinc coated articles.
IS:2713	Tubular steel poles for overhead power lines.
IS:3043	Code of practice for earthing
IS:5216	Guide for safety procedures and practices in electrical work.
IS:5571	Guide for selection of electrical equipments for hazardous areas.
BS:6121	Mechanical cable glands

G.3 LIGHTING SYSTEM DESCRIPTION

G.3.1 The illumination of various indoor and outdoor areas in the main plant & offsite area shall be provided as described here. The lighting system of various areas shall comprise of the following systems:

(a) Normal AC Lighting System

(b) Emergency AC Lighting System.

G.3.1.1 Normal AC Lighting System

Normal AC lighting system 415V, 3Phase, 4wire, will be fed from lighting panels (LPs) which in turn will be fed from the lighting distribution boards (LDBs)/Switch board MCC.

G.3.1.2 DC Lighting System

Emergency DC lighting is to be provided, through self-contained DC emergency fixtures with four hours' back-up duration, at strategic locations, in auxiliary/offsite buildings wherever DC supply system is not available. The fixtures shall be switched 'ON' automatically in case of failure of AC supply.

G.4 DESIGN PHILOSOPHY

G.4.1 A comprehensive illumination system shall be provided in the entire project areas under bidder's scope.

G.4.2 All outdoor lighting system shall be automatically controlled by synchronous timer. Provision to bypass the timer shall be provided in the panel.

G.4.3 The system shall include distribution boards, normal/ emergency lighting panels, lighting fixtures, junction boxes, receptacles, switch boards, conduits, cables and wires, etc. The system shall cover all interior and exterior lighting. The constructional features of lighting distribution boards shall be similar to AC/DC distribution boards described in chapter of LT Switchgear. Outgoing circuits in LPs shall be provided with MCBs of adequate ratings.

G.4.4 The illumination system shall be designed on the basis of best engineering practice and shall ensure uniform, reliable, aesthetically pleasing and glare free illumination. The lighting fixtures shall be designed for minimum glare. The design shall prevent glare/luminous patch seen on VDU/ Large video screens, when viewed from an angle. The finish of the fixtures shall be such that no bright spots are produced either by direct light source or by reflection. The diffusers/ louvers used in fixtures shall be made of impact resistant polystyrene sheet and shall have no yellowing property over a prolonged period. The Lux levels to be adopted for various area are indicated at Annexure - A. (placed at the end of this Chapter).

G.4.5 Different Lighting Systems envisaged for various plant areas are indicated in Annexure-B: While finalizing the detailed layout of lighting fixtures, the position/location and layout of equipments should be taken into account to have adequate illumination at desired locations. For CCR room Dimmable and Tunable downlighter fittings to be provided.

G.4.6 LED Luminaires

LED Luminaires shall be used for the lighting of all the indoor & outdoor areas in bidder's scope. However, for DC lighting, conventional type luminaires shall be used. In false ceiling area LED luminaires shall be recessed mounting type & in non-false ceiling area the LED luminaires shall be surface mounting type.

The individual lamp wattage for LED shall be upto 3 watt. Fractional wattage LEDs are also acceptable. The LED chip efficacy shall be min 120 Lm/W. The luminaire efficacy shall be not less than 100 Lm/W. Suitable heat sink shall be designed & provided in the luminaire. The LED used in the luminaires shall have colour rendering index (CRI) of Min 80. Colour designation of LED shall be "cool day light" (min 5700K) type for indoor areas. However, for outdoor areas, the colour temperature of LED shall be min. 4000K, including rough & dust prone areas. The LED luminaries shall have a minimum life of 25000 burning hours with 80% of lumen maintenance at the end of the life. LED shall conform to the LM 80 requirements.

The max. junction temperature of LED shall be 85°C. Further the lumen maintenance at this temperature shall be min 90%. The THD of LED Luminaires shall be less than 10%. Further the EMC shall be as per IS 14700. The power factor of the luminaire shall not be less than 0.9. The marking on luminaire & safety
requirements of luminaire shall be as per IS standards. Suitable heat sink with proper thermal management shall be designed & provided in the luminaire.

The connecting wires used inside the system, shall be low smoke halogen free, fire retardant type and fuse protection shall be provided in input side specifically for LED luminaires.

Care shall be taken in the design that there is no water stagnation anywhere in the housing of luminaire. The entire housing shall be dust and water proof protection as per IS 12063.

G.4.7 Driver Circuit

LED modules and drivers shall be compatible to each other. The LED module driver's ratings and makes shall be as recommended by corresponding LED chip manufacturer.
LED Drivers shall have following control & protections: -

- Suitable precision current control of LED.
- Open Circuit Protection
- Short Circuit Protection
- Over Temperature

G.4.8 Apart from maintenance factor as given below, Temperature correction factor shall be considered in the lighting design for fixtures located in non-air conditioned area.

a) Office area (air conditioned): 0.8
b) Office area (non-air conditioned) and other indoor area: 0.7
c) Dust prone indoor and outdoor area: 0.6

Reflectance Factor: -

a) Ceiling: 0.8
b) Wall: 0.5
c) Floor: 0.2

G.4.9 All outdoor fixtures shall be weather proof and of min. IP65 degree of protection. For Indoor type of fixtures: -

a. Surface/Pendent mounting: - IP 54 class of protection.
b. Recess Mounting (False ceiling): - IP 20 class of protection.

G.4.10 Lighting Panels

a. Lighting panels shall be constructed out of 2 mm thick CRCA sheet steel. The door shall be hinged and the panel shall be gasketted to achieve specified degree of protection. Lighting panels shall be powder coated with color shade RAL9002. Lighting panels shall have min. IP55 degree of protection.

b. All MCBs/Isolators/Switches/Contactors etc. shall be mounted inside the panel and a fibre glass sheet shall be provided inside the main door such that the operating knobs of MCBs etc., shall project out of it for safe operation against accidental contact.

c. Terminal bocks shall be 1100 V grade, clip-on stud type, made up of polymide 6.6 or better suitable for terminating multicore 35 or 70 Sq. mm. stranded aluminium conductor incoming cable and 10 Sq. mm. stranded aluminium conductor for each outgoing circuits voltage. All terminals shall be shrouded, numbered and provided with identification strip for the feeders.

d. MCBs shall be current limiting type with magnetic and thermal release suitable for manual closing and automatic tripping under fault condition. MCBs shall have short circuit interrupting capacity of 9 KA rms. MCB knob shall be marked with ON/OFF indication. A trip free release shall be provided to ensure tripping on fault even if the knob is held in ON position. MCB terminal shall be shrouded to avoid accidental contact.

e. Contactors of AC lighting panels shall be 3 nos, 63 A, single pole continuous duty MCB, with neutral link, load make-break type suitable for 415 V, 3 phase 4 wire system.

f. DC switches shall be rotary type, 2 pole, continuous duty, load break type, quick make quick break, suitable for 220 V DC, 2 wire system. Switch knob shall be provided with ON/OFF indication.

g. Programmable Digital Timer shall be Electronic Astronomical Almanac Time switch with battery backup of min. TEN years, 4 Digit LED display, 24 hours range, manual override facility, 10 Amp 3 relay output, with NO/NC Contacts suitable for operation on 240V single phase AC supply.

h. Each lighting panel (LP-3) shall be fed from a 415V/42V, 3 phase-4 wire, 3kVA transformer. The transformer shall be located inside the lighting panel itself. Transformers shall be dry type, natural air cooled with class F insulation or better. Impedance of transformer shall be 5%. Transformers shall be tested as per IS:11171. Off-circuit tap changer with +/- 5% in steps of +/- 1.25% tapping shall be provided. One-minute power frequency withstands voltage for lighting transformer shall be 2.5kV.

i. Lighting Panels shall have 20% spare outgoing feeders and shall be of following types:

TYPE	**INCOMER FEEDER**	**OUTGOING FEEDERS**	**DETAIL OF CONTENTS**
LP-1	3No. 415V, 63A, SP MCB (31/2Cx70sqmm cable)	18Nos.,20A, 240V MCB	415V, 63A(min.), AC2 duty contactor and Programmable Digital Timer of 24-hour range 10A, 240V selector switch, fuse, etc. outdoor type and IP:55 degree of protection
LP-2	3No. 415V, 63A, SP MCB (31/2Cx70sqmm cable)	9 Nos.,20A, 240V MCB	415V, 63A(min.), AC2 duty contactor and Programmable Digital Timer of 24-hour range 10A, 240V selector switch, fuse, etc. outdoor type and IP:55 degree of protection
LP-3	1 No., 4A fuse 3kVA	24 Nos., 16A, 45V MCB	IP 55 degree of protection. Incomer shall be suitable for receiving 4Cx16 sqmm cable and

	transformer, 40A TPN MCB		outgoing circuit shall be suitable for 2Cx16 sqmm cable.
LP-D1	1No. 220V, 32 A, DP Isolator (2Cx35sqmm cable)	6Nos.,16A, 220V DP Switch & Fuse	220V, 32A DC Fuse, etc. outdoor type IP:55 degree of protection.

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

k. Power supply shall be fed from 415 / 240 V normal AC supply, emergency AC supply and 220V DC supply through suitable number of conveniently located lighting distribution boards (LDB) and lighting panels (LP). AC lighting supply shall be isolated from main supply by 2x100% isolation transformers of max. rating of 50kVA for 10/15 nos. outgoing feeder with changeover switch facility. The isolation transformer shall be fed from two different bus sections of MCC and fault level restricted to 3kA at Lighting Panels.

l. At least one 6/16A, 240V AC universal socket outlet with switch shall be provided in offices, cabins, etc. Further 20A, 240V AC industrial receptacle with switch shall be provided strategically in all industrial areas. At least one 63A, 3ph, 415V AC receptacle shall be provided in each floor of off-site buildings/ structures. Receptacles boxes shall be fabricated out of 2 mm thick MS steel hot dip galvanized or of not less than 2.5 mm thick die-cast aluminium alloy or fabricated out of 2 mm thick CRCA sheet with electro static powder coating. IP-degree of protection shall be applicable to receptacles Type 'RA &''RC' only.

m. Receptacles shall be of following types:

Type	**Switch Rating**	**Socket & Plug Rating**	**Type & make of Plug & Socket**	**Terminal Block size**
RA	20 A, SP240V AC(Industrial)	20A, 3 pin240 V AC	DVC appd. Make	1-4 way, suitable for loop-in loop- out of 10 sqmm Al. Conductor
RB	16A, S.P240V AC	6A+16A6 Pin decorative Piano-key Type Switch	DVC appd. make	1-4 way, suitable for loop-in loop- out of up to 10 sqmm Al. Conductor
RC	20 A, SP24 V AC(Industrial)	20A, 3 pin24 V AC	DVC appd. Make	1-4 way, suitable for loop-in loop- out of 2 core -16 sqmm Al. Cable.

n. All fluorescent lamps shall be have "Cool day light" colour designation. The mirror optics type fluorescent fixtures shall have no iridescence effect. Fixtures with better efficiency and upgraded proven system may also be considered.

o. Incandescent lamps may be used only with DC Lighting.

p. Contractor shall demonstrate the average lux level achieved for different areas as per specification requirements, after completion of the lighting work, at site to the satisfaction of engineer-in-charge.

G.4.11 All luminaires and their accessories and components shall be of type readily replaceable by available Indian makes.

G.4.12 Fans & Regulator

Ceiling Fans, to be provided in non-air-conditioned office/control room area. Further tentatively one (1) no. ceiling fan shall be provided for 10 sqm area, at suitable mounting height. The ceiling fans shall be suitable for operation on 240 V +/-10%, 50 Hz, AC supply comprising of class 'E' or better insulated copper wound single phase motor, 1200mm sweep, aerodynamically designed well balanced AL blades (3 Nos.), down rod, BEE 5 star rated, die cast aluminium housing, capacitor, suspension hook, canopies etc. finished in stove enameled white or with electro static powder coating. Power factor of fans shall not be less than 0.9. Fan regulators shall be stepped electronic type suitable for operation on 240V +/-10% AC supply.

G.4.13 Junction Boxes, Conduits, Fitting & Accessories, Pull Out Boxes:

G.4.13.1 Junction box for indoor lighting shall be made of fire retardant material. Material of JB shall be Thermoplastic or thermosetting or FRP type.

G.4.13.2 All switches and receptacles up to 16A shall be modular type. These shall be provided with pre-galvanized/galvanized modular switchbox & plate.

G.4.13.3 Conduits, Pipes and Accessories Galvanised heavy duty steel conduits for normal area and galvanised heavy duty steel conduits with an additional epoxy coating for corrosive area shall be offered. Alternatively glass reinforced epoxy conduits with comparable compressive and impact strength with that of heavy duty steel conduits may be offered. Conduits in walls and ceilings in buildings with RCC and masonry structure such as Administrative, Service, Canteen, Time Office, Auditorium, IT building etc shall be concealed. Rigid steel conduits shall be heavy duty type, hot dip galvanised conforming to IS: 9537 Part-I & II shall be suitable for heavy mechanical stresses, threaded on both sides and threaded length shall be protected by zinc rich paint. Conduits shall be smooth from inside and outside.

G.4.13.4 Flexible conduit shall be water proof and rust proof made of heat resistant TERNE coated steel.

G.4.13.5 Pull out boxes shall be provided at suitable interval in a conduit run. Boxes shall be suitable for mounting on Walls, Columns, Structures, etc. Pull-out boxes shall have cover with screw and shall be provided with good quality gasket lining. Pull out boxes used outdoor shall be weather proof type suitable for IP: 55 degree of protection and those used indoor shall be suitable for IP: 52 degree of protection. Pull out box & its cover shall be hot dip galvanized.

G.4.14 Lighting Wires

G.4.14.1 Lighting wires shall be 1100 V grade, light duty PVC insulated unsheathed, stranded copper/ aluminium wire for fixed wiring installation. Colour of the PVC insulation of wires shall be Red, Yellow, Blue and Black for R, Y, B phases & neutral, respectively and white & grey for DC positive & DC negative circuits, respectively. Minimum size of wire shall not be less than 1.5 sqmm for copper and 4 sqmm for aluminium.

G.4.14.2 Following sizes of 1100 V grade, PVC insulated, single core, stranded copper conductor wires will be used:

Lighting Panel to Fixtures:	1.5 sq. mm (Cu) wire or cable
Lighting Panel to JBs/ Switches:	1.5 sq. mm (Cu) wire or cable
JBs/ switches to Fixtures:	1.5 sq. mm (Cu) wire or cable
Panel to First receptacles:	4 sq. mm (Cu) wire OR 10 sq. mm (Al) cable
First receptacles to looping other receptacles (240V,1 phase receptacles):	4 sq. mm (Cu) wire OR 10 sq. mm (Al) cable
In case of only one receptacles in ckt., Panel to receptacles (240V,1 phase receptacles):	4 sq. mm (Cu) wire OR 10 sq. mm (Al) cable
Panel/ JBs to flood light fixtures:	1.5 sq. mm (Cu) or cable

G.4.14.3 Lighting fixtures shall generally be group controlled directly from lighting panel. However, in office areas, control shall be provided through switch boxes. Each switch shall control a maximum of three fluorescent fixtures.

G.4.14.4 A.C. normal, AC emergency and DC system wiring shall run throughout in separate conduits. Wires of different phase shall run in different conduits.

G.4.14.5 Lighting panels, etc. shall be earthed by two separate and distinct connections with earthing system. Switch boxes, junction boxes, lighting fixtures, fans, single phase receptacles etc. shall be earthed by means of separate earth continuity conductor. The earth continuity conductor 14 SWG GI wire shall be run along with each conduit run. Cable armours shall be connected to earthing system at both the ends.

G.4.14.6 Alternately Vendor may offer technically superior and proven product subject to approval of employer.

G.4.15 Occupancy based Passive Infra-red sensors

- The sensors shall be recess mounted, programmable type suitable for lighting load of 6A with variable off delay settings. The detection area shall be minimum 5 metres for standard room height of 3mt. All the calibrated settings shall be stored in non-volatile memory of PIR sensor which shall be unaffected by power supply fluctuations. Necessary 16A contactor shall be supplied along with each sensor & shall be located inside the switch box. Occupancy sensor shall be of reputed make and subject to approval of DVC/BHEL during detailed engineering.

G.5 TESTS

G.5.1 For LED Fixture

The contractor shall carry out the type tests as listed in this specification on the following types of LED fixtures to be supplied under this contract.

LED fixtures (as per applicability)
Type test shall be conducted on one rating each of following type of LED fixtures. Rating for test conduction shall be decided by the employer during detailed engineering.
a) High bay fixture.
b) Well glass fixture.
c) Street light fixture
d) Surface mounted type fixture.
e) Recessed mounted type fixture.

G.5.2 For all other Station lighting equipment

G.5.1.1 All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.

G.5.1.2 Selection of samples for type test, acceptance test & routine test and acceptance criteria for all the items shall be as per relevant I.S.

G.5.1.3 Type test reports of the following items as per technical specification requirements/ standards shall be submitted for approval.

S. No.	DESCRIPTION
i.	Lighting fixtures of each type.
ii.	Lighting panel of each type (Degree of Protection).
iii.	Junction Box of each type.

Type test reports for LED as per standards for following shall be submitted for approval.
1. Visual and Dimension check
2. Proof of procurement of LEDs
3. Safety tests
a) Marking
b) Construction
c) Provision for Earthing
d) External and Internal wiring
e) Protection against electrical shock
f) Endurance and Thermal
g) Insulation resistance & electrical strength
h) Resistance to heat fire & tracking
i) Resistance to Humidity
4. Fire Retardant test
5. Performance tests (electrical, Photometric color and Life)
6. Burn-in Test
7. Power Cycling
8. Temperature rise test
9. Emission Tests
a) Radiated & conducted emission
b) Harmonics & flickers

10. Immunity tests

In addition, following test reports to be submitted for LED chip/LED luminaire:
a) LED parameters like Lumen per watt, CRI, Beam angle from manufacturer.
b) LM 80/IS: 16105 report.
c) LM 79/IS: 16106 report.

G.5.3 Acceptance Test and Routine Test

G.5.3.1 All lighting fixtures, lamps and other items shall be subjected to acceptance and routine test, as per relevant specified standards.

G.5.3.2 Junction boxes, switch boxes, receptacle enclosure etc. shall be subjected to physical and dimensional checks also. Switch boxes shall be made of 1.6 mm thick MS sheet with 3 mm thick decorative, Perspex cover. Switch box shall be hot dip galvanized.

G.5.3.3 Switch boxes shall be of following types:

TYPE No.	Switch	Fan Regulator*	Socket
SWB 1	5 A - 2 Nos.	-	-
SWB 2	5 A - 3 Nos.	-	5A - 1.No.
SWB 3*	5 A - 5 Nos.	1	5A - 1.No
SWB 4*	5 A - 7 Nos	3	5A - 1.No.
SWB 5**	5 A - 5 Nos	-	5A - 1.No.

* Space provision shall be kept for fan regulator in switch boxes.
** Shall have the provision for mounting the 16 A contactor.

G.5.4 Galvanizing Tests

G.5.4.1 The quality of galvanizing shall be smooth, continuous, free from flux stains and shall be inspected visually.

G.5.4.2 In addition, following tests shall be conducted as acceptance tests.

a. Uniformity of coating - The coating of any article shall withstand for one (1) minute dips in standard copper sulphate solution without the formation of an adherent red spot of metallic copper upon the basic metal.

b. The quality of cadmium/zinc plating on items with screw threads shall be free from visible defects such as unplated areas, blisters and modules and shall be inspected visually.

c. In addition, the plating thickness shall be determined microscopically/ chemically or electronically.

G.6 COMMISSIONING CHECKS

G.6.1 On completion of installation work, the Contractor shall request the Project manager for inspection and test with minimum of fourteen (14) days advance notice.

G.6.2 The Project manager shall arrange for joint inspection of the installation for completeness and correctness of the work. Any defect pointed out during such inspection shall be promptly rectified by the Contractor.

G.6.3 The installation shall be then tested and commissioned in presence of the Project manager.

G.6.4 The contractor shall provide all, men material and equipment required to carry out the tests.

G.6.5 All rectifications repair or adjustment work found necessary during inspection, testing and commissioning shall be carried out by the Contractor without any extra cost. The handing over the lighting installation shall be affected only after the receipt of written instruction from the Employer/his authorized representative.

G.6.6 The testing shall be done in accordance with the applicable Indian Standards and codes of practices. The following tests shall be specifically carried out for all lighting installation.

(a) Insulation Resistance.
(b) Testing of earth continuity path.
(c) Polarity test of single phase switches.
(d) Functional checks.

G.6.7 The lighting circuits shall be tested in the following manner:

(a) All switches ON and consuming devices in circuit, both poles connected together to obtain resistance to earth.
(b) Insulation resistance between poles with lamps and other consuming devices removed and switches ON.

G.7 ANNEXURE — A

S. No.	Location (GENERAL)	Average Illumination Level (Lux)	Type of Fixture
1	Switchgear rooms, Charger, Rectifier room	200	Industrial type LED Luminaire
2	Control room, computer room, control equipment room	350	LED luminaire equivalent to Mirror optics with anti-glare features or down-lighter.
3	Offices, conference rooms, etc.	300	Decorative mirror optics Type LED luminaire or LED down-lighter
4	Cable galleries/vault	50	Industrial type LED Luminaire
5	Street lighting- primary roads secondary roads	 20 10	LED street lights
6	Workshop. Building	150	LED high/medium bay / Industrial trough LED Luminaire

7	Laboratory General Analysis area	 150 300	Corrosion proof LED Luminaire
8	Garage/Car Parking	50	Industrial type LED Luminaire
9	Facility building, canteen etc	150	Industrial type LED Luminaire
10	Corridors, Walkways	50	LED Luminaire
11	Building Periphery Lighting	10	LED Street Light fixture/ LED Luminaire

- Exit lamp unit shall contain maintenance free Ni-Cd battery with 0.5 hours' backup capacity. These exit lamps will remain ON all the time and normally receive 240V AC power supply. When AC supply goes OFF, the in-built battery & inverter system automatically takes on to ignite the luminaire.

G.8 EARTHING

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

Lighting Distribution Board	GS Flat 50x6 mm
Lighting Panels	GS Flat 25x3 mm
Lighting fixtures, receptacles, conduits, junction boxes & switch boxes	14 SWG GI wire
Welding receptacles	GS Flat 50x6 mm
Street light pole/ flood light pole/ high mast	GS Flat 25x3 mm
Electrode for Pole/ High mast earthing	1 nos, 40 mm dia MS rod, 3 mtr long

H. LT SWITCHGEAR

H.1 CODES AND STANDARDS

IS: 5	Colours for ready-mixed paints and enamels.
IS: 694	PVC insulated cables for working voltages up to and including 1100V.
IS: 722	A.C. Electricity Meters
IS: 1248	Electrical Indicating instruments
IS/IEC: 60947–1	Degree of protection provided by enclosures for low voltage Switchgear and Control gear
IS/IEC: 60947-2	A.C. circuit Breakers, MCCB, MCB, MPCB
IS: 2551	Danger Notice Plates
IS: 2629	Hot dip galvanising
IS: 2705	Current Transformers

IS/IEC: 60947-4-1	Contactors and motors starter for voltages not exceeding 1000V AC or 1200V DC
IS: 3043	Code of practice for earthing.
IS: 3072	Code of practice for installation and maintenance of Switchgear
IS: 3156	Voltage Transformers
IS: 3202	Code of practice for climate proofing of electrical equipment.
IS: 3231	Electrical relays for power system protection.
IS/IEC 60947	Air-Break Switches, air break disconnectors, air break disconnector and fuse combination units for voltages not exceeding 1000V AC or 1200 V DC.
IS/IEC 60947-1	General Requirements for Switchgear and Control gear for voltages not exceeding 1000 V.
IS: 5082	Wrought Aluminium and Aluminium alloys for electrical purposes.
IS: 6005	Code of practice of phosphating of iron and steel.
IS/IEC 60947-5-1	LV switchgear and Control gear Control current devices and switching element.
IS: 8623 / IEC: 61439-1/2	Low Voltage Switchgear & Control gear assemblies
IS: 8686	Static Relays
IS: 13703 / IEC: 60269	HRC Cartridge fuses
IS: 10118 (4 parts)	Code of practice for selection, installation and maintenance of switchgear and control gear
IS: 11171	Specification for dry type transformers.
IEC: 60255	Electrical Relays
IEC: 61850	Communication networks and systems in substations
IS: 11353	Guide for uniform system of marking and identification of conductors and apparatus terminals
IS: 12021	Specification of control transformers for switchgear and Control gear for voltage not exceeding 1000V AC.
IEC: 60947-7-1	Terminal blocks for Copper conductors
IS :513 (2008)	Cold Rolled Low Carbon Steel Sheets and Strips

H.2 TECHNICAL PARAMETERS

H.2.1 Power Supply

H.2.1.1 AC SYSTEM

1)	Voltage	415 V±10%, 3 Phase, 4 wire, solidly earthed
2)	Frequency	50 Hz ±5%
3)	Combined variation (in Volts & frequency)	10% absolute sum
4)	Fault Level	50 kA(RMS)

H.2.1.2 DC SYSTEM

1)	System Voltage	220 V DC 2-Wire, Unearthed
2)	Fault Level	20 kA

H.2.1.3 CONTROL SUPPLY VOLTAGE

1)	Closing coil of circuit breaker	220 V DC/110 V DC
2)	Spring charging motor	220 V DC/110 V DC
3)	MCC control supply	110 V AC Neutral solidly earthed
4)	Space heater & lighting	240 V AC Neutral solidly earthed

H.2.2 CUBICLE DATA

H.2.2.1 Busbar Rating

1)	Continuous Current rating	As per requirement /Sizing Calculation
2)	Short time rating where	
	a) CB is used as incomer	50 kA(RMS) for one sec (Ph-Ph & Ph-N)
	b) MCCB is used as incomer	Prospective current of 50 kA(RMS) for the MCCB clearing time , (Ph-Ph & Ph-N)
3)	Dynamic Rating where	
	a) CB is used as incomer	105 kA (PEAK) , (Ph-Ph & Ph-N)
	b) MCCB is used as incomer	Prospective current of 105 kA (PEAK) as limited by MCCB (Ph-Ph & Ph-N)
4)	Busbar insulation	
	a) For switchgear /MCC/ACDB/DCDB /MCCB Box	PVC Sleeve insulated(UL224) CE/UL certified
5)	Horizontal Busbar & Jumper Connection	High Conductivity Aluminium Alloy/Copper
6)	Vertical Busbar	Copper Only
7)	Hardware for Busbars (Bolts/Nuts/Spring Washer)	High Tensile steels

H.2.2.2 Enclosure Details

1)	Material	CRCA 2mm: Load bearing Structure and Frame 1.6mm: Doors, covers etc 3mm for Gland Plates (CRCA/HR) 4mm for Gland plates (Non-Magnetic) –Single Core Cable Entry

2)	Type	Metal enclosed, indoor, floor-mounted, Free-Standing Type
3)	Degree of Protection	IP:52 (IP:42 for Busbar chamber, 1600A & above) As per IS/IEC:60947 IP65: Paddle Feeder and Travelling Tripper MCC IP55: Outdoor Panels enclosed in Stainless Steel Mounted on 500 mm Pedestal
4	Design	Complete Closed-Door Design
5	Internal Arc Classification	50kA, 0.5 sec
6	Cable Alley Compartment	Form-4B as per IEC-61439
7	Gasket	Steel Reinforced EPDM /PU Foam gaskets
8)	Height	2450mm max
9)	Clearances	25 mm: (Ph-Ph)/(Ph-earth) Insulation Sleeves/Barriers shall be provided for clearance less than 25 mm Incomer Rear Door and Busbar-400mm

H.2.2.3 CIRCUIT BREAKER

1)	Type	Air break spring charged stored energy type
2)	Operating duty	O-3 min-CO-3 min-CO
3)	Symmetrical interrupting	50 kA(RMS
4)	Short circuit rating	105 kA(PEAK)
5)	Short Circuit Breaking current	
	a) AC Component	50 kA(RMS)
	b) DC Component	As per IS/IEC 60947
6)	Short time withstand	50 kA(RMS) for 1 s
7)	No of aux. contacts	4 NO + 4 NC for DDCMIS interface 6NO+6NC Auxillary Contact(directly operated from breaker operated Mechanism)
8)	Anti-pumping Feature	Both Mechanical and Electrical

H.2.2.4 METERS

1)	Accuracy Class	2.0
2)	One min. power frequency withstand test voltage	2.0 kV(RMS)

H.2.2.5 CURRENT TRANSFORMERS

1)	Type	Cast Resin Bar Primary / Nylon Casing
2)	Voltage class and frequency	650 V, 50 HZ
3)	Class of insulation	E or better
4)	Rated Secondary Current	1 A
5)	Accuracy class & burden	
	a) For protection	5P20, 5VA PS Class for REF
	b) For metering	class 1.0, 5VA (min) class 0.2s, 5VA (min) for feeders indicated in SLD ,if any
6)	Instrument Security Factor (ISF) for metering CT	5
7)	Short time withstand	
	a) For CT Associated with circuit breaker	50 kA(RMS) for 1 sec
	b) For CT Associated with MCCB protected feeders	Prospective current of 50 kA(RMS) for the MCCB clearing time
8)	Dynamic withstand	
	a) For CTs Associated with circuit breaker	105 kA(PEAK)
	b) For CT Associated with MCCB protected feeders	Prospective current of 105 kA(PEAK) as Limited by MCCB

H.2.2.6 BUSDUCT (NON-SEGREGATED, AIR INSULATED TYPE)

1)	Rating	As per requirement /Sizing Calculation
1)	Type	Non-Segregated
2)	One minute power frequency withstand voltage	2.5 kV
3)	One second short ckt withstand current	50 kA(RMS)
4)	Momentary dynamic current withstand	105 kA(PEAK)
5)	Enclosure	3mm Al Alloy Rectangular(IP:55) Al sheet flange protection hood for outdoor
6)	Gasket	Steel Reinforced EPDM /PU Foam gaskets
7)	Conductor	Material: Aluminium Clearance:25 mm(Min)
8)	Steel Structure	Hot Dipped Galvanised

9)	Earthing	GI of Adequate Size along full length

H.2.2.7 BUSDUCT (SANDWICH TYPE)

1)	Type	Bus Trunking
2)	Rated Insulation voltage	1000V
3)	One second short ckt withstand current	50KA(RMS)
4)	Momentary dynamic current withstand	105KA(PEAK)
5)	Power frequency withstand voltage	3.5kV
6)	Impulse withstand voltage	8kV
7)	Insulation	Class F
8)	Conductor	Material: AL/Cu
9)	Enclosure	CRCA/GI:1.6mm Al:2.5mm DOP:-IP:55
10)	Gasket	Steel Reinforced EPDM /PU Foam gaskets
11)	Earthing	GI of Adequate Size along full length

H.2.2.8 VOLTAGE TRANSFORMERS

1)	Type	Cast Resin
2)	Voltage Ratio	415 / 110 V for line PT $415/\sqrt{3}$ / $110/\sqrt{3}$ V for Bus PT
3)	Method of Construction	V-V
4)	Accuracy Class	0.5 0.2 for feeders indicated in SLD ,if any
5)	Rated Voltage factor	1.1continuous, 1.5 for 30 sec.
6)	Class of insulation	E or better
7)	One minute power frequency withstand voltage	2.5 kV

H.2.2.9 HRC FUSES

1)	Voltage Class	650 Volts
2)	Rupturing capacity	80 kA (rms) for AC ckt., 20 kA for DC ckt.

H.2.2.10 CONTACTORS

1)	Type	Air break electro magnetic
2)	Utilising Category	AC3 of IS/IEC 60947 for non reversible AC4 of IS/IEC 60947 for reversible drives

		DC3 for DC contactor
3)	Operating Coil Voltage	(i)110V AC (-15%-+10%) Drop out voltage-less than 70% Guaranteed Drop out at 20% of rated voltage (ii)220V DC((-15%-+10%)

H.2.2.11 Relays

1)	Power frequency withstand voltage	2.5 kV for 1 sec. or 2.0 kV for 1 min.

H.2.2.12 CONTROL TRANSFORMERS

1)	Type	Dry / Cast Resin
2)	Voltage Ratio	415 / 110 V with taps ± 5% in steps of 2.5%
3)	Class of insulation	Class-B or better
4)	One minute power frequency withstand voltage	2.5 kV
5)	Rating	1.5 X Adequate for application.

H.2.2.13 LIGHTING TRANSFORMER / WELDING TRANSFORMER

1)	Type & Rating	Dry type / 50 kVA(Welding TRF),
2)	Voltage Ratio	50kVA(Mi i)(Li hti TRF) 415/415V, +/- 5% taps in steps of 2.5%
3)	Class of insulation	B or better
4)	One minute power frequency withstand voltage.	2.5 kV
5)	Enclosure protection	IP-42
6)	Type Test	As per IS 2026
7)	Fault level	3-5 kA secondary side

H.2.2.14 TRANSDUCERS

1)	Current transducers	
	a) Input	0-1 A (CT secondary)
	b) Rated frequency	50 Hz
	c) Output	4-20 mA (2 Nos. decoupled)
	d) Over current	Transducer for motor current ammeters shall be capable of withstanding min. 6 times CT sec. current of 1A for a min period of 30 seconds

	e) Accuracy	1.0
2)	Voltage Transducers	
	a) Input	500 V, 50 Hz (for AC) / 250 V / 125 V DC (for DC)
	b) Output	4-20 mA (2 Nos. decoupled)
	c) Accuracy	1.0

H.2.2.15 MCCB & MPCB

1)	Type	Thermal Magnetic based(in built front adjustable releases
2)	Rated insulation level	690V
3)	Rated ultimate & Service S.C. breaking capacity	50 kA
4)	Rated making capacity	105 kA
5)	Utilization category	A

H.2.2.16 MCB

1)	Rated voltage	415V/240V/110V AC 240V DC
2)	Current breaking Capacity	10 kA
3)	Characteristic Curve	C or above

H.2.2.17 AC & DC MCCB Box

1)	Construction	(i)Metal Enclosed Fixed Type CRCA:2mm structure :1.6mm enclosure Or (ii)Poly Corbonate (a) Halogen Free,flame Retardant(UL-94,V0) (b) Thickness:4mm (iii) UL224 sleeved Busbars
2)	Degree of Protection	Indoor: IP52 Outdoor: IP54
3)	Characteristic Curve	C or above

H.2.2.18 Earth Bus and Earthing

Material	GS/Cu/Al of Sufficient cross section Separate Copper Earth bus for Electronic Earthing of IMCs

H.2.2.19 Internal Wiring and Control Terminal Blocks

Control Terminal Blocks		
1)	Rating	650V grade , 10 A ,6.6 polyamide UL 94Separate Copper Earth bus for Electronic Earthing of IMCs
2)	Type	Screw less ,push in technology(IEC 60947-7-1 and UL certified)
3) Spare 20%		
Internal Wiring		
1)	Rating	650 V grade, FRLS, single core 2.5 sq. mm cu for CT connection 1.5 sq. mm cu for others

H.2.2.20 LOCAL/EMERGENCY PUSH BOTTON

1)	Construction	CRCA/Die Cast Al:1.6mm enclosure Or (ii)Poly Corbonate (a) Halogen Free,flame Retardant(UL-94,V0) (b) Thickness:4mm (iii) UL224 sleeved Busbars
2)	Degree of Protection	IP55 IP65(Dusty Area)
3)	Characteristic Curve	C or above
4)	Contacts	Latched Type EPB 2NO+2NC

H.3 CONSTRUCTIONAL DETAILS OF SWITCHBOARDS

H.3.1 All switchboards shall be divided into distinct vertical sections (panels), each comprising of the following compartments:

a. BUSBAR COMPARTMENT

A completely enclosed bus bar compartment shall be provided for the horizontal and vertical bus bars. Bolted covers shall be provided for access to horizontal and vertical busbars and all joints for repair and maintenance, which shall be feasible without disturbing any feeder compartment. Auxiliary and power bus bars shall be in separate compartments.

b. SWITCHGEAR / FEEDER COMPARTMENT

All equipment associated with an incomer or outgoing feeder shall be housed in a separate

compartment of the vertical section. Two-tier breaker arrangement in a vertical section shall be offered for outgoing breaker feeders of rating up to 1600A. Fixed part of vertical busbar and moving part of draw-out modules for power connection shall be of Silver/Tinned plated Copper only. No live parts shall be accessible with equipment drawn out. The Module compartment door shall have external padlocking facility with MCC frame/fixed structure. The MCC module will have a hole with a grommet on side plate of the module truck for taking Profibus DP connector with 2 nos. armoured profibus DP cables from Cable alley to IMC's profibus DP port for making daisy chain connection of IMCs by DDCMIS vendor in an MCC panel. Alternatively, good quality Secondary Isolating Contacts(SICs) can be offered for Profibus DP communication port connection & isolation between moving & fixed parts of MCC.
A separate compartment shall be provided for relays and other control devices associated with a circuit breaker. For breaker controlled motor feeders, an aux. relay shall be provided for taking Local push button station(EPB) "normally open (NO)" contact input from field and provide potential free output to DDCMIS to avoid probable mixing of switchgear control voltage with DDCMIS 24V DC voltage. This aux. relay shall have 2NO+2NC contacts.

H.3.2 Wherever two breaker compartments are provided in the same vertical section form 4B separation and separate vertical busbar chamber shall be provided. For Incomer panel suitable interlock shall be provided to prevent opening of rear cover, in case incoming supply is ON/Line is live and for Bus-coupler panel suitable interlock shall be provided to prevent opening of rear cover, in case either of the bus-section is in charged condition.

H.3.3 All 415V air circuit breaker switchgear panels shall be of single-front type. MCCs and DBs shall be of single-front / double-front construction as per the requirements. All ACDBs, DCDBs and Solenoid Valve DBs shall be of fixed module type. MCCs located on the Stacker reclaimer, Paddle Feeders, Travelling Trippers shall be fixed type, single front.

H.3.4 For modules of size more than 300 mm, symmetric guides not less than 4 nos shall be provided for smooth removal or insertion of module. All identical module chassis of same size shall be fully interchangeable without having to carry out any modifications. Suitable interlock shall be provided in DCDB for prevention of opening of Isolator (Incomer) when the bus coupler is open and vice-versa.

H.3.5 All draw-out modules shall be provided with "Closed door operation" feature wherein movement of the module from "Isolated" position to "Test" position and to "Service" position & vice-versa and power ON / OFF operation of the module shall be possible only with the module door closed condition. Degree of protection of the panel shall be maintained in both " Service", "Test" and "Isolated" positions. Module door shall open only when module is in "Isolated" position and "Power off" condition. Interlock shall be provided to prevent the change of module state from "Isolated" to "Test" position and to "Service" position or vice- versa, if Main Switch/MCCB/MPCB of the module is kept in ON condition. All the modules shall be of standard width only and no half width, quarter width etc sized modules shall be acceptable. It shall be possible to pad lock the module door irrespective of state of module i.e. "Service", "Test" or "Isolated". Module Operated Automatic safety shutter shall be provided to cover all the live power terminals, in case the module is taken out from the panel. 2 nos of Dummy modules of each size to fill in module being taken out for maintenance purpose shall be provided

in each switchgear room, in case module door is part of module. These Dummy Modules shall be fitted in switchboard as vacant modules having no cut out on back side and cable alley side. In case door is hinged to the panel, 2 nos of blanking plates of each size need to be provided. Minimum 10mm of gap shall be ensured between busbar and moving power contact tips while module is in "Test" position to ensure user safety. It shall not be possible to open the rear door of incomer and buscoupler breaker modules when the incoming power source are in live condition.

H.3.6 Air Circuit Breakers Modules shall be provided with "Closed door operation" feature wherein movement of the module from "Isolated" position to "Test" Position and then to "Service" position & vice-versa and power ON / OFF operation of the module shall be possible only with the module door closed condition. Degree of protection of the panel shall be maintained in both "Test" and "Service" positions. Module door shall open only when module is in "Isolated" position and "Power off" condition.

H.3.7 Circuit-breaker cubicles shall be provided with safety shutters operated automatically by the movement of the circuit breaker carriage, to cover the stationary isolated contacts when the breaker is withdrawn.

H.3.8 The compartment door of fixed type modules shall be interlocked to prevent opening while the MCCB/MPCB in "ON" condition.

H.3.9 Employer reserves the right to alter the cable entries, if required during detailed engineering, without any additional commercial implication.

H.3.10 The Contractor shall provide adopter panel / dummy panel required to meet various configuration / arrangement of busbars/layout requirement adopted by the Contractor. The Switchboards fed from indoor transformer will be flange connected to the same and the same shall be located as close as desirable to the transformer

H.4 PROTOTYPE PANELS

In order to establish the compliance with the requirements of this technical specification, prototype panels shall be made and offered for the Employer's inspection and approval before the start of bulk manufacturing of panels for this project. The exact configuration of such prototype panels shall be finalized during detailed engineering. The switchgear shall be modified complying the observation marked during Prototype inspection (if any).

H.5 CONSTRUCTIONAL DETAILS OF AC & DC MCCB BOX

H.5.1 Each DC MCCB Box shall comprise of the following:

a. 1 no. 63 A DP MCCB as incomer.
b. 100 A fully insulated (PVC sleeved, UL224) busbars.
c. 8 nos. 16A outgoing DP MCCB feeders.
d. 1 no. auxiliary contactor for supply monitoring.
e. 1 no. Blue LED indicating lamp.

H.5.2 Each AC MCCB Box shall comprise of the following:

a. 1 no. 63A TPN MCCB as incomer.
b. 100 A, 3-phase, 4-wire, fully insulated (PVC sleeved, UL224) busbars.
c. 9 nos. 16 A DP MCCB and 3 nos. 16 A TPN MCCB units as outgoing feeders.
d. 3 nos. LED indicating lamps (R, Y, B) for incoming supply monitoring.

H.6 POWER BUSBARS AND INSULATORS

Two separate sets of vertical busbars shall be provided in each panel of double front MCCs / DBs. Interleaving arrangement for busbars may be adopted for switchboards with a rating of more than 1600A.

H.7 Power Cable Termination

Cable termination compartment and arrangement for power cables shall be suitable for heavy duty, 1.1 kV grade, stranded Aluminium conductor, PVC/ XLPE insulated, armoured / unarmoured and PVC sheathed cables. All necessary cable terminating accessories such as supporting clamps and brackets, hardware etc. for cables shall be provided by the contractor to suit the final cable sizes.

H.8 BUS TRUNKING SYSTEM (SANDWICH TYPE BUSDUCT)

Three phase Bus trunking system conforming to IEC 61439-6 / IS 8623 (Parts 1 & 2) shall be provided for connecting the Main and Standby DG sets to Unit Emergency Switchgears.
Enclosures shall be provided with flanged ends with drilling dimensions to suit the flanges at the switchgear and DG terminals. Any adapter boxes required for this purpose are in the contractor's scope of supply. The flanges shall be provided with gaskets, nuts, bolts, etc.

H.9 TEMPERATURE –RISE

The temperature rise of the horizontal and vertical busbars and main bus links including all power draw-out contacts when carrying 90% of the rated current along the full run shall in no case exceed 550 C with silver plated joints and 400C with all other types of joints over an outside ambient temperature of 500C. The temperature rise of the accessible parts/external enclosures expected to be touched in normal operation shall not exceed 200C. The temperature rise of manual operating means shall not exceed 100C for metallic & 150C for insulating material. Temperature rise for the busbars shall be carried out at 90% of the rated current. The above temperature rise limits are applicable for busducts also without any current derating.

H.10 DERATING OF EQUIPMENTS

The Contractor shall ensure that the equipment offered will carry the required load current at site ambient conditions specified and perform the operating duties without exceeding the permissible temperature as per Indian Standards / Specification. Continuous current rating at 500C ambient in no case shall be less than 90% of the normal rating specified.
The Contractor shall indicate clearly the derating factors if any employed for each component and furnish the basis for arriving at these derating factors duly considering the specified current ratings and ambient temperature of 50°C.

H.11 PROTECTION CO-ORDINATION

It shall be the responsibility of the Contractor to fully coordinate the overload and short circuit tripping of the circuit breakers with the upstream and downstream circuit breakers / MCCBs / motor starters (0.5 kW & 1.5 KW), to provide satisfactory discrimination. Further, the various

equipment supplied shall meet the requirements of Type 2 class of Co-ordination as per IS: 13947.

H.12 TESTS AND TEST REPORTS

H.12.1 GENERAL

a. The following type test certificates of LT Switchgear and MCC panels shall be submitted.

1)	Circuit breaker of each rating	
	a)	Test sequence 1
	b)	Combined test sequence (With Circuit breakers mounted inside the Switchgear panel)
2)	Complete design verification of Switchgear/MCC Panels as per IEC 61439 Part 1, Annexure-D	
3)	Internal arc test for Personnel and Assembly Protection as per IEC/TR 61641. Test shall be conducted for breaker compartment, busbar chamber, incoming side of smallest sized module, outgoing terminals of module in cable allay.	
4)	MCC modules of any three ratings, as selected by the Employer, for class - II protection Co-ordination as per IS 13947-4-1 / IEC 60947-4-1.	

H.12.2 For the following equipment the contractor shall submit the reports of all the type tests NUMERICAL RELAYS, Ethernet switches as given in Protection, Control and metering of MV & LV switchgear chapter.

a. LOCAL PUSH BUTTON STATION

b. LOCAL MOTOR STARTER

c. MCCB

H.12.3 The type test reports once approved for any projects shall be treated as reference. For subsequent projects of DVC, an endorsement sheet will be furnished by the manufacturer confirming similarity and “No design Change”. Minor changes if any shall be highlighted on the endorsement sheet.

H.12.4 The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.

H.12.5 Routine checking to observe compliance to degree of protection, first numeral, on switchboard enclosures and busbar chambers shall be as under:

1) IP -4X	It shall not be possible to insert a one mm dia. Steel wire into the enclosure from any direction, without using force.
2) IP-5X	It shall not be possible to insert a thin sheet of paper under gaskets and through enclosure joints.

H.13 ERECTION / INSTALLATION OF SWITCHBOARDS AND OTHER EQUIPMENTS COMMISSIONING OF LT SWITCHGEARS

Commissioning of LT switchgears at site shall only be carried out either by the switchgear manufacturer himself or under the supervision of the switchgear manufacturer.

H.14 RESPONSIBILITY OF THE ASSOCIATE/COLLABORATOR (APPLICABLE IF LT SWITHCHGEAR IS SUPPLIED THROUGH PROVENNESS CRITERIA: ROUTE-2):

The Associate/Collaborator (as applicable) for sourcing of LT Air Circuit Breaker shall be fully responsible and accountable for the item supplied and its compliance to the specification requirements. The Associate/Collaborator (with respect to his manufactured and supplied LT Air Circuit Breaker) shall:

i. Participate in the Inspection of the LT Switchgears at Switchgear Supplier's Works, if required by Employer.
ii. Participate in Technical Co-ordination Meetings (TCMs) from time to time during detailed engineering, if required.
iii. Participate in Site Testing and Commissioning of LT Switchgears, if required.
iv. Participate/address/resolve the issues raised during Contract Execution Period.

H.15 Insulating Mat:

Insulating mat supplied for laying in front of LT Switchgears in switchgear rooms shall be as per IS:15652.

I. AXIAL FANS

Ventilation requirements of Safety Park Control Room shall be catered by a combination of Axial flow Supply and exhaust fans.

Wall mounted Axial Exhaust flow fan:

I. These fans shall have fixed/variable pitch cast aluminum blades of aero foil design.
II. The fan casing shall be of heavy gauge sheet steel construction.
III. Necessary rain protection cowl, inlet and outlet cones, bird protection screen, adjustable damper, vibration isolators, back draft dampers etc. shall be provided.
IV. The speed of the fan shall not exceed 1000 rpm for fan with impeller diameter above 450 mm and 1500 rpm for fan with impeller diameter 450 mm or less.
V. All other accessories like supporting structure etc. as required shall be provided.
VI. Fans of Capacity 1000 m3/hr & lower shall be of propeller exhaust type.
VII. Wall mounted gravity damper in GI construction with 20 G (min.) frame & 24 G (min.) blade.

Proposed makes for Axial Fans W.R.T. PREVIOUSLY DVC APPROVED MAKE LIST: -
Advance Ventilation/ Kruger(Singapore/Pune)/ Marathon Electric/ CB Doctor/Patel Air Flow/ Khaitan/Howden (Solyvent Flakt)/TCF Nadi/ Almonard

Proposed makes for LT Motors of Axial Fans W.R.T. PREVIOUSLY DVC APPROVED MAKE LIST: -
ABB/ Crompton Greaves/ Kirloskar Electric Co./ NGEF/ Jyoti/ Siemens/ Marathon/ Bharat Bijlee Ltd/LHP

L. MISCELLANEOUS

L.1. LIGHTING

a) This lighting work covers complete safety control room area of 2x800MW DVC Koderma Project.

b) The work includes engineering, designing, supplying and erection & commissioning at site of lighting, electrical works and other related associated works.

c) This includes handling, transportation from BHEL stores / yard at site to work place at site. Erection & Commissioning of lighting material like LDB (Including Lighting transformer for AC Type, LP, lighting luminaires (with Complete accessories), Switch Boxes, Junction Boxes, Receptacles, Fans, Emergency lighting, Poles, Conduits, Rigid/ Flexible coated conduit, Wires, structural Steel, cable trays, cabling in Tray and Underground excavated trench, earthing above and below ground, earth pit for poles as per approved drawings, ventilation and air-conditioning.

d) The item LDB(Including Lighting Transformer) has two incomings (two transformers) of rating in line with the design memorandum.

L.2. ERECTION AND COMMISSIONING

a) This work shall be completed in the premises of 2x800MW DVC Koderma Project. The safety protocols and other statutory compliances needs to be met which can be updated and revised by DVC at their discretion. The sub-contractor needs to follow these practices while inside the premises of DVC.

b) All measuring and testing instruments required during erection, testing, commissioning and performance testing shall be arranged by the bidder.

c) Supply of necessary hardware such as double compression cable glands, conduit fittings viz. couplers, elbows, bends, tees, circular boxes etc., conduit accessories viz. clips, saddles, spacing plates, entry bushes, lock nuts, plugs, heavy duty lugs, ferrules, expansion fasteners, ball & sockets, earth clips, fan boxes, clamps, screws, pull out boxes etc. are in the scope of bidder. No separate rate shall be payable for the above.

d) Fabrication & painting charges of structural steel shall be part of erection charges of that equipment for which the same is being used.

e) Cost of E&C for lighting fixture shall be inclusive of cost of lamp installation.

L.3. Erection & Commissioning of Luminaire

a) Mounting of lighting fixtures should be as per approved layout drawings and manufacturer catalogue.

b) Lighting fixtures shall be generally group controlled directly from lighting panel but for office area it shall be from switch boxes.

c) Lighting pole/ mast shall be painted with two coats of Aluminium paint after completion of installation.

d) No cutting or drilling is permitted on galvanized structure.

e) Lighting panel shall be earthed by two separate distinct connections and lighting fixtures shall be earthed separately by earth continuity conductor.

L.4.Erection & Commissioning of Receptacles/Switch boxes/Cables and Wires

a) For receptacles/Switch boxes/Cables and Wires proper calibrated crimping tool of appropriate die must be used for better crimping quality.

b) Crimping shall be solderless.

c) Receptacles/Switch boxes/Cables and Wires shall be earthed separately by earth continuity conductor.

L.5.Erection & Commissioning of Conduits

a) For Conduit supporting metallic saddles clamp secured to nylon rawl plugs with screws must be used to the building steel at an interval not more than one meter, couplers or benders to be used either side for similar fittings.

b) 40mm GI Conduit shall be used for fabrication of J-poles and bending of pipes as per typical drawings and the same has been included in the E&C works. There shall be no additional payment for this fabrication works.

L.6.Erection & Commissioning of Cable Laying

a) Cable laying includes cutting to the required length, laying in overhead Cable racks/ underground cable trenches, pipes, flexible conduits, dressing/ clamping in tray, drilling of holes in gland plates in panels and junction box, glanding, splicing, dressing of spliced wire inside the panel and JBs, providing printed ferrules (ferrule printing machines to be provided by contractor for printing necessary cross ferruling details)/ PVC numerical/ alphabetical ferrules (where printed ferrules not possible at all) machine engraved ferrules sleeve/ ferrule, termination by using crimp type copper tinned/aluminium lugs, insulated/un-insulated, crimp and soldered termination, plug-in connections with insert type crimping, providing identification cable tags of PVC/ aluminium at both the ends and at appropriate interval (approximately 30meters) throughout the route length, continuity checking, insulation resistance checking, high voltage test on HT cables. Contractor to arrange adequate numbers of his own ferrule printing machines.

b) Entry to the panels, JB's may be at top, side or bottom. All cable is required be supported and clamped near to the panel.

c) Wherever cable glanding is not possible, either due to the gland plate size limitations or more number of cable entries, cables may have to be lifted inside the panel by making large cut-out in gland plate and providing 4 or 6 inch PVC pipe coupling glands. These pipe coupling glands shall be supplied by contractor within the quoted rates of cable lying.

d) Copper tinned lugs of various types up to 4 sqmm conforming to IS: 694 (pin, ring, fork, snap-on) for cables, PVC cable ties, PVC ferrules, PVC button and tapes, cable identification tag of PVC/metal as per site requirement, clamping and dressing material such as suitable cable ties/ clamps etc. with hardware, PVC sleeves etc. shall be supplied by contractor within the quoted rate for cable laying. The quality and make of cable lugs shall be got approved from BHEL engineer prior to their use on job.

e) All care should be taken to avoid abrasion, tension, twisting, kinking and stretching of cables during installation.

f) Cable shielding – all signal cables are supplied with bare shielded copper wire/with braided wire shield. Generally, shield wire is kept isolated at instrument/field device end and continuity is maintained through JBs and earthed at panel end only. While terminating the shield wire in either panel or JBs, PVC sleeves are to be used to avoid two-point earthing.

g) Spare holes in the panels/ Instruments/ Actuators/ Motors/ JB's etc. shall be sealed by suitable method by contractor. (The cost of work and Materials such as aluminium sheet or Adhesive tape / Plugs etc. shall be within the quoted rates for laying of cables).

h) Many of the cable trays and cables have to be laid in cable trenches. For this purpose, the cover of the trenches has to be opened for working in site and whenever the cables are to be laid in existing cable tray, all safety precautions have to be observed. After completing the work, the trenches have to be cleaned and covers put back into position. Contractor shall also carry out de-watering from the trenches if required and arrange pumps etc. at his cost.

i) Cables to be laid for exhaust fan and its starter box shall be laid on the wall/ beam/ceiling for that spacer, cleat and clamp material shall be supplied by the bidder. Cable laying rate shall be inclusive of hardware items.

j) Looping wire at terminal block of panels and electrical actuator as shown in the inter-connection diagram is to be done by contractor at no extra cost. Re termination of control/power cable in panel or equipment side due to any reason will not be paid extra. Agency shall provide the electrician during commissioning of equipment after cable termination work if necessary.

k) Contractor shall carefully plan the cutting schedule of each cable drum in consultation with BHEL site engineer such that wastages are minimized. Recovery will be made in case the wastages are exceeding the wastage allowances fixed in this contract.

L.7.LT Motors Axial Fan:

1.00 GENERAL REQUIREMENTS

Degree of Protection

Degree of protection for various enclosures as per IEC60034-05 shall be as follows: -

i) Indoor motors - IP 55 ii) Outdoor motors - IP 55
(Additional Canopy to be provided)

iii) Cable box-indoor area - IP 55

iv) Cable box-Outdoor area - IP 55

2.00 CODES AND STANDARDS

1) Three phase induction motors : IS15999/IEC:60034
2) Single phase AC motors : IS 996/ IEC:60034
3) Energy Efficient motors : IS 12615, IEC:60034-30

34.00 RATING

(a) Continuously rated (S1).
(b) maximum continuous motor ratings shall be at least 10% above the maximum load demand of the driven equipment under entire operating range including voltage and frequency variations.

5.00 TEMPERATURE RISE

Air cooled motors

70 deg. C by resistance method for both thermal class 130(B) & 155(F) insulation.

6.00 OPERATIONAL REQUIREMENTS

6.01.Starting Time

For motors with starting time upto 20 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 2.5 secs. more than starting time.

6.02. Torque Requirements

a) Accelerating torque at any speed with the lowest permissible starting voltage shall be at least 10% motor rated torque.
b) Pull out torque at rated voltage shall not be less than 205% of rated torque.

7.00 DESIGN AND CONSTRUCTIONAL FEATURES

7.01. All motors shall be either Totally enclosed fan cooled (TEFC) or totally enclosed tube ventilated (TETV) or Closed air circuit air cooled (CACA) type. The method of movement of primary and secondary coolant shall be

self-circulated by fan or pump directly mounted on the rotor of the main motor as per IEC 60034-6.

Motors and EPB located in hazardous areas shall have flame proof enclosures conforming to IS:2148.

7.02. Winding and Insulation
Type: Electrolytic grade Copper conductor, Nonhygroscopic, oil resistant, flame resistant Insulation.

Starting duty: Two hot starts in succession, with motor initially at normal running temperature.

240VAC, & 415V AC motors: Thermal Class (F) or better

7.03. Noise level for all the motors shall be limited to 85 dB(A). Vibration shall be limited within the limits prescribed in IS:12075 / IEC 60034-14. Motors shall withstand vibrations produced by driven equipment.

7.04. Motor body shall have two earthing points on diagonally opposite sides.

7.05. All motors shall be so designed that maximum inrush currents and locked rotor and pullout torque developed by them at extreme voltage and frequency variations do not endanger the motor and driven equipment.

Makes for LT Motors of Axial Fans

ABB/ Crompton Greaves/ Kirloskar Electric Co./ NGEF/ Jyoti/ Siemens/ Marathon/ Bharat Bijlee Ltd/LHP

L.8.TECHNICAL SPECIFICATION FOR AXIAL FLOW FANS

Ventilation requirements of Safety Control room shall be catered by a combination of Axial flow Supply Fan and wall mounted damper.

Wall mounted Axial flow fan:

I. These fans shall have fixed/variable pitch cast aluminum blades of aero foil design.
II. The fan casing shall be of heavy gauge sheet steel construction.

III. Necessary rain protection cowl, inlet and outlet cones, bird protection screen, adjustable damper, vibration isolators, back draft dampers etc. shall be provided.

IV. The speed of the fan shall not exceed 1000 rpm for fan with impeller diameter above 450 mm and 1500 rpm for fan with impeller diameter 450 mm or less.

V. All other accessories like supporting structure etc. as required shall be provided.

VI. Fans of Capacity 1000 m3/hr & lower shall be of propeller exhaust type.

Makes for Axial Fans: -

Advance Ventilation (Sonepat)/ Kruger(Thane)/ Marathon Electric (Kolkata)/ CB Doctor (Ahmedabad)/Patel Air Flow (Ahmedabad) / Khaitan (Kolkata)/Howden (Solyvent Flakt – Chennai)/ Nadi (Chennai)/ Almonard (Chennai)/ C. Doctor (Kolkata), Suvidha Air Solutions Pvt. Ltd. (Ahemadabad), Subarban Industrial Works Pvt. Ltd. (Kolkata), S. K. System Pvt. Ltd. (Sonepat)

L.9.TECHNICAL SPECIFICATION FOR LOUVERS AND DAMPERS

- GI construction with 20 G (min.) frame & 24 G (min.) blade

Note:

Sl. No.	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1	**ESTABLISHMENT**			
3.1.1	**For construction purpose**			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with owner
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner

Sl. No.	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipment, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
f	Firefighting equipment like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	**For living purpose**			
a	Open space for labour colony (as per availability)		Yes	Contractor has to make his own arrangements for space, shelter and transportation of labors as per their requirement.
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2	**ELECTRICITY**			
3.2.1	**Electricity for construction purposes 3 Phase 415/440 V**			**Contractor has to make his own arrangement.**
a	Single point source of 440 V		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	**Electricity for the office, stores, canteen etc. of the bidder (to be specified whether chargeable or free)**			**Contractor has to make his own arrangement.**
a	Single point source		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**		Yes	**Contractor has to make his own arrangement.**
a	Single point source		Yes	

Sl. No.	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.3	**WATER SUPPLY**			
3.3.1	**For construction purposes (to be specified whether chargeable or free)**			**Contractor has to make his own arrangement.**
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.2	**Water supply for bidder's office, stores, canteen etc**			**Contractor has to make his own arrangement.**
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	**Water supply for Living Purpose**			**Contractor has to make his own arrangement.**
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4	**LIGHTING**			**Contractor has to make his own arrangement.**
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3 At the construction site /area		Yes	

Sl. No.	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			Contractor has to make his own arrangement.
a	Telephone, fax, internet, intranet, e-mail etc.		Yes	
3.6	**COMPRESSED AIR (wherever required for the work)**		Yes	Contractor has to make his own arrangement.
3.7	**DEMOBILIZATION OF ALL THE ABOVE FACILITIES**		Yes	Contractor has to make his own arrangement.
3.8	**TRANSPORTATION**			Contractor has to make his own arrangement.
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

Sl. No.	Description PART II	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.9	**ERECTION FACILITIES**			
3.9.1	**Engineering works for construction**			Not Applicable
a	Providing the erection/constructions drawings for all the equipment covered under this scope	Yes	Yes	Bidder to provide drawings for sheeting works.
b	Drawings for construction methods	Yes	Yes	In consultation with BHEL
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site-example – routing of small bore pipes		Yes	Changes are to be marked in drawing & handover to BHEL on completion of work.
d	Shipping lists etc for reference and planning the activities			NOT APPLICABLE
e	Preparation of site erection schedules and other input requirements		Yes	In consultation with BHEL

Sl. No.	Description **PART II** 3.9 **ERECTION FACILITIES**	Scope / to be taken care by		Remarks
		BHEL	**Bidder**	
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments		Yes	In consultation with BHEL
g	Weekly erection schedules based on Sl. No. e		Yes	In consultation with BHEL
h	Daily erection / work plan based on Sl. No. g		Yes	In consultation with BHEL
i	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule.		Yes	
j	Preparation of preassembly bay		Yes	
k	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself			Not Applicable
L	Arranging the materials required for preassembly		Yes	

4. TOOL & PLANTS:

Nos. of T&Ps to be deployed at site shall be decided based on site requirement. They may be owned or on rental basis with all valid documents which shall be vetted by BHEL and DVC.

given below nos. are tentative for planning purposes by the bidder.

Sl. No.	Description of T&P	Quantity
1.	Tractor with Trolley	As per requirement
2.	DG set of required capacity	As per requirement
3.	Ladder	As per requirement
4.	Welding machine	As per requirement
5.	Drill machine	As per requirement

MEASURING AND MONITORING DEVISES (MMD):

To be finalized as per site requirement.

NOTE:

This above list is only indicative and neither exhaustive nor limiting. Quantities indicated above are only the minimum required. Contractor shall deploy all necessary T&P to meet the schedules & as prescribed by BHEL engineer and required for completion of work. In the event of non-mobilization of any T&P by the successful bidder and as a result progress of work suffered, BHEL reserves the right to deduct suitable amount from the dues of the bidder, with assigning reasons thereof.

5.1 **BHEL WILL NOT PROVIDE ANY T&P's FOR THIS WORK**.

6 TIME SCHEDULE & MOBILIZATION

After issue of LOI (though Fax/courier/email) the contractor shall report to the Construction Manager/Site In-Charge of BHEL at site within seven (07) days from date of LOI and submit detailed mobilization plan to start work within 15 days from date of LOI; unless instructed by BHEL to differ start of work in writing.

The contractor has to subsequently augment his resources in such a manner that the entire works are completed within the contract period of 01 (one) Months from the date of start of work in a manner required by BHEL to match with the project schedule.

- The above schedule is only tentative. The above schedule shall be advanced, if there are requirements to advance the project schedule and the civil works in the scope of the contractor is to be advanced to meet the project requirement. No extra payment whatsoever shall be paid on this account.

- In order to meet above schedule in general, and any other intermediate targets set, to meet customer/project schedule requirements, contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL.

- In case of delay in completion beyond schedule and non-finalization of delay analysis, BHEL at its discretion may provide provisional time extension with withholding 10% of running bills, which shall be finalized on actual time extension approval based on delay analysis.

7.0 TERMS OF PAYMENT

7.1 *The payment for running bills will normally be released within 30 days of submission of running bill complete in all respects with all documents. It is the responsibility of the contractor to make his own arrangements for making timely payments towards labour wages, statutory payments, outstanding dues etc. and other dues in the meanwhile. No interest shall be payable for the payment (if any) made beyond 30 days.All documents like HR Clearance, Quality and Safety Compliances, etc. required for processing the RA Bills should be submitted along with RA Bills.*

Few points of consideration are as below:

7.1.1 The measurements sheets of work done in a month shall be submitted in triplicate duly agreed/signed by BHEL Engineer. The contractor shall extend all necessary assistance for verification of measurements of works without any extra cost.

7.1.2 The RA bill payments are interim payments and bills shall be submitted in prescribed formats.

7.1.3 BHEL will release payment through **Electronic Fund Transfer (EFT)/RTGS**.

7.1.4 Final bill shall be submitted after completion of works and upon material reconciliation along with all prescribed formats.

7.2 The Bill will be paid at BHEL's Site office, 2X800 MW DVC Koderma TPP, PH-II, jhankhand where the PEB sheds will be erected.

7.3 Extra/Additional Items of Work: - The works shall be regulated as per clause no 2.15 and clause no 2.16 of General Conditions of Contract.

7.4 Please also refer clause no. C.12 of Chapter II of TCC.

TAXES, DUTIES, LEVIES (Rev 14 dated 09/10/2020)

1. All taxes excluding GST, GST Cess **& BOCW** Cess **but including, Royalties, fees, license, deposits, commission, any State or Central Levy and other charges whatsoever, if any, shall be borne by you and shall not be payable extra.**
2. Any increase of the taxes excluding GST, GST Cess & BOCW **Cess**, at any stage during execution including extension of the contract shall have to be borne by the contractor. Quoted/ accepted rates/ price shall be inclusive of all such requirements. Please note that since GST on output will be paid by BHEL separately as enumerated below, your quoted rates/ price should be after considering the Input Credit under GST law at your end.
3. **GST :**

   The successful bidder shall furnish proof of GST registration. GST along with Cess (as applicable) legally leviable & payable by the successful bidder as per GST Law, shall be paid by BHEL. Hence Bidder shall not include GST along with Cess (as applicable) in their quoted price.
4. GST charged in the Tax Invoice/Debit note by the contractor shall be released separately to the contractor only after contractor files the outward supply details in GSTR-1 on GSTN portal and input tax credit of such invoice is matched with corresponding details of outward supply of the contractor and has paid the GST at the time of filing the monthly return
5. E-invoicing under GST has been implemented with effect from 1st October 2020 for all the taxable persons having turnover more than the threshold limit in any preceding financial year from 2017-18 onwards. Therefore, for all the taxable persons falling under the purview of E-invoice, it is mandatory to mention a valid unique Invoice Reference No. (IRN) and QR code as generated from E-Invoicing portal of the Government for the purpose of issuing a valid Tax Invoice. Only an E-invoice issued in the manner prescribed under rule 48(4) of CGST Rules shall be treated as valid invoice for reimbursement of GST amount.

   If the successful Bidder is not falling under the purview of E-Invoicing then he has to submit a declaration in that respect along with relevant financial statements.
6. Bidder shall note that the GST Tax Invoice complying with GST Invoice Rules (Section 31 of GST Act & Rules referred there under) wherein the 'Bill to' details will as below:

   BHEL GSTN – As per **Annexure -1**

   NAME -- Bharat Heavy Electricals Limited

   ADDRESS – Site address
7. Bidder to immediately intimate on the day of removal of Goods (in case of any supply of goods) to BHEL along with all relevant details and a scanned copy of Tax Invoice to below email ids to enable BHEL to meet its GST related compliances: -

   Email id ---- to be intimated later on.

In case of delay in submission of the abovementioned documents on the date of dispatch, BHEL may incur penalty /interest for not adhering to Invoicing Rules under GST Law. The same will be liable to be recovered from the successful bidder, if such delay is not attributable to BHEL.

8. In case of raising any Supplementary Tax Invoice (Debit / Credit Note) Bidder shall issue the same containing all the details as referred to in Section 34 read with Rule 53.
9. Bidder shall note that in case GST credit is delayed/ denied to BHEL due to delayed / non receipt of goods and /or tax invoice or expiry of the timeline prescribed in GST Law for availing such ITC, or any other reasons not attributable to BHEL, GST amount shall be recoverable from the vendor along with interest levied / leviable on BHEL, as the case may be.
10. Bidder shall upload the Invoices raised on BHEL in GSTR-1 within the prescribed time as given in the GST Act. Bidder shall note that in case of delay in declaring such invoice in your return and GST credit availed by BHEL is denied or reversed subsequently as per GST Law , GST amount paid by BHEL towards such ITC reversal as per GST law shall be recoverable from the bidder along with interest levied / leviable on BHEL.
11. Way Bill: Successful Bidder to arrange for way bill / e-waybill for any transfer of goods for the execution of the contract.

    The Bidder has to make their own arrangement at their cost for completing the formalities, if required, with Issuing Authorities, for bringing materials, plants & machinery at site for execution of the works under this contract, Road Permit/ Way Bill, if required, shall be arranged by the contractor and BHEL will not supply any Road Permit/ Way Bill for this purpose.
12. **New taxes and duties**: -Any New taxes & duties, if imposed subsequent to due date of offer submission as per NIT & TCN, by statutory authority during contract period including extension, if the same is not attributable to you, shall be reimbursed by BHEL on production of relevant supporting document to the satisfaction of BHEL. However, you shall obtain prior approval from BHEL before depositing new taxes and duties.
    Benefits and/or abolition of all existing taxes must be passed on to BHEL against new Taxes, if any, proposed to be introduced at a later date.
    In case any new tax/levy/duty etc. becomes applicable after the date of bidder's offer but before opening of the price bid, the bidder must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of the price bids. Claim for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

13. For transportation work, bidder shall declare in his quotation whether he is registered under GST, if yes, whether he intends to claim GST on forward charge basis. In absence of this declaration, BHEL will proceed further with the assumption that bidder intends not to claim GST on forward charge basis. However, in case of GST registered transporter, the amount to the extent of goods and service tax will be retained till BHEL avails the credit of GST. Further,

transporter shall issue tax invoice which inter alia includes gross weight of the consignment, name of the consigner and the consignee, registration number of vehicle in which the goods are transported, details of goods transported, details of place of origin and destination, GSTIN of the person liable for paying tax whether as consigner, consignee or goods transport agency, and also containing other information as mentioned under rule 46.

14. **TDS under Income Tax shall be deducted at prevailing rates on gross invoice value from the running bills unless exemption certificate from the appropriate authority/ authorities is furnished.**

15. **TDS under GST shall be deducted at prevailing rates on applicable value from the running bills.**

16. **TCS under Income Tax 1961 has been implemented with effect from 1st October 2020 for every seller having turnover more than threshold limit during financial year immediately preceding financial year in which the sale of goods is carried out, who receives any amount as consideration for sale of any goods of the value or aggregate of such value exceeding threshold limit other than export of goods or who is already covered under other provision of section 206C, collect from the buyer, TCS as per applicable rates of the sale consideration exceeding threshold limit subject to following conditions**
    i. Buyer shall be as per clause (a) of section 206C- (1H)
    ii. Seller shall be as per clause (b) of section 206C- (1H)
    iii. No TCS is to be collected, if the seller is liable to collect TCS under other provision of section 206C or the buyer is liable to deduct TDS under any provision of the Act and has deducted such amount.

    If Successful Bidder is falling under the purview of TCS then he has to submit a declaration in that respect along with relevant financial statements before the start of work or if bidder is falling under preview of TCS during the work in progress, then bidder is compulsorily required to submit relevant financial statement in the beginning of the respective FY.

    For TCS claim, vendor has to submit relevant documents required as per Income Tax Act.
17. Refer Annexure – 2 for BOCW Act & Cess Act.

ANNEXURE-1

State wise GSTIN no.s of BHEL

Sl. No	Projects under state	GSTIN
1	Andhra Pradesh	37AAACB4146P7Z8
2	Bihar	10AAACB4146P1ZU

3	Chhattisgarh	22AAACB4146P1ZP
4	Gujarat	24AAACB4146P1ZL
5	Jharkhand	20AAACB4146P5ZP
6	Madhya Pradesh	23AAACB4146P1ZN
7	Maharashtra	27AAACB4146P1ZF
8	Orissa	21AAACB4146P1ZR
9	Telangana	36AAACB4146P1ZG

ANNEXURE-2

BOCW Act & Cess Act

Bidder may please note that the sub-contractor/bidder of BHEL engaging building or construction worker in connection with building or other construction work, are required to follow the procedures enumerated below:

1. It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
2. It shall be sole responsibility of the contractor engaging Building Workers in connection with the building or other construction works in the capacity of employer to apply and obtain registration certificate specifying the scope of work under the relevant provisions of the Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 from the appropriate Authorities.
3. It shall be responsibility of the contractor to furnish a copy of such Registration Certificate within a period of one month from the date of commencement of Work.
4. It is responsibility of the contractor to register under the Building and other Construction Workers' Welfare Cess Act, 1996 and deposit the required Cess for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 at such rate as the Central Government may, by notification in the Official Gazette, from time to time specify. However, before registering and deposit of Cess under the Building and other Construction Workers' Welfare Cess Act, 1996, the contractor will seek written prior approval from the Construction Manager.
5. It shall be sole responsibility of the contractor as employer to get registered every Building Worker, who is between the age of 18 to 60 years of age and who has been engaged in any building or other construction work for not less than ninety days during the preceding twelve months as Beneficiary

under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996.

6. It shall be sole responsibility of the contractor as employer to maintain all the registers, records, notices and submit returns under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
7. It shall be sole responsibility of the contractor as employer to provide notice of poisoning or occupation notifiable diseases, to report of accident and dangerous occurrences to the concerned authorities under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the rules made thereunder and to make payment of all statutory payments & compensation under the Employees' Compensation Act, 1923.
8. It shall be the responsibility of the sub-contractor as employer to make payment/deposit of applicable cess amount on the extent of work involving building or construction workers engaged by the sub-contractor within a period of one month from the receipt of payment. It shall also be responsibility of the Contractor to furnish BHEL on monthly basis, Receipts/ Challans towards Deposit of the Cess under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder along with following statistics:
   (i)Number of Building Workers employed during preceding one month.
   (ii) Number of Building workers registered as Beneficiary during preceding one month.
   (iii)Disbursement of Wages made to the Building Workers for preceding wage month.
   (iv) Remittance of Contribution of Beneficiaries made during the preceding month
9. BHEL shall reimburse the contractor the Cess amount deposited for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder. However, BHEL shall not reimburse the Fee paid towards the registration of establishment, fees paid towards registration of Beneficiaries and Contribution of Beneficiaries remitted.
10. It shall be responsibility of the Building Worker engaged by the Contractor and registered as a beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 to contribute to the Fund at such rate per mensem as may be specified by the State government by notification in the Official Gazette. Where such beneficiary authorizes the contractor being his employer to deduct his contribution from his monthly wages and to remit the same, the contractor shall remit such contribution to the Building and other construction Workers' Welfare Board in such manner as may be directed by the Board, within the fifteen days from such deduction.
11. Bidders may please note that though the quoted price is exclusive of BOCW (which will be reimbursed by BHEL as per sub-clause 9 above) , however, If at any point of time during the contract period, non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other

Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder is observed, BHEL reserves the right to deduct the applicable cess (1%) on the contract value and penalty (if any, imposed by Cess Authorities) from the payables on account of non-compliance.

The contractor shall declare to undertake any liability or claim arising out of employment of building workers and shall indemnify BHEL from all consequences / liabilities / penalties in case of non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.

Annexure E with drawings has been attached

10.1 THE WORK SHALL BE EXECUTED UNDER USUAL CONDITIONS AFFECTING MAJOR THERMAL POWER PROJECTS IN AN EXISTING POWER PLANT AND IN CONJUNCTION WITH NUMEROUS OTHER OPERATIONS AT SITE. THE CONTRACTOR AND HIS PERSONNEL SHALL COOPERATE WITH PERSONNEL OF CUSTOMER'S CONTRACTORS, COORDINATING HIS WORK WITH OTHERS AND PROCEED IN A MANNER THAT SHALL NOT DELAY OR HINDER THE PROGRESS OF WORK AS A WHOLE.

10.2 ALL THE WORK SHALL BE CARRIED OUT AS PER THE INSTRUCTIONS OF BHEL ENGINEER. BHEL ENGINEER'S DECISION REGARDING CORRECTNESS OF THE WORK AND METHOD OF WORKING SHALL BE FINAL AND BINDING ON THE CONTRACTOR.

10.3 THE CONTRACTOR SHALL PERFORM ALL REQUIRED SERVICES WHICH MAY NOT BE SPECIFIED HEREIN BUT NEVERTHELESS REQUIRED FOR THE COMPLETION OF WORK WITHIN QUOTED RATES.

10.4 ALL NECESSARY CERTIFICATES AND LICENSES REQUIRED TO CARRY OUT THIS WORK ARE TO BE ARRANGED BY THE CONTRACTOR EXPEDITIOUSLY.

10.5 ALL CRANES, TRANSPORT EQUIPMENTS, HANDLING EQUIPMENT, TOOLS, TACKLES, FIXTURES, EQUIPMENT, MANPOWER, SUPERVISORS/ENGINEERS, CONSUMABLES ETC REQUIRED FOR THIS SCOPE OF WORK SHALL BE PROVIDED BY THE CONTRACTOR.

10.6 ALL EXPENDITURE, INCIDENTALS IN THIS CONNECTION WILL HAVE TO BE BORNE BY THE CONTRACTOR UNLESS OTHERWISE SPECIFIED IN THE RELEVANT CLAUSES ELSEWHERE IN THESE SPECIFICATIONS. THE CONTRACTOR'S QUOTED RATES SHALL INCLUDE ALL SUCH CONTINGENCIES. IN THIS CONNECTION REFER RELEVANT CLAUSE OF GENERAL CONDITIONS OF CONTRACT.

10.7 THE CONTRACTOR SHALL PERFORM ALL REQUIRED SERVICES WHICH MAY NOT BE SPECIFIED HEREIN BUT NEVERTHELESS REQUIRED FOR THE COMPLETION OF WORK WITHIN QUOTED RATES.

10.8 THE DISTANCES INDICATED IN THESE SPECIFICATIONS ARE ONLY APPROXIMATE. HOWEVER, THE TENDERERS SHOULD ASSESS THE VARIOUS DISTANCES AND SITE CONDITIONS BY VISITING SITE BEFORE SUBMITTING THEIR OFFER. NO ADDITIONAL/EXTRA CLAIMS FOR ANY VARIATION IN THIS REGARD WILL BE ENTERTAINED.

TENTATIVE BILL OF QUANTITY FOR SAFETY CONTROL ROOM OF 2x800MW KODERMA PH-II PROJECT

Item No.	DESCRIPTION	UNIT	Tentative QTY	weightage
1	**Lighting Luminaires (complete with accessories)**			
1.1	TUBE LIGHT-40 W -FC06 (LED),Make: Philips/Havells/Equivalent makes	Nos	4	0.006039067
1.2	2 x 2 LIGHT FIXTURE -FC30 (LED), Make: Philips/Havells/Equivalent makes	Nos	17	0.023597764
1.3	STREET LIGHT FIXTURE -SS62 (LED),Make: Philips/Havells/Equivalent makes	Nos	5	0.008806158
2	**Switch Box**			
2.1	Type SWB5(6 nos. Switches, 1 nos. 6A socket, JB Type SWB5)	Nos	6	0.00893109
3	**Junction boxes**			
3.1	Type JB-F(Provided with four (4) way stud type terminals for terminating upto 2 nos. 10 mm2 stranded aluminium conductors on each terminal, suitable for outdoor installations.)	Nos	32	0.022696857
4	**Receptacles**			
4.1	Type RA (electrical room etc) (RA: 20A, 240V, 2 pole, 3 pin with third pin earthed, wall/ column mounted, metal clad gasketed construction, 20mm conduit entry, screwed metal cover tied to it by a metal chain, weatherproof suitable for indoor/outdoor installation. Degree of Protection shall be IP-52 (for indoor) / IP 65 (for outdoor).	Nos	9	0.020140091
4.2	Type RB (Control room)(RB: 6A / 16A, 240V, 2 pole, 3 pin with third pin earthed, Suitable for flush mounting in office areas and control room. The switch shall be also flush mounted piano type. Degree of Protection shall be IP-52 (for indoor) / IP 65 (for outdoor).	Nos	10	0.011283039

4.3	Type RC (welding receptacle)(63A, 415 V, 3 phase, 4 pin interlocked plug and switch with earthing contact, wall/column mounted, metal clad gasketed construction, weatherproof, suitable for entry and exit of upto 3.5C-95 Sq.mm XLPE cable and loop-in loop-out terminals for the same shall be provided such that not more than one core is terminated at one terminal. Removable, undrilled cable gland plate shall be provided. Suitable lugs and double compression cable glands shall also be supplied by the bidder.)	Nos	2	0.014920066
5	Pedastal Fan	Nos	2	0.001454931
6	20 mm dia PVC coated electrogalvanized flexible conduit with fixing hardware	MTR	50	0.00504554
7	20 mm dia GI conduit, 1.6 mm thick with fixing hardware	MTR	300	0.024768052
8	50mm dia PVC pipe (for floor corssing of IT cables)	MTR	12	0.00121093
9	EXIT SIGN	Nos	2	0.004787733
10	Occupancy Sensor with controller	Nos	1	0.000975999
11	Emergency Lighiting Unit with Ni-Cd battery and 2x10W Fluorescent Lamp	Nos	1	0.00480509
12	1.x1.5sqmm Cu PVC wire	METER	800	0.005189558
13	1x2.5sqmm Cu PVC Wire	METER	150	0.001936898
14	1x 4sqmm Cu PVC Wire	METER	150	0.002721631
15	**LDB PANEL with Transformar**			
15.1	50KVA AC LIGHTING DISTRIBUTION BOARD (2I/C & 1 B/C) (including 2 nos lighting transformer encapsulated type (50 KVA) - 8 Outgoing (63 A Each)	Nos	1	0.53686273
16	**PANEL & JB**			
16.1	NORMAL LIGHTING PANEL :LP – A (6) [with timer] Indoor type (For Lighting & Split AC)	Nos	3	0.04582624
16.2	NORMAL LIGHTING PANEL :LP – A (6) [without timer] Indoor type (For IT)	Nos	1	0.015275413

16.3	Sheet metal (16SWG) iron clad busbar chamber (W=500mm x D=150mm) on angle iron frame duly painted on wall with 4 Al bars (25mm x 5mm x 600mm) 500V, with adequate nos of holes drilled for connection of incomimg & outgoing ckts, bars are fixed on porcelain insulators. Including supply of required hardwares for connection, fitted with DANGER board, all complete as per instruction of BHEL Engineer. (SUITABLE FOR 100 Amps capacity)	Nos	1	0.00217662
16.4	4 POLE 125 Amp MCCB with box - make L&T	Nos	1	0.00756831
17	**Cables**			
17.01	2Cx10sqmm Al LT XLPE Power Cables	METER	100	0.004641907
17.03	3.5Cx50sqmm Al LT XLPE Power Cables	METER	50	0.064514798
17.04	3C x 2.5 sq mm Cu LT XLPE Power Cables	METER	50	0.002544694
17.05	Lan Cable	METER	50	0.00322882
18	**Local Motor Starter**			
18.01	Local Motor Starter	Nos	2	0.001316636
19	**Above Ground Earthing Material**			
19.01	GS Flat 50 X 6 mm	MT	0.6	0.02082473
19.02	GS Flat 25 X 3 mm	MT	0.4	0.015976818
19.03	GI Wire 14 SWG	METER	300	0.002198038
19.04	1.x0.5sqmm Cu PVC wire (For IT)	METER	100	0.000403643
20	**Lighting Protection Material**			
20.01	GS Flat 25 X 6 mm	MT	0.1	0.003510587
20.02	GS Rod 20 mm dia. 1000 mm long	Nos	2	0.00044805
20.03	Test Link 150X25X6 mm GS Flat with Box	Nos	2	0.001402108
21	**Cable Tray & Structural steel**			
21.01	Cable Tray 300 mm Ladder Type	METER	20	0.015577072
21.02	Cable Tray 300 mm Perforated Type	METER	10	0.01000722
21.03	Structural steel	MT	0.5	0.018957775
22	**Ventilation**			

22.1	Axial flow supply fans with pre and fine filter (wall mounted) complete with casing, TEFC sq cage induction motors & mounting frame, MS rain protection cowl, bird screen and all other accessories (suitable for 415V/3-phase supply). Following fan shall have 30 mmwc static pressure.Capacity 7,500 CMH with Motor rating 1.5 KW	No	1	0.034531284
22.2	Axial flow exhaust fans (Bifurcated type, spark proof construction, wall mounted) complete with casing, flame proof motor & mounting frame, MS rain protection cowl, bird screen and all other accessories epoxy painted (suitable for 415V/3-phase supply) as specified. Following fan shall have 15 mmwc static pressure.Capacity 2,000 CMH with Motor rating 0.55 KW	No	1	0.012661471
22.3	Exhaust fan (propeller type) complete with induction motor & mounting frame MS rain protection cowl, bird screen and all other accessories as specified (suitable for 240V/ 1 phase). The following fan shall have 5 mmwc static pressure.Capacity 1000 CMH with Motor rating 100 watts	No	2	0.004604171
22.4	Wall mounting Dampers (Gravity Operated)	No	2	0.005630373

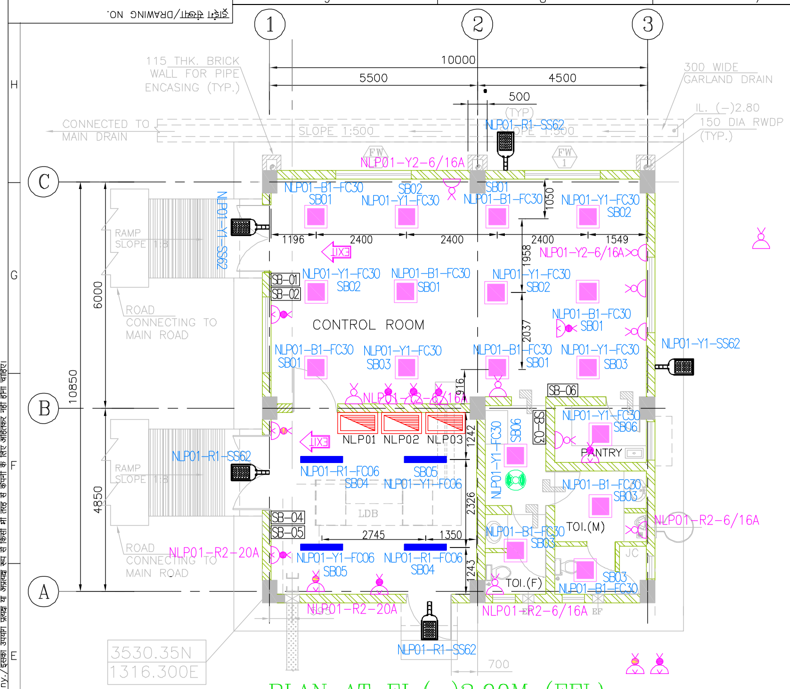
'In Part Payment of any item, if purchase price of material is lesser than the % given in BOQ in such case only purchase price shall be paid by BHEL and balance payment will be done after completion of activity.

Instructions to the bidders

1. **Bidders shall quote Total Lump-sum Price for the entire scope of work in Rupees in VOL II PRICE BID .** Any other entry elsewhere in the offer of the bidder shall be treated as Null and Void. The total value including value of St No. A shall be automatically calculated on E-portal
2. This Quoted Lump-sum Price shall be distributed based on the BHEL fixed percentage weightages w.r.t the total Total Lump-sum Price quoted by the bidder for the subject tender.
3. BHEL has pre-fixed the Weightage/Factor as detailed above in this chapter for deriving the Unit Rates. By multiplying BHEL pre-fixed the Weightages / Factor and the total Quoted prices above and dividing by quantities of individual items; unit rate of individual items shall be derived. Unit Rate thus arrived shall be rounded off to two decimal places.
4. Based on the quantities of individual item and the unit rates arrived in Sl No 3 above, the total amount for individual items shall be derived. Total amount thus derived shall be rounded off to zero decimal places.

5. **Grand Total amount for the work shall be derived by BHEL by summing up respective total amounts.**
6. **Bidders to note that this is an item rate contract. Payment shall be made for the actual quantities of work executed at the unit rate arrived at as per Sl No.3 above.**

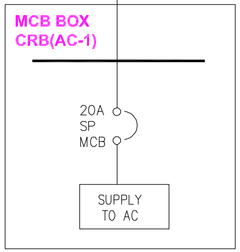
ELECTRONIC FILE NAME : 9587-001-301-PVC-C-1452_R2_SAFETY CONTROL ROOM-ARCHITECTURAL DETAILS (EFC).dwg



PLAN AT EL.(-)2.00M (FFL)

SAFETY CONTROL ROOM

I/C SUPPLY



SWITCH BOARD DETAILS

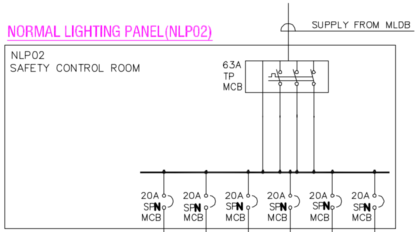
DESCRIPTION	QTY.
SWITCH BOARD TYPE-SWB5 (5NOs+5A SWITCH+1SOCKET) SWITCH BOARD NOS.:SB01, SB02, SB03, SB04, SB05, SB06	06Nos.

GENERAL NOTES:-

NOTE-:

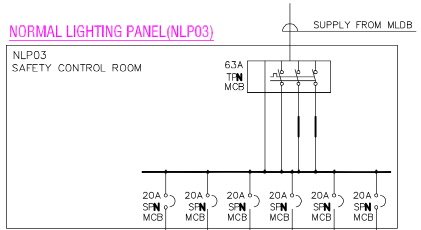
1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. MOUNTING HEIGHT OF VARIOUS EQUIPMENT FROM FINISHED FLOOR LEVEL ARE AS FOLLOW :-
   - (i) LIGHTING PANEL & SWITCH BOARDS : 1200 MM
   - (ii) RECEPTACLE IN INDUSTRIAL AREA : 900MM FOR INDOOR AREA
   - (iii) RECEPTACLE IN INDUSTRIAL AREA : 1200MM FOR OUTDOOR AREA
   - (iv) RECEPTACLE IN FALSE CEILING AREA : 500MM
   - (V) LED FIXTURE SHALLBE SUPPLY AS PER APPROVED PRODUCT

NORMAL LIGHTING PANEL(NLP02)



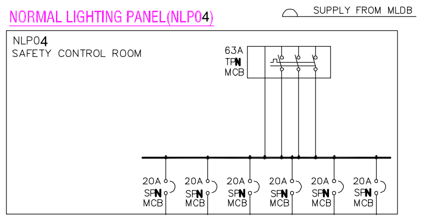
SYMBOL	DESCRIPTION	TOTAL QTY	UNIT WATT.	R1	Y1	B1	R2	Y2	B2
	SPLIT AC 2TON	02	--	--	01	01			
	EXHAUST FAN ø300MM(ONLY TOILET)	01	--				01		
	EXHAUST FAN **7500 CMH**	01	--	01					

NORMAL LIGHTING PANEL(NLP03)



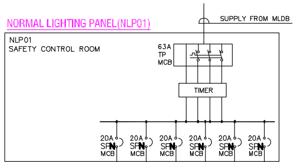
SYMBOL	DESCRIPTION	TOTAL QTY	UNIT WATT.	R1	Y1	B1	R2	Y2	B2
	SPLIT AC 2TON	02	--	01	01				
	EXHAUST FAN ø300MM(ONLY TOILET)	01	--						01
	EXHAUST FAN **2000 CMH**	01				01			

NORMAL LIGHTING PANEL(NLP04)



SYMBOL	DESCRIPTION	TOTAL QTY	UNIT WATT.	R1	Y1	B1	R2	Y2	B2
	CCTV SYSTEM	01	--	01	01		01		
	PA SYSTEM	01	--					01	
	5/15A DECORATIVE TYPE RECEPTACLE (TYPE-RA) SUITABLE FOR 240V AC NORMAL POWER SUPPLY	**03**				**02**			01

NORMAL LIGHTING PANEL(NLP01)



SYMBOL	DESCRIPTION	TOTAL QTY	UNIT WATT.	R1	Y1	B1	R2	Y2	B2
	40W LIGHT FIXTURE(TYPE-FC06)	04	40	02					SPARE
	40W FIXTURE 2X2 TYPE (TYPE-FC30)	17	40		08	09			
	STREET LIGHT LED FIXTURE (TYPE-SS62)	05	90	03	02				
	EXIT SIGH BOARD	02	10	02					
	5/15A DECORATIVE TYPE RECEPTACLE (TYPE-RA) SUITABLE FOR 240V AC NORMAL POWER SUPPLY	06	500 D.F 50%				03	04	
	20A, 240V, 1PH+1N, INDUSTRIAL RECEPTACLE SUITABLE FOR 240V POWER SUPPLY (TYPE-RB)	02	1000 D.F 50%				03		
	TOTAL LOAD IN WATT			370	580	360	1500	1000	

BILL OF MATERIALS

SR.NO.	SYMBOL	DESCRIPTION	QTY
1		40W LIGHT FIXTURE(TYPE-FC06)	04NOs.
2		LED FIXIURE 2X2 IYPE (IYPE-FC30)	17NOs.
3		STREET LIGHT LED FIXTURE (TYPE-SS62)	05NOs.
4	SWB	SWITCH BOARD TYPE-SWB5 (5NOs 5A SWITCH+1SOCKET)	06NOs.
5	○	JUNCTION BOX (TYPE-F)	32 Nos
6		6/16A DECORATIVE TYPE RECEPTACLE (TYPE-RB)	10 Nos
7		20A, 240V, 1PH+1N, INDUSTRIAL RECEPTACLE SUITABLE FOR 240V POWER SUPPLY (TYPE-RA)	8 Nos
8		63A, 3 PHASE, 415V INDUSTRIAL RECEPTACLE WITH SWITCH SUITABLE FOR 240V POWER SUPPLY (TYPE-RC)	02NOs.
9		**ø20 mm PVC coated electro galvanized flexible counduit**	26mtr.
10		ø20mm GI CONDUIT 1.6mm THICK	200mtr.
11		STRUCTURAL STEEL	0.5MT
12		EXIT SIGH BOARD (TYPE-EX)	02NOs.
13.		OCCUPANCY SENSORS	01NOs.
14.		EMERGENCY LIGHT UNIT	01NOs.
15.		1X1.5sq.mm Cu PVC	800mtr
16.		1X2.5sq.mm Cu PVC	150mtr
17.		1X4.0sq.mm Cu PVC	150mtr
18.		NORMAL LIGHTING PANEL INDOOR TYPE WITH TIMER (6WAY)	03NOs.
19.		MCB BOX FOR AC	4Nos.
20.		SPLIT AC 2TON	4Nos.
21.		LAN CABLE	50mtr
22.		3CX2.5sq.mm Cu LT XLPE POWER CABLE	50mtr
23.		2CX10sq.mm Al LT XLPE POWER CABLE	100mtr
24.		3.5CX50sq.mm Al LT XLPE POWER CABLE	50mtr
25.		EXHAUST FAN 7500CMH	01NOs.
26.		EXHAUST FAN 2000CMH	01NOs.
27.		EXHAUST FAN 1000CMH	02NOs.
28		NORMAL LIGHTING PANEL INDOOR TYPE (6WAY)	1 No.
29		**50 KVA AC LIGHTING DISTRIBUTION BOARD with 2 nos Transformer (2 I/C AND 1 B/C)**	1 No.

NOTE:- SCAN QR CODE FOR CHECKING THE LATEST REV. STATUS OF DRAWING.

कार्य संख्या- JOB NO. 497
स्थिति STATUS CONTRACT
मुद्रण स्केल मीटर में PRINT SCALE IN METRE

REVISED AS PER COMMENTS

ग्राहक ड्राइंग संख्या CUSTOMER DRAWING NO. 9587-001-215-PEM-PVE-G-152

ग्राहक/CUSTOMER

दामोदर घाटी निगम
DAMODAR VALLEY CORPORATION

परियोजना PROJECT
2X800 मेगावाट डीवीसी कोडरमा ता. वि. के. चरण-II
2X800 MW DVC KODERMA TPS PHASE-II

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
BHARAT HEAVY ELECTRICALS LTD
पावर सेक्टर/ PSER

DEPT CODE E

	नाम NAME	हस्ताक्षर SIGNATURE	दिनांक DATE
तैयारकर्ता/DRN	SG		24.07.25
डिज़ाइनकर्ता/DESN	DDM		24.07.25
/CHD	RJD		24.07.25
/APPD	RJD		24.07.25

शीर्षक/TITLE
LIGHTING LAYOUT OF SAFETY CONTROL ROOM

एमपीएल MPL | सिविल CIVIL | ELEC | C&I | एमएसई MSE | मैक्स MAX | विभाग DEPT. | स्केल SCALE-

ड्राइंग संख्या / DRAWING NO. PSER/DG/119/01

शीट SHEET 1 OF 1 | पुनरीक्षण REV. 01

फॉर्मेट साइज A1
FORMAT SIZE A1

Bidders to submit the following dully filled formats with Stamped & Signed by the authorised signatory.

INDEX

ANNEXURE – 1

FORMAT FOR NO DEVIATION CERTIFICATE
(To be submitted in the bidder's letter head)

BHARAT HEAVY ELECTRICALS LIMITED,
2 X 800 MW Koderma Power Project,
Banjhedih, P.O. Jhumri Telaiya,
Dist. Koderma-825409 (Jharkand)

Sub	No Deviation Certificate.	
Job	Work of Electrical Package for Safety Control Room at DVC Koderma Thermal Power Station Phase-II (2x800 MW)Project, Jharkhand.	
Ref	1.0	Tender no.: Ref: PSER:PMX:KOD: Safety Control Room:2025/03
	2.0	All other pertinent issues till date.

Dear Sir/Madam,

With reference to above, this is to confirm that as per tender conditions, we have visited site before submission of our offer and noted the job content & site conditions etc. We also confirm that we have not changed/ modified the tender documents as appeared in the website/ issued by you and in case of such observance at any stage, it shall be treated as null and void.

We hereby confirm that we have not taken any deviation from tender clauses together with other references as enumerated in the above referred bid. We hereby confirm our unqualified acceptance to all terms & conditions, unqualified compliance to technical specification, integrity pact (if applicable) and acceptance to reverse auctioning process.

In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null & void.

We confirm to have submitted/uploaded offer/documents in accordance with tender instructions with acceptance of the terms & conditions of the tender by us and as per aforesaid references.

Thanking you,

Yours faithfully,

(Signature, date & seal of authorized
representative of the bidder)

ANNEXURE-2

UNDERTAKING

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir/Madam,

Sub: DECLARATION REGARDING INSOLVENCY/ LIQUIDATION/ BANKRUPTCY PROCEEDINGS

Ref: Tender no.: Ref: PSER:PMX:KOD: Safety Control Room:2025/03

I/We, _____ declare that, I/We am/are not under insolvency resolution process or liquidation or Bankruptcy Code Proceedings (IBC) as on date, by NCLT or any adjudicating authority/authorities, which will render us ineligible for participation in this tender.

Sign. of the AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

Place:
Date:

Annexure- 3

DETAILS OF BIDDER

Please arrange to submit this filled-up format along with Tender	
Name of the Company	
Address of Company*	
Company Registration Number*	
Name of Partners / Directors	
ALL THE STATES WHERE BIDDER HAS A PLACE OF BUSINESS*	
ALL ADDRESS OF VENDOR MENTIONING THEIR PIN AS PER THE LATEST GST REGISTRATION*	
GSTN OF ALL THE ABOVE NOTED PLACES OF VENDOR*	
Bidder Type: Indian/ Foreign*	
City*	
State*	
Country*	
Postal Code*	
PAN/TAN Number*	
Company's Establishment Year	
Company's Nature of Business*	
Company's Legal Status* {limited /undertaking/joint venture/partnership/other}	
Company Category* {micro unit as per MSME/small unit as per MSME/medium unit as per MSME/ UAN as per Udyog Aadhaar Memorandum/ Udyam Registration Certificate / Ancillary unit/project affected person of this company/SSI/ other} Relevant documents to be submitted as applicable.	
Enter Company's Contact Person Details	
Title (Mr. / Mrs. / Ms. / Dr. / Shri) *	
Contact Name*	
Date of Birth*	
Correspondence Email*	
(Correspondence Email ID can be same	
as your Login ID. All the mail correspondence	
will be sent only to the Correspondence Email ID.)	
Designation	
Phone*	
Fax*	
Mobile*	

ANNEXURE-4

FORMAT FOR LOCAL CONTENT

DECLARATION REGARDING MINIMUM LOCAL CONTENT IN LINE WITH REVISED PUBLIC PROCUREMENT (PREFERENCE TO MAKE IN INDIA), ORDER 2017 DATED 04TH JUNE, 2020 AND SUBSEQUENT ORDER(S)

(To be typed and submitted in the Letter Head of the statutory auditor or cost auditor of the company (in the case of companies) or a practising cost accountant or practicing chartered accountant (in respect of suppliers other than companies))

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir,

Sub: Declaration reg. minimum local content in line with Public Procurement (Preference to Make in India), Order 2017-Revision, dated 04th June, 2020 and subsequent order(s).

Ref : 1) Tender no.: Ref: PSER:PMX:KOD: Safety Control Room:2025/03
2) All other pertinent issues till date

We hereby certify that the items/works/services offered by…… *(specify the name of the organization here)* has a local content of _____ % and this meets the local content requirement for **'Class-I local supplier' / 'Class II local supplier' **** as defined in Public Procurement (Preference to Make in India), Order 2017-Revision dated 04.06.2020 issued by DPIIT and subsequent order(s).

The details of the location(s) at which the local value addition is made are as follows:

1. _____ 2. _____
3. _____ 4. _____

Thanking you,
Yours faithfully,

(Signature, Date & Seal of Authorized Signatory of Statutory Auditor/Cost Auditor/ practicing Cost Accountant/practicing Chartered Accountant)

****** - *Strike out whichever is not applicable.*

Note:

1. Bidders to note that above format Duly filled & signed by authorized signatory, shall be submitted along with the techno-commercial offer.
2. In case the bidder's quoted value is in excess of Rs. 10 crores, the authorized signatory for this declaration shall necessarily be the statutory auditor or cost auditor of the company (in the case of companies) or a practising cost accountant or practicing chartered accountant (in respect of suppliers other than companies).
3. In the event of false declaration, actions as per the above order and as per BHEL Guidelines shall be initiated against the bidder.

ANNEXURE – 5

PROFORMA OF BANK GUARANTEE (in lieu of SECURITY DEPOSIT)

In consideration of the Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at BHEL House, Siri Fort, Asiad, New Delhi – 110049 through its Unit at Bharat Heavy Electricals Limited, Power Sector Eastern Region, BHEL Bhawan, Plot No 9/1, DJ Block, Sector-II, Salt lake City, Kolkata – 700091 having agreed to exempt (Name of the Vendor / Contractor / Supplier) having its registered office at_____ [1] (hereinafter called the said Contractor which term includes supplier), from demand under the terms and conditions of the Contract reference No._____ [2] dated _____[2] valued at Rs……[2] (Rupees ----------)[2] for <Nature of the Work>[3] (hereinafter called the said Contract) of Security Deposit for the due fulfilment by the said contractor of the terms and conditions contained in the said Contract, on production of a Bank Guarantee for Rs._____ [4] (Rupees _____ only), we ____(indicate the name and address of the Bank) having its Head Office at _____(address of the head Office) (hereinafter referred to as the Bank) at the request of _____ [Name of Contractor(s)] do hereby undertake to pay to the Employer an amount not exceeding Rs._____ in the event of any breach by the said Contractor(s) of any of the terms and conditions contained in the said Contract.

We, _____(indicate the name of the Bank), do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the Employer. Any such demand made on the bank, shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs._____.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) in any suit or proceeding pending before any Court or Tribunal relating thereto our liability under this present being absolute and unequivocal.

The payment so made by us under this guarantee shall be a valid discharge of our liability for payment hereunder and the Contractor(s) shall have no claim against us for making such payment.

We, further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claim satisfied or discharged or till _____ [5] or till the office/Department/Division of Bharat Heavy Electricals Limited certifies that the terms and conditions of the said Contract have been fully and properly carried out by the said contractor(s) and also including the satisfactory performance of the equipment during guarantee period and accordingly discharges this guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before the _____[6], (3 months more than the present date of validity of Bank Guarantee) we shall be discharged from all the liability under this guarantee thereafter.

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

This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

We,…… BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

a) The liability of the Bank under this Guarantee shall not exceed…… [7]

b) This Guarantee shall be valid up to ……[8]

c) Unless the Bank is served a written claim or demand on or before _____[9] (3 months more than the present date of validity of Bank Guarantee) all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We, ____(indicate the name of the Bank)____ lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Any claim or dispute arising under the terms of this document shall only be enforced or settled in the courts of at Kolkata only.

Date _____ Day of _____
for____(indicate the name of the Bank)__

(Signature of Authorised signatory)

[1] *NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER .*

[2] *DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE*

[3] *PROJECT/SUPPLY DETAILS*

[4] *BG AMOUNT IN FIGURES AND WORDS*

[5] *VALIDITY DATE*

[6] *DATE OF EXPIRY OF CLAIM PERIOD*

[7] *BG AMOUNT IN FIGURES AND WORDS.*

[8] *VALIDITY DATE*

[9] *DATE OF EXPIRY OF CLAIM PERIOD*

Note:

1. **Units are advised that expiry of claim period may be kept 2/3 months after validity date.**

2. **In Case of Bank Guarantees submitted by Foreign Vendors-**

   a. **From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India)** can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.

   b. **From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor country's Bank)**

   b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by **any of the Consortium Banks only** will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter-Guarantee by Foreign Bank in favour of the Indian Bank (BHEL's Consortium Bank). It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.

   b.2 **In case, Foreign Vendors intend to provide BG from** Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at **sl.no. b.1** will required to be followed.

   b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time). In case, of Foreign Vendors, the BG Format provided to them should clearly specify the same.

   b.4 The BG should clearly specify that the demand or other document can be presented in electronic form.

ANNEXURE-6

BANK GUARANTEE FOR PERFORMANCE SECURITY

Bank Guarantee No:

Date:

To

NAME

& ADDRESSES OF THE BENEFICIARY

Dear Sirs,

In consideration of the Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at BHEL House, Siri Fort, Asiad, New Delhi – 110049 through its Unit at Bharat Heavy Electricals Limited, Power Sector Eastern Region, BHEL Bhawan, Plot No 9/1, DJ Block, Sector-II, Salt lake City, Kolkata – 700091 having awarded to (Name of the Vendor / Contractor / Supplier) having its registered office at_____[1] hereinafter referred to as the 'Contractor/Supplier', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No……dated ……[2] valued at Rs……[2] (Rupees ----------)for <Nature of Work>[3] (hereinafter called the 'Contract') and the Contractor having agreed to provide a Contract Performance Guarantee, equivalent to ……% (…. Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract,

we, ……, (hereinafter referred to as the Bank), having registered/Head office at ……. and inter alia a branch at …… being the Guarantor under this Guarantee, hereby, irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer a maximum amount Rs ---------- (Rupees ----------)[4] without any demur, immediately on a demand from the Employer, .

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

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

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

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

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

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

This Guarantee shall remain in force upto and including…….. [5] and shall be extended from time to time for such period as may be desired by Employer.

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

Unless a demand or claim under this guarantee is made on us in writing on or before the ……[6] (3 months more than the present date of validity of Bank Guarantee) we shall be discharged from all liabilities under this guarantee thereafter.

We, …… BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

d) The liability of the Bank under this Guarantee shall not exceed…… [7]

e) This Guarantee shall be valid up to ……[8]

f) Unless the Bank is served a written claim or demand on or before _____[9] (3 months more than the present date of validity of Bank Guarantee) all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

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

Any claim or dispute arising under the terms of this document shall only be enforced or settled in the courts of at Kolkata only.

For and on behalf of

(Name of the Bank)

Dated…….

Place of Issue…….

[1] NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.

[2] DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE

[3] PROJECT/SUPPLY DETAILS

[4] BG AMOUNT IN FIGURES AND WORDS

[5] VALIDITY DATE

[6] DATE OF EXPIRY OF CLAIM PERIOD

[7] BG AMOUNT IN FIGURES AND WORDS.

[8] VALIDITY DATE

[9] *DATE OF EXPIRY OF CLAIM PERIOD*

Note:

3. **Units are advised that expiry of claim period may be kept 2/3 months after validity date.**

4. **In Case of Bank Guarantees submitted by Foreign Vendors-**

c. **From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India)** can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.

d. **From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor country's Bank)**

b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by **any of the Consortium Banks only** will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter-Guarantee by Foreign Bank in favour of the Indian Bank (BHEL's Consortium Bank). It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.

b.2 **In case, Foreign Vendors intend to provide BG from** Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at **sl.no. b.1** will required to be followed.

b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time). In case, of Foreign Vendors, the BG Format provided to them should clearly specify the same.

b.4 The BG should clearly specify that the demand or other document can be presented in electronic form.

ANNEXURE-7

PROFORMA OF BANK GUARANTEE (in lieu of RETENTION AMOUNT)

B.G. NO. Date

In consideration of Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at _____[1] through its Unit at……..(name of the Unit) having agreed to exempt (Name of the Vendor / Contractor / Supplier) with its registered office at_____ [2] (hereinafter called the said "Contractor" which term includes supplier), from demand under the terms and conditions of the Contract reference No._____ dated _____ [3] valued at Rs……[4] (Rupees ----------)[4] (hereinafter called the said Contract), of Retention Amount for the due fulfilment by the said Contractor of the terms and conditions contained in the said Contract, on production of a Bank Guarantee for Rs._____ 5 (Rupees _____ _____ only),

We ____(indicate the name and address of the Bank) having its Head Office at _____(address of the head Office) (hereinafter referred to as the Bank), at the request of _____ [Contractor(s)], being the Guarantor under this Guarantee, do hereby irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer, an amount not exceeding Rs._____ without any demur, immediately on demand from the Employer and without any reservation, protest, and recourse and without the Employer needing to prove or demonstrate reasons for its such demand.

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

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

The payment so made by us under this guarantee shall be a valid discharge of our liability for payment hereunder and the Contractor(s) shall have no claim against us for making such payment.

We, further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied & the Employer certifies that the terms and conditions of the said Contract have been fully and properly carried out by the said contractor(s) or acceptance of the final bill or discharge of this guarantee by the Employer, whichever is earlier. This guarantee shall initially remain in force upto and including _____[6] and shall be extended from time to time for such period as may be desired by the Employer. Unless a demand or claim under this guarantee is made on us in writing on or before the _____7, we shall be discharged from all the liability under this guarantee thereafter.

We, ____(indicate the name of the Bank)____ further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations

hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by any reason of any such variation or extension being granted to the said contractor(s) or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

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

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Contractor but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).
We……. BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:
a) The liability of the Bank under this Guarantee shall not exceed…… [5]
b) This Guarantee shall be valid up to ……[6]
c) Unless the Bank is served a written claim or demand on or before _____[7] all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

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

Date _____ Day of _____

for____(indicate the name of the Bank)__

(Signature of Authorized signatory)

[1] ADDRESS OF THE EMPLOYER. i.e. Bharat Heavy Electricals Limited
[2] ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.
[3] DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE
[4] CONTRACT VALUE
[5] BG AMOUNT IN FIGURES AND WORDS
[6] VALIDITY DATE
[7] DATE OF EXPIRY OF CLAIM PERIOD

Note:

1. Units are advised that expiry of claim period may be kept 3-6 months after validity date. It may be ensured that the same is in line with the agreement/ contract entered with the Vendor.

2. The BG should be on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Vendor/Contractor/Supplier /Bank issuing the guarantee.

3. In line with the GCC, SCC or contractual terms, Unit may carry out minor modifications in the Standard BG Formats. If required, such modifications may be carried out after taking up appropriately with the Unit/Region's Law Deptt.

4. In Case of Bank Guarantees submitted by Foreign Vendors-

a. From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.

b. From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor Country's Bank)

b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by **any of the Consortium Banks only** will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank's (BHEL's Consortium Bank) branch in India. It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.

b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at **sl.no. b.1** will required to be followed.

b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time). The BG Format provided to them should clearly specify the same.

ANNEXURE-8

BANK ACCOUNT DETAILS FOR E-PAYMENT

(To be given on Letter head of the Company /Firm of Bidder, and **ENDORSED (SIGNED & STAMPED) BY THE BANK** to enable BHEL release payments through Electronic Fund Transfer (EFT/RTGS)

---

1. Beneficiary Name :
2. Beneficiary Account No. :
3. Bank Name & Branch :
4. City/Place :
5. 9 digit M ICR Code of Bank Branch :
6. IFSC Code of Bank Branch :
7. Beneficiary E-mail ID :
   (for payment confirmation)

NOTE: In case Bank endorsed certificate regarding above has already been submitted earlier, Kindly submit photocopy of the same

ANNEXURE-9

REFUND OF SECURITY DEPOSIT

To,

The Construction Manager
BHEL Site Office

Dear Sir,

Sub : **Refund of Security Deposit**
Ref : Contract No: ……,
Work:……..

I/We have submitted Final Bill in respect of the above Contract/Work vide our letter no:…… dated …….. . In line with Tender conditions (GCC clause no 1.11), kindly arrange to release/refund the Security Deposit along with Final Bill payments.

The details of Security Deposit are as below:

1. Cash Portion :
2. BG Portion :

Thanking You

Date: _____ Authorised representative of Contractor

==========

To be filled up by BHEL

1. Security Deposit to be refunded:
    a. Cash Portion:
    b. BG Portion :
2. Less
    a. Amount spent by BHEL on behalf of Contractor:
    b. Payments made by BHEL on behalf of Contractor:
    c. Other recoveries for Services etc
    d. Any other recoveries
    e. Total of 'a' to 'd':
3. Net Amount to be released (1-2) :
4. Certified that
    a. The payment recommended for release is in order and there are no demands other than those included in the claim outstanding from the Contractor
    b. Contract Guarantee period of ……. Months commenced wef :_____
    c. All objections raised so far have been settled
    d. A note for refund of Security Deposit has been made in the Measurement Book

Signature of BHEL Engineer Construction Manager

VOLUME-III PRICE SCHEDULE, REV-00	
Job:Work of Electrical Package for Safety Control Room at DVC Koderma Thermal Power Station Phase-II (2x800 MW)Project, Jharkhand.	
TENDER NO:Ref: PSER:PMX:KOD: Safety Control Room:2025/03	
PREAMBLE	
BIDDER'S NAME	**0**
SL NO	**DESCRIPTION**
1.0	This preamble forms part of tender document and schedule of items. The tenderer should read this preamble carefully before filling in rates for various items. Clauses under this preamble shall be read in conjunction with various volumes of tender and other tender sections as applicable and shall have precedence over any contrary statement mentioned any where in this document. The tenderer shall sign & stamp all the pages of the tender document as a token of their acceptance.Submission of unfilled formats with sign & stamp shall be construed as acceptance of the contents of the same.
2.0	The work shall be carried out strictly as per specifications, description of the items in these schedule and / or engineer's instructions. Drawings enclosd with the tender are only preliminary and for guidence/tender purposes giving some idea of the work involved. The work is to be executed as per terms & conditions of the tender and actual drawings/documents, which shall be furnished during execution.
3.0	Items of work provided in this schedule but not covered in this specification shall be executed strictly as per instruction of the engineer.
4.0	Unless specifically mentioned otherwise in the tender document, the tenderer shall quote for the finished items and shall provide for the complete cost towards power, fuel, tools, tackles, equipment, constructional plants, temporary works, labour, dismantling of all temporary piping, structures, valves, pumps, tanks & other misc. equipment, strengthening of roads/culverts/bridges etc. including arranging all clearances etc. required for carrying out different activities & tests, materials, levies, transport, layout, repairs, rectification, maintenance till handing over, supervisions, colonies, shops, establishments, overheads, profits and all incidental items not specifically mentioned but reasonably implied and necessary to complete the work according to the complete tender document and this schedule.
5.0	The quantities of the various items mentioned in this schedule of items are approximate, based on very preliminary information and may vary to any extent or be deleted altogether.
6.0	Prior written approval of BHEL shall be sought by the contractor in case quantity variation of any item crosses +50% (plus fifty percent) limit during execution and approval to be obtained before execution of further quantity for this item.
7.0	The rates quoted shall be inclusive of cleaning of site of any vegetation, dressing, clearing of old structures and leveling etc. including fixing of grid pillars, benchmarks etc. required for commencement of site activities. No separate payment will be made towards the same.However, if separate rate for such item is avalable in the rate schedule, the same shall be considered.
8.0	All works item wise shall be measured upon completion and paid for at the rates quoted and accepted as per BHEL approved payment schedule/billing break-up.
9.0	The Bidder shall be deemed to have visited site and made himself aware of all the site conditions, studied the specifications and details of work to the done within the time schedule attached and to have acquainted himself of the conditions prevailing at site before submission of his bid/offer. No claim whatsoever due to lack of knowledge of site conditions shall be entertained after award of the work.
10.0	No splitting of the job is envisaged
11.0	Bidders are not allowed to alter the Price Schedule format including item description,quantity etc. and the offer is liable for rejection if the bidders submit their prices in Price Schedules modified by them.BHEL reserves the right to reject the offers of bidders who submit offers in Price Formats which are modiified/altered by them. Also putting any comments instead of rates/price in the designated column of the rate schedule shall make the offer liable for rejection.
12.0	Bidders to note that for Civil &/Structural packages, against a particular item against a ST No. appearing in more than one schedule of the BOQ, same rate must be quoted in all schedules for that particular items with same descriptions. If by error, different rates are quoted in different schedules for same ST No.(i.e. item with same description), then the higher of the rates shall be considered for evaluation but awarding shall be done with the lower rate, if the bidder becomes L-1. The same modality shall be applicable for other item rate service contracts where item with same decription is repeated in different schedules.
13.0	Engineer's decision shall be final and binding on the contractor regarding clarification of items in the schedule with respect to the other sections/volumes of the contract.
14.0	No interest, whatsoever, shall be payable by BHEL on the security deposit, any bank guarantee submitted or any amount due to successful bidder/contractor. N idling charge whatsoever (either for labour or any other resources) is payable by BHEL for any reason whatsoever.
15.0	Size and weights of various items are mentioned in the attached BOQ cum rate/price schedule for reference purpose only & these shall not be taken into consideration for quoting/calculating amount in the rate schedule. These shall be utilised as per relevant sections of tender. Bidders shall quote for each item in the rate column, taking unit as mentioned in the quantity column. Rates shall be filled in both figures and words. Amount shall be calculated based upon these rates multiplied by the mentioned quantity for the respective items.
16.0	Bidder's Total price shall be considered for evaluation unless stated otherwise.

VOLUME-III
PRICE SCHEDULE, REV-00

Job:Work of Electrical Package for Safety Control Room at DVC Koderma Thermal Power Station Phase-II (2x800 MW)Project, Jharkhand.

TENDER NO: Ref: PSER:PMX:KOD: Safety Control Room:2025/03

BIDDER'S NAME	**0**

SCH-1-TOTAL PRICE

SL NO	**DESCRIPTION**	**PRICE SCHEDULE REF**	**TOTAL QUOTED PRICE (IN INR) (IN FIGURE AND WORDS)**
1.0	TOTAL PRICE FOR Work of Electrical Package for Safety Control Room at DVC Koderma Thermal Power Station Phase-II (2x800 MW)Project, Jharkhand.	SCH 2 - BREAK UP OF TOTAL PRICE	**0.00**

NOTE

1.0	Bidder shall quote total price for total price of SCH-1- Part only at sl no 1 above. All other amounts/ rates of each item of works in respective schedules/ parts will be derived based on allocated percentages. As such, any uncalled figure/ amount noted at any other place/ schedule of Volume-III will not be recknoed & will stand null void.
2.0	Bidder to note that total price at sl no 1.0 above shall be considered for evaluation & awarding. As such grand total price should be complete in all respect for the full scope defined and considering all terms and conditions.
3.0	Bidder's quoted total price of SCH-2 at Sl. no 1 above respectively shall be apportioned into amount of various items of works based on allocated weightage against respective item, in respective schedules/ parts. As such, bidder shall not indicate/ quote any amount/ rate in these schedules/ parts and any amount/ rate quoted against any item shall not be taken into cognizance/ account and offer may be liable for rejection
4	Based on the itemwise weightage allocations, the amount for the individual items of the Bill of Quantity shall be arrived at. The rates of individual items shall be derived from the amount against each items after roundeding off .
5	Bidders to note that this is an item rate contract. Payment shall be made for the actual quantities of work executed at the unit rate arrived at as per Sl No.6.0 above.
6	Unit rates of each item of works of respective schedules/ parts will be derived by dividing derived amount by corresponding quantities. In deriving the unit rates of each item in this manner, figures only upto 9 decimal places will be taken into account. Any adjustment, if required, due to such methodology, will be effected in final bill.
7	The quoted price shall be inclusive of freight on FOR site basis.

VOLUME-III PRICE SCHEDULE, REV-00				
Job:Work of Electrical Package for Safety Control Room at DVC Koderma Thermal Power Station Phase-II (2x800 MW)Project, Jharkhand.				
TENDER NO: Ref: PSER:PMX:KOD: Safety Control Room:2025/03				
BIDDER'S NAME	**0**			
SCH-2				
Item No.	**DESCRIPTION**	**UNIT**	**QTY**	**Weightage**
1	**Lighting Luminaires (complete with accessories)**			
1.1	TUBE LIGHT-40 W -FC06 (LED)Make: Philips/Havells/Equivalent makes	Nos	4	0.006039067
1.2	2 x 2 LIGHT FIXTURE -FC30 (LED), Make: Philips/Havells/Equivalent makes	Nos	17	0.023597764
1.3	STREET LIGHT FIXTURE -SS62 (LED)Make: Philips/Havells/Equivalent makes	Nos	5	0.008806158
2	**Switch Box**			
2.1	Type SWB5(6 nos. Switches, 1 nos. 6A socket, JB Type SWB5)	Nos	6	0.00893109
3	**Junction boxes**			
3.1	Type JB-F(Provided with four (4) way stud type terminals for terminating upto 2 nos. 10 mm2 stranded aluminium conductors on each terminal, suitable for outdoor installations.)	Nos	32	0.022696857
4	**Receptacles**			
4.1	Type RA (electrical room etc) (RA: 20A, 240V, 2 pole, 3 pin with third pin earthed, wall/ column mounted, metal clad gasketed construction, 20mm conduit entry, screwed metal cover tied to it by a metal chain, weatherproof suitable for indoor/outdoor installation. Degree of Protection shall be IP-52 (for indoor) / IP 65 (for outdoor).	Nos	9	0.020140091
4.2	Type RB (Control room)(RB: 6A / 16A, 240V, 2 pole, 3 pin with third pin earthed, Suitable for flush mounting in office areas and control room. The switch shall be also flush mounted piano type. Degree of Protection shall be IP-52 (for indoor) / IP 65 (for outdoor).	Nos	10	0.011283039
4.3	Type RC (welding receptacle)(63A, 415 V, 3 phase, 4 pin interlocked plug and switch with earthing contact, wall/column mounted, metal clad gasketed construction, weatherproof, suitable for entry and exit of upto 3.5C-95 Sq.mm XLPE cable and loop-in loop-out terminals for the same shall be provided such that not more than one core is terminated at one terminal. Removable, undrilled cable gland plate shall be provided. Suitable lugs and double compression cable glands shall also be supplied by the bidder.)	Nos	2	0.014920066
5	Pedastal Fan	Nos	2	0.001454931
6	20 mm dia PVC coated electrogalvanized flexible conduit with fixing hardware	MTR	50	0.00504554
7	20 mm dia GI conduit, 1.6 mm thick with fixing hardware	MTR	300	0.024768052
8	50mm dia PVC pipe (for floor corssing of IT cables)	MTR	12	0.00121093
9	EXIT SIGN	Nos	2	0.004787733
10	Occupancy Sensor with controller	Nos	1	0.000975999
11	Emergency Lighiting Unit with Ni-Cd battery and 2x10W Fluorescent Lamp	Nos	1	0.00480509
12	1.x1.5sqmm Cu PVC wire	METER	800	0.005189558
13	1x2.5sqmm Cu PVC Wire	METER	150	0.001936898
14	1x 4sqmm Cu PVC Wire	METER	150	0.002721631
15	**LDB PANEL with Transformar**			

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TENDER NO: Ref: PSER:PMX:KOD: Safety Control Room:2025/03				
BIDDER'S NAME	**0**			
SCH-2				
Item No.	**DESCRIPTION**	**UNIT**	**QTY**	**Weightage**
15.1	50KVA AC LIGHTING DISTRIBUTION BOARD (2I/C & 1 B/C) (including 2 nos lighting transformer encapsulated type (50 KVA) - 8 Outgoing (63 A Each)	Nos	1	0.53686273
16	**PANEL & JB**			
16.1	NORMAL LIGHTING PANEL :LP – A (6) [with timer] Indoor type (For Lighting & Split AC)	Nos	3	0.04582624
16.2	NORMAL LIGHTING PANEL :LP – A (6) [without timer] Indoor type (For IT)	Nos	1	0.015275413
16.3	Sheet metal (16SWG) iron clad busbar chamber (W=500mm x D=150mm) on angle iron frame duly painted on wall with 4 Al bars (25mm x 5mm x 600mm) 500V, with adequate nos of holes drilled for connection of incomimg & outgoing ckts, bars are fixed on porcelain insulators. Including supply of required hardwares for connection, fitted with DANGER board, all complete as per instruction of BHEL Engineer. (SUITABLE FOR 100 Amps capacity)	Nos	1	0.00217662
16.4	4 POLE 125 Amp MCCB with box - make L&T	Nos	1	0.00756831
17	**Cables**			
17.01	2Cx10sqmm Al LT XLPE Power Cables	METER	100	0.004641907
17.03	3.5Cx50sqmm Al LT XLPE Power Cables	METER	50	0.064514798
17.04	3C x 2.5 sq mm Cu LT XLPE Power Cables	METER	50	0.002544694
17.05	Lan Cable	METER	50	0.00322882
18	**Local Motor Starter**			
18.01	Local Motor Starter	Nos	2	0.001316636
19	**Above Ground Earthing Material**			
19.01	GS Flat 50 X 6 mm	MT	0.6	0.02082473
19.02	GS Flat 25 X 3 mm	MT	0.4	0.015976818
19.03	GI Wire 14 SWG	METER	300	0.002198038
19.04	1.x0.5sqmm Cu PVC wire(For IT)	METER	100	0.000403643
20	**Lighting Protection Material**			
20.01	GS Flat 25 X 6 mm	MT	0.1	0.003510587
20.02	GS Rod 20 mm dia. 1000 mm long	Nos	2	0.00044805
20.03	Test Link 150X25X6 mm GS Flat with Box	Nos	2	0.001402108
21	**Cable Tray & Structural steel**			
21.01	Cable Tray 300 mm Ladder Type	METER	20	0.015577072
21.02	Cable Tray 300 mm Perforated Type	METER	10	0.01000722
21.03	Structural steel	MT	0.5	0.018957775
22	**Ventilation**			
22.1	Axial flow supply fans with pre and fine filter (wall mounted) complete with casing, TEFC sq cage induction motors & mounting frame, MS rain protection cowl, bird screen and all other accessories (suitable for 415V/3-phase supply). Following fan shall have 30 mmwc static pressure.Capacity 7,500 CMH with Motor rating 1.5 KW	No	1	0.034531284
22.2	Axial flow exhaust fans (Bifurcated type, spark proof construction, wall mounted) complete with casing, flame proof motor & mounting frame, MS rain protection cowl, bird screen and all other accessories epoxy painted (suitable for 415V/3-phase supply) as specified. Following fan shall have 15 mmwc static pressure.Capacity 2,000 CMH with Motor rating 0.55 KW	No	1	0.012661471

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BIDDER'S NAME	**0**			
SCH-2				
Item No.	**DESCRIPTION**	**UNIT**	**QTY**	**Weightage**
22.3	Exhaust fan (propeller type) completes with induction motor & mounting frame MS rain protection cowl, bird screen and all other accessories as specified (suitable for 240V/ 1 phase). Following fan shall have 5 mmwc static pressure.Capacity 1000 CMH with Motor rating 100 watts	No	2	0.004604171
22.4	Wall mounting Dampers (Gravity Operated)	No	2	0.005630373
	Total			**1.00**