

Name of work

SITC of K smart kit (PCO5 Plus) Controller with
PGD display, Temperature sensor, Pressure
Transducer, Current Transformer and controller
related cards/ other components etc complete as
required for CESE AC plant at IIT Kanpur

BID DOCUMENT



OFFICE OF INFRASTRUCTURE AND PLANNING
INDIAN INSTITUTE OF TECHNOLOGY KANPUR
November, 2023

Indian Institute of Technology Kanpur

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Officer-in-Charge, Office of Infrastructure and Planning

1 Notice Inviting e-Tenders

The Dean of Infrastructure and Planning on behalf of Board of Governors of Indian Institute of Technology Kanpur invites online [percentage rate tenders from Original Equipment Manufacturers or authorized dealers satisfying the eligibility criteria mentioned in the document.](#)

NIT No: [HVAC/16/11/2023-1](#)

1	Name of work	: SITC of K smart kit (PCO5 Plus) Controller with PGD display, Temperature sensor, Pressure Transducer, Current Transformer and controller related cards/ other components etc complete as required for CESE AC plant at IIT Kanpur
2	Estimated Cost exclusive of GST	: Rs. 5,50,800/-
3	Earnest Money Deposit (Rs.)	: EMD Declaration to be submitted in lieu of EMD as per Form 5.1
4	Duration of contract	: Two (2) months
5	Last Time & date of submission of bids (Up to)	: As per CPP portal data (https://eprocure.gov.in/eprocure/app)
6	Opening of bids	: As per CPP portal data
7	Time allowed for submission of requisite documents by lowest bidder	: Within One week of opening of financial bids

The bid forms and other details may be downloaded from Central Public Procurement Portal (<http://eprocure.gov.in/eprocure/app>). Aspiring bidders who have not enrolled / registered in e-procurement should enroll / register themselves before participating through web site <http://eprocure.gov.in/eprocure/app>. The portal enrolment is free of cost. Bidders are advised to go through instructions provided at “Instructions for online bid submission.”

Bidders can access quotation / tender documents on the website (for searching in the NIC site), kindly go to quotation search option and type ‘IIT’. Thereafter, click on “GO” button to view all IIT quotations. Select the appropriate quotation / tender and fill them with all relevant information and submit the completed Quotation / Tender document online on the website <http://eprocure.gov.in/eprocure/app> as per the schedule given in the next page.

Note: No manual bids will be accepted. All bids (both Technical & Financial) should be submitted in the e-procurement portal.

Applicants are advised to keep visiting the above-mentioned websites from time to time (till the deadline for bid submission) for any updates in respect of the tender documents, if any. Failure to do so shall not absolve the applicant of his liabilities to submit the applications complete in all respect including updates thereof, if any. An incomplete application may be liable for rejection.

Officer-in-Charge, Office of Infrastructure and Planning

2 Information and Instructions for Bidders for E-Tendering

The Dean of Infrastructure and Planning on behalf of Board of Governors of Indian Institute of Technology Kanpur invites online [percentage rate tenders from Original Equipment Manufacturers or authorized dealers satisfying the eligibility criteria mentioned in the document.](#)

2.1 Schedule

1	Name of organization	:	Indian Institute of Technology Kanpur
2	NIT No:	:	HVAC/16/11/2023-1
	Location	:	Indian Institute of Technology Kanpur
3	Tender / Quotation type (open / limited / EOI / auction / single)	:	Open
4	Tender / Quotation category (services / goods / works)	:	Works
5	Type of Contract (work / supply / auction / service / buy / empanelment / sell)	:	Work
6	Form of contract (IITK-7/8)	:	IITK-7
7	Work Category (civil / electrical / fleet management / computer systems)	:	HVAC
8	Is multi-currency allowed?	:	No
9	Date of publishing / issue / start	:	As per CPP portal
10	Document download start date	:	As per CPP portal
11	Document download end date	:	As per CPP portal
12	Date & time of pre-bid meeting	:	As per CPP portal
13	Venue of pre-bid meeting	:	As per CPP portal
14	Last date & time of uploading of bids	:	As per CPP portal
15	Date & time of opening of Technical bids	:	As per CPP portal
16	Bid Validity Days	:	90 days after opening of technical bid
17	Earnest Money Deposit (EMD)	:	EMD Declaration to be submitted in lieu of EMD as per FORM given in section 5.1

18	Non- Refundable Processing Fee (Inclusive of GST @18%) as given in section 5.2	Rs. 2,000/-for Non MSME/NSIC/Startup and Rs. 1,500/-for MSME/NSIC/Startup to The Registrar, Indian Institute of Technology Kanpur. The proof of submission must be uploaded along with transaction slip with due mention of NIT No. in the CPP portal for valid tender submission as per format given in section 5.2
19	No. of Bids / Covers (1 / 2 / 3 / 4)	: 2
20	Address for communication	: Office of Infrastructure and Planning, Indian Institute of Technology Kanpur, Kanpur, U.P. Pin - 208016
21	e-mail address	: tender_doip@iitk.ac.in

The intending bidder must read the terms and conditions of CPWD-6 carefully. He should only submit his bid if he considers himself eligible and he is in possession of all the documents required.

1. Information and instructions for bidders posted on website shall form part of bid document.
2. The bid document consisting of specifications, schedule of quantities of items to be executed, schedule of stages for payment as applicable and the set of terms & conditions of the contract to be complied with and other necessary documents can be seen and downloaded free of cost from www.eprocure.gov.in
3. But the bid can only be submitted after deposition of e processing fee and with the EMD declaration.
4. Those contractors not registered on the website mentioned above, are required to get registered beforehand. Only e-bids shall be accepted in CPPP portal through e-tendering processes.
5. The intending bidder must have valid Class-III digital signature to submit the bid.
6. On opening date, the contractor can login and see the bid opening process. After opening of bids, he will receive the competitor bid sheets.
7. Contractor can upload documents in the form of JPG format and PDF format.
8. Contractor must ensure to quote rate of each item. The column meant for quoting rate in figures appears in pink colour and the moment rate is entered, it turns sky blue.

In addition to this, while selecting any of the cells a warning appears that if any cell is left blank the same shall be treated as "0". Therefore, if any cell is left blank and no rate is quoted by the bidder, rate of such item shall be treated as "0" (ZERO).

However, if a tenderer quotes nil rates against each item in item rate tender or does not quote any percentage above/below on the total amount of the tender or any section /

sub head in percentage rate tender, the tender shall be treated as invalid and will not be considered as lowest tenderer.

9. The “Eligibility/technical Bid” shall be opened first on due date and time as per the evaluation scheme. The “Financial Bid” of bidders qualifying the technical bid shall be opened on a later date as to be announced in CPP portal.
10. The bidders are advised to visit the site before submission of bids to have more clarity about the site conditions and availability of space for execution of the work.
11. All modifications/addendums/corrigendums issued regarding this bidding process shall be uploaded on website only.
12. The department reserves the right to reject any or all bids without assigning any reason thereof and may restrict the list of qualified bidders to any number deemed suitable by it, if too many bids are received satisfying the minimum laid down criteria.
13. The rates for all items of work, shall unless clearly specified otherwise, include cost of all operations and all inputs of labour, material, T&P, wastages, watch and ward, other inputs, all incidental charges, all other taxes (exclusive of GST), cess, duties, levies etc. required for execution of the work.
14. The specialized works shall be in compliance with 3 Star GRIHA rating and as per environmental policies of Institute. Nothing extra shall be payable on this account.
15. If the clause of enlistment is applicable, The enlistment of the contractors should be valid on the last date of submission of bids. In case the last date of submission of bid is extended, the enlistment of contractor should be valid on the original date of submission of bids.
16. The description of the work is as follows: “[SITC of K smart kit \(PCO5 Plus\) Controller with PGD display, Temperature sensor, Pressure Transducer, Current Transformer and controller related cards/ other components etc complete as required for CESE AC plant at IIT Kanpur](#)”
17. The work is estimated to cost **Rs.5,50,800/-**. However, this estimate given is mere approximation for guide.
18. Agreement shall be drawn with the successful bidders on prescribed Form No. CPWD 7 which is available as a Govt. of India Publication and also available on website www.cpwd.gov.in. Bidders shall quote his rates as per various terms and conditions of the said form which will form part of the agreement.
19. The time allowed for carrying out the entire work will be **Two (2) months** from the date of start as defined in Schedule “F” or from the first date of handing over of the site, whichever is later, in accordance with the phasing as detailed in special conditions of contract in the bid document.
20. The site for the work will be handed over as per the special terms and conditions of the document.
21. An approved programme of completion submitted by the contractor after award of work based on the milestones given in the tender.
22. The bid document consisting of NIT, the schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and

other necessary documents can be seen and downloaded from website www.eprocure.gov.in free of cost.

23. After submission of the bid the contractor can re-submit revised bid any number of times but before last time and date of submission of bid as notified.
24. While submitting the revised bid, contractor can revise the rate of one or more item(s) any number of times (he need not re-enter rate of all the items) but before last time and date of submission of bid as notified.
25. Earnest Money Declaration shall be uploaded to the e-Tendering website within period of submission
26. The receipt of e-processing fee shall also be uploaded to the e-tendering website by the intending bidder up to the specified bid. The Details of Institute Account for submitting e-processing fees is given in [5.2](#) under Section [Various Forms and Formats](#).
27. Copy of documents as specified in the bid shall be scanned and uploaded to the e-tendering website within the period of bid submission.
28. The bid submitted shall be opened at as per the details provided in the CPP portal at DOIP office. The date of opening of Financial Bid shall be informed through web site after the opening of financial bid
29. [The bid submitted shall become invalid and e- processing fee shall not be refunded if:](#)
 - (i) The bidder is found ineligible.
 - (ii) The bidder does not upload scanned copies of all the documents stipulated in the bid document.
 - (iii) If a tenderer quotes nil rates against each item in item rate tender or does not quote any percentage above/below on the total amount of the tender or any section / sub head in percentage rate tender, the tender shall be treated as invalid and will not be considered as lowest tenderer.
30. The contractor whose bid is accepted will be required to furnish performance guarantee of [5% of tendered value](#) within the period specified in Schedule F. This guarantee shall be in the form of or Deposit at Call receipt of any scheduled bank/ Banker's cheque of any scheduled bank/ Demand Draft of any scheduled bank/ Pay order of any Scheduled Bank of any scheduled bank (in case guarantee amount is less than Rs. 1,00,000/-) or Government Securities or Fixed Deposit Receipts or Guarantee Bonds of any Scheduled Bank or the State Bank of India in accordance with the prescribed form.
31. In case the contractor fails to deposit the said performance guarantee within the period as indicated in Schedule 'F' including the extended period if any, the contractor shall be suspended for [two years and shall not be eligible to bid for IITK tenders from the date of issue of suspension order](#).
32. The contractor whose bid is accepted will also be required to furnish either copy of applicable licenses/ registrations or proof of applying for obtaining licenses, registration with EPFO, ESIC and BOCW Welfare Board including Provident Fund Code No. If applicable and also ensure the compliance of afore said provisions by the sub-contractors, if any engaged by the contractor for the said work and program chart (Time and Progress) within the period specified in Schedule 'F'.

33. Intending Bidders are advised to inspect and examine the sites and its surroundings and satisfy themselves before submitting their bids as to the form and nature of the site, the means of access to the site, making proper arrangements to the site for smooth operation, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid. Bidder shall be deemed to have full knowledge of the sites whether he inspects it or not and no extra charge consequent on any misunderstanding or otherwise shall be allowed. The bidder shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a bid by a bidder implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which stores, tools and plant, etc. will be issued to him by the Institute and local conditions and other factors having a bearing on the execution of the work.
34. Intending Bidders are advised to get familiarized with the specifications /rules related (i.e., [SITC of K smart kit \(PCO5 Plus\) Controller with PGD display, Temperature sensor, Pressure Transducer, Current Transformer and controller related cards/ other components etc complete as required for CESE AC plant at IIT Kanpur](#)) to the work as approved by the competent authority and various policies related to c&d waste and other environmental guidelines of the institute pertaining to the. Bidder shall be deemed to have full knowledge of such rules and regulations whether he has read it or not and no extra charge consequent on any misunderstanding or otherwise shall be allowed. In case of reduction of scope of work or no work is possible to carry out on account of such issues, no cost shall be payable to them. Submission of a bid by the bidder implies that he has read this notice and all other documents and has made himself aware of the Institute Regulations and other factors having a bearing on the execution of the work.
35. The competent authority on behalf of the Board of Governors does not bind itself to accept the lowest or any other bid and reserves to itself the authority to reject any or all the bids received without assigning any reason. Bids in which any of the prescribed conditions is not fulfilled or any condition including that of conditional rebate is put forth by the bidders shall be summarily rejected.
36. Canvassing whether directly or indirectly, in connection with bids is strictly prohibited and the bids submitted by the bidders who resort to canvassing will be liable to rejection.
37. The competent authority on behalf of the Board of Governors reserves to himself the right of accepting the whole or any part of the bid and the bidders shall be bound to perform the same at the rate quoted.
38. The contractor shall not be permitted to bid for works in the [Office of Infrastructure and Planning / Institute Works Department responsible for award and execution of contracts](#), in which his near relative is posted as Divisional Accountant or as an officer in any capacity between the grades of [Superintending Engineer and Junior Engineer \(both inclusive\) in IWD and Office of Infrastructure and Planning](#). He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any gazetted officer in the Office of Infrastructure and Planning/ Institute Works Department. Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractors of this Department.

39. No Engineer of Gazetted Rank or other Gazetted Officer employed in Engineering or Administrative duties in an Engineering Department of the Government of India is allowed to work as a contractor for a period of one year after his retirement from Government service, without the prior permission of the Government of India in writing. This contract is liable to be canceled if either the contractor or any of his employees is found any time to be such a person who had not obtained the permission of the Government of India as aforesaid before submission of the bid or engagement in the contractor's service.
40. The bids for the work shall remain open for acceptance for a period of **Ninety (90) days** from the date of opening of bids. If any bidder withdraws his bid before the said period or issue of letter of acceptance, whichever is earlier, or makes any modifications in the terms and conditions of the bid which are not acceptable to the department, then the Institute shall, without prejudice to any other right or remedy, be at liberty to suspend the bidder for one year
41. This notice inviting Bid shall form a part of the contract document. The successful bidders/contractor, on acceptance of his bid by the Accepting Authority shall within 7 days from the stipulated date of start of the work, will sign the contract.
42. The Notice Inviting Bid, all the documents including additional conditions, specifications and drawings, if any, forming part of the bid as uploaded at the time of invitation of bid and the rates quoted online at the time of submission of bid and acceptance thereof together with any correspondence leading thereto
43. Standard C.P.W.D. Form 7 or other Standard C.P.W.D. Form as applicable.
44. The bid document will include the following components:
 - (a) CPWD-7 and CPWD-6 including **Schedule A** to F for all the components of the work, Standard General Conditions of Contract for CPWD 2023 as amended/modified up to last date of submission of the bid.
 - (b) General / specific conditions, specifications applicable to the all aspects of the work.
45. The eligible bidders shall quote percentage rates after considering all the components.
46. After acceptance of the bid by competent authority, the Dean, Infrastructure and Planning shall issue letter of award on behalf of the Board of Governors to the contractor. After the work is awarded, the contractor will have to enter into one agreement with Dean, Infrastructure and Planning. One such signed set of agreement shall be handed over to Engineer-In-Charge as applicable.
47. Entire work under the scope of bid shall be executed under one agreement.
48. The requirement of technical staff given in various specialized works is as per requirements given in clause 32 of NIT document. The actual deployment of these technical staff will be as per execution of work and direction of the **Dean of Infrastructure and Planning, IITK**.
49. The bill for the work shall be facilitated by Engineer-in-Charge. The bill must be submitted to the Office of Infrastructure and Planning, IIT Kanpur.
50. The work shall be treated as complete when all the components of the work are complete.
51. It will be obligatory on the part of bidder to sign the contract document for all components before the first payment is released.

52. In case of reduction in scope of work no claim on account of reduction in value of work, loss of expected profit, consequential overheads etc. shall be entertained.
53. A team of officers from Indian Institute of Technology Kanpur may visit the office/ site of work of bidders for establishing their credibility and verification of submitted documents
54. The mentioned work is urgent as requested by client/Institute and to be completed strictly in given time schedule as per special terms and conditions. The contractor has to deploy the labour and supervisory staff in shifts to meet the targeted completion date. The work may be executed in extended shifts or two shifts. The rates quoted by the contractor will be deemed to be inclusive of any extra expenditures on account of this reason. Nothing shall be paid on this account.

2.2 Instructions for Online BID Submission

This tender document has been published on the Central Public Procurement Portal (URL: <http://eprocure.gov.in/eprocure/app>). The bidders are required to submit softcopies of their bids electronically on the CPP portal, using valid Digital Signature Certificates (DSC). The instructions given below are meant to assist the bidders in registering on the CPP portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP portal.

More information useful for submitting online bids on the CPP portal may be obtained at <http://eprocure.gov.in/eprocure/app>

2.2.1 Registration

1. Bidders are required to enroll on the e-procurement module of the Central Public Procurement portal (URL:<http://eprocure.gov.in/eprocure/app>) by clicking on the link, “click here to enroll”. Enrolment on the CPP portal is free of charge
2. As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for the accounts.
3. Bidders are advised to register their valid e-mail address and mobile number as part of the registration process. These would be used for any communication from the CPP portal.
4. Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (class 2 or class 3 certificates with signing key usage) issued by any certifying authority recognized by CCA India (e.g. Sify / TCS / nCode/ eMudhra etc.) with their profile.
5. Only one valid DSC should be registered by a bidder. Please note that bidders are responsible to ensure that they do not lend their DSCs to others which may lead to misuse.
6. Bidder then logs in to the site through the secured log-in by entering their user ID Password and the password of the DSC / eToken.

2.2.2 Searching for tender documents

1. There are various search options built in the CPP portal to facilitate bidders to search active tenders by several parameters. These parameters could include tender ID, organization name, location, date, value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization

name, form of contract, location, date, other keywords etc. to search for a tender published on the CPP portal.

2. Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. The tenders can be moved to the respective “My Tenders” folder. This would enable the CPP portal to intimate the bidders through SMS / e-mail in case there is any corrigendum issued to the tender document.
3. The bidder should make a note of the unique Tender ID assigned to each other; in case they want to obtain any clarification/help from the Helpdesk.

2.2.3 Preparation of bids

1. Bidder should take into account any corrigendum published on the tender document before submitting their bids.
2. Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bids. Please note the number of covers in which the bid documents have to be submitted. Any deviations from these may lead to rejection of the bids.
3. Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document / schedule and generally, they can be in PDF / XLS / RAR / DWF formats. Bid documents may be scanned with 100 dpi with black & white option.
4. To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents (e.g., PAN card copy, annual reports, auditor’s certificates, etc.) has been provided to the bidders. Bidders can use “My Space” area available to them to upload such documents. These documents may be directly submitted from the “My Space” area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.

2.2.4 Submission of bids

1. Bidder should log into the site well in advance for bid submission so that he / she upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other issues.
2. The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.
3. Bidder has to select the payment option as “on-line” to pay the EMD as applicable and enter details of the instrument
4. A standard BOQ Format has been provided with the tender document to be filled by all the bidders. Bidders are requested to note that they should necessarily submit their financial bids in the format provided and no other format is acceptable. Bidders are required to download the BOQ file, open it and complete the white colored [unprotected] cells with their respective financial quotes and other details (such as name of the bidder). No other cells should be changed. Once the details have been completed, the bidder should save it online, without changing the filename. If the BOQ file is found to be modified by the bidder, the bid will be rejected.

OR

In some cases, financial bids can be submitted in PDF format as well (in lieu of BOQ).

5. The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission.
6. All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128-bit encryption technology. Data storage encryption of sensitive fields is done.
7. The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
8. Upon the successful and timely submission of bids, the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.
9. Add scanned PDF of all relevant documents in a single PDF file of compliance sheet.

2.2.5 Assistance to bidders

1. Any queries relating to tender document and the terms and conditions contained therein should be addressed to the tender inviting authority for a tender or the relevant contact person indicated in the tender.
2. Any queries relating to the process of online bid submission or queries relating to CPP portal in general may be directed to the 24 x 7 CPP Portal Help Desk.

2.2.6 General instruction to bidders

1. The tenders will be received online through portal <https://eprocure.gov.in/eprocure/app>. In the technical bids, the bidders are required to upload all the documents in PDF format.
2. Possession of a valid class II / III Digital Signature Certificate (DSC) in the form of smart card / e-token in the company's name is a prerequisite for registration and participating in the bid submission activities through <https://eprocure.gov.in/eprocure/app>. Digital Signature Certificates can be obtained from the authorized certifying agencies, details of which are available in the website <https://eprocure.gov.in/eprocure/app> under the link "Information about DSC".

Tenderers are advised to follow the instructions provided in the "Instructions to the tenderer" for the e-submission of the bids online through the Central Public Procurement Portal for e-procurement at <https://eprocure.gov.in/eprocure/app>.

Dean, Infrastructure and Planning
Indian Institute of Technology Kanpur

2.3 List of documents to be scanned and uploaded within the period of bid submission

The following mandatory documents to be submitted with online bid submission:

The Online bids (complete in all respect) must be uploaded online in two Envelops as explained here: -

2.3.1 Envelope - 1: Technical Bid

The following mandatory documents to be provided as **a single PDF** file in the same sequence as listed for evaluation:

1. EMD Declaration [as per 5.1](#)
2. Proof of submission of Processing Fees [as per 5.2](#)
3. GST Registration Certificate or GST Undertaking [as per 5.3](#)
4. EPF & ESI Registration
5. Copy of PAN card
6. Affidavit for not being blacklisted/debarred/restrained [As per 5.4](#)
7. Performance report of works executed [as per 5.5](#)
8. Structure and Organization of the Agency [as per 5.6](#)
9. Declaration on Details of the Bidder(s) [as per 5.7](#)
10. Scanned Copy of Original Equipment Manufacturers (OEM) or authorized dealership certificate specifically for Kirloskar make water cooled chiller.
11. Details of Similar Nature of Works Completed [as per 5.8](#) The works certificates submitted by the bidder clearly indicate that:
 - (a) The completion certificate cost of the executed air-conditioning works.
 - (b) Actual date of completion of the above air-conditioning work.
12. Declaration about Site Inspection [as per 5.9](#)
13. Letter of Transmittal [as per 5.10](#)

2.3.2 Envelope - 2: Financial Bid

Price bid should be submitted in BOQ format

3 Eligibility Criteria

3.1 Eligibility criteria for contractors

Contractors who fulfill the following criteria shall be eligible to apply.

Eligible Bidders

Eligible bidders should satisfy the following criteria for evaluation:

1. **Experience (value of work done shall be within a span of one year):**

Firms/Contractors must have completed satisfactorily

i) One similar work of 80% value of the estimated cost put to tender

Or

ii) Two similar work of 60% value of the estimated cost put to tender

or

iii) Three similar work of 40% value of the estimated cost put to tender

Works completed during last 7 years ending on date [31.03.2023](#).

2. **Definition of similar work:** Similar type of work means “[SITC of K smart kit controller, temperature sensor, pressure transducer etc. and related Chiller works](#)” done with any Central Government Department / Central Autonomous Body / Central Public Sector Undertakings / State Government and Private Institute / Establishment of repute in last 7 years (Not earlier than [01-04-2016](#)).

Eligible bidders must also satisfy the following conditions and ensure submission of all documents mentioned in 2.3

1. **Legal:** Unregistered Partnership Firm and Joint Venture or Consortium are not eligible.
2. **Registration:** Bidder should be registered with the Income Tax Department, Employees Provident Fund (EPF) Organization, Employees State Insurance (ESI) Corporation & GST. Bidders are not eligible in absence of these documents.
3. **Office:** Bidders have to establish its local accessible office registered with local GSTIN at IIT Kanpur to run the awarded work.

4 Bid Evaluation and Award

The following process will be followed for the Technical and Financial Bids Evaluation:

4.1 Technical Bid Evaluation

- Technical bids received complete in all respects covering the entire scope of work, will only be opened
- The technical bid evaluation is done only for bidders who satisfy the minimum criteria by submitting documentary proof supporting eligibility criteria and the bids of agencies who have not submitted these documents are liable to be rejected without notice

4.2 Financial Bid Evaluation

For financial bids, the following points shall be followed:

- After evaluation of Pre-Qualification Documents, a list of short listed agencies will be prepared.
- Thereafter the financial bids of only the qualified and technically acceptable bidders shall be opened at the notified time, date and place in the presence of the qualified bidders or their representatives, if present.
- The bid shall remain valid for **Ninety (90) days** from date of opening of eligibility bids/Technical bid.

NOTE

The employer reserves the right, without being liable for any damages or obligation to inform the bidder, to:

- Amend the scope and value of contract to the bidder.
- Reject any or all the applications without assigning any reason.

Any effort on the part of the bidder or his agent to exercise influence or to pressurize the employer would result in rejection of his bid. Canvassing of any kind is prohibited.

5 Various Forms and Formats

5.1 Declaration in lieu of submitting Earnest Money Deposit

Proforma for Declaration in lieu of submitting Earnest Money Deposit
(Scanned copy of this Declaration to be uploaded at the time of submission of bid)

Whereas, I/we (name of agency) have submitted bids for Name of work: - “SITC of K smart kit (PCO5 Plus) Controller with PGD display, Temperature sensor, Pressure Transducer, Current Transformer and controller related cards/ other components etc complete as required for CESE AC plant at IIT Kanpur”.

I/we hereby submit following declaration in lieu of submitting Earnest Money Deposit:

1. If after the opening of tender, I/we withdraw or modify my/our bid during the period of validity of tender (including extended validity of tender) specified in the tender documents,

or
2. If, after the award of work, I/we fail to sign the contract, or to submit performance guarantee before the deadline defined in the tender documents,

I/we shall be suspended for **two year** and shall not be eligible to bid for IITK tenders from date of issue of suspension order.

.....
Signature of the Bidder(s)

5.2 Format for submission of processing fees

Format for proof of submission to be uploaded along with transaction slip
(Scanned copy of this page to be uploaded at the time of submission of bid)

I/we have submitted the processing fees as per the following details:

NIT No	:	HVAC/16/11/2023-1
Name of Agency	:	
GST number of Agency	:	
Date of transaction	:	
Total amount transferred	:	
UTR number	:	

.....
Signature of the Bidder(s)

Details of Institute Account for submitting processing fees are as follows:

Beneficiary Name: The Registrar, IIT Kanpur
Bank Name: SBI, IIT Kanpur
Account Number: 30632766814
IFSC Code: SBIN0001161

5.3 Undertaking regarding obtaining GST registration

Proforma for Undertaking regarding obtaining GST registration Certificate of The State in which work is to be taken up

(Undertaking to be furnished on a 'Non-Judicial' stamp paper worth Rs.100/)

(Scanned copy of this notarized undertaking to be uploaded at the time of submission of bid, if required)

If work is awarded to me, I/we shall obtain GST registration Certificate of the State, in which work is to be taken up within one month from the date of receipt of award letter or before release of any payment by IITK, whichever is earlier, failing which I/We shall be responsible for any delay in payments which will be due towards me/us on a/c of the work executed and/or for any action taken by IITK or GST department in this regard.

.....
(Signature of Bidder(s))

Or

.....
(An authorized Officer of the firm with stamp)

.....
(Signature of Notary with seal)

5.4 Affidavit for not being blacklisted/debarred/restrained

Proforma for AFFIDAVIT for not being blacklisted/debarred/restrained

(AFFIDAVIT to be submitted on a 'Non-Judicial' stamp paper worth Rs.100/)

(Scanned copy of this notarized affidavit to be uploaded at the time of submission of bid)

I/we undertake and confirm that our firm/partnership firm has not been blacklisted and/or debarred/restrained by ny Central Govt./ State Govt. Agency/ Autonomous body of the Central or State govt./ PSU etc. Further that, if such information comes to the notice of the Institute, then I/we shall be debarred for bidding in the Institute in future forever. Also, if such information comes to the notice of the Institute on any day before date of start of work, the competent authority shall be free to cancel the agreement and to forfeit the entire amount of Earnest Money Deposit/Performance Guarantee.

.....
(Signature of Bidder(s))

Or

.....
(An authorized Officer of the firm with stamp)

.....
(Signature of Notary with seal)

5.5 Performance report on work executed

Proforma of Performance report on works referred to in Financial Information

(To be printed in Company's Letterhead)

(Scanned copy of the Performance Reports to be uploaded at the time of submission of bid)

1. Name of work/project & location:
2. Agreement no.:
3. Estimated cost:
4. Tendered cost:
5. Date of start:
6. Date of completion:
7. Stipulated date of completion:
8. Actual date of completion:
9. Amount of compensation levied for delayed completion, if any:
10. Amount of reduced rate items, if any:
11. Performance Report:
 - (a) Quality of work: Outstanding / Very Good / Good /Poor
 - (b) Technical Proficiency: Outstanding / Very Good / Good /Poor
 - (c) Resourcefulness: Outstanding / Very Good / Good /Poor
 - (d) General Behavior: Outstanding / Very Good / Good /Poor

Date:

Signature of Superintending Engineer or Equivalent

5.6 Structure and Organization of the Agency

Proforma of providing Structure and Organization of the Bidding Agency

(To be printed in Company's Letterhead)

(Scanned copy of the Structure and Organization Document to be uploaded at the time of submission of bid)

1. Name & address of the bidder:
2. Telephone no./Telex no./Fax no.:
3. Email address for Communication.:
4. Legal status of the bidder (attach copies of original document defining the legal status):
 - (a) An Individual:
 - (b) A proprietary firm:
 - (c) A firm in partnership:
 - (d) A limited company or Corporation:
5. Particulars of registration with various Government Bodies (attach attested photocopy)
Organization / Place of registration Registration No.
 - 1.
 - 2.
 - 3.
6. Names and titles of Directors & Officers with designation to be concerned with this work.
7. Designation of individuals authorized to act for the organization
8. Has the bidder, or any constituent partner in case of partnership firm, ever been convicted by the court of law? If so, give details.
9. Any other information considered necessary but not included above.

(Signature of of Bidder(s))

5.7 Declaration on Details of the Bidders

Proforma of Declaration on Details of the Bidders

(To be printed in Company's Letterhead)

(Scanned copy of the Performance Reports to be uploaded at the time of submission of bid)

DECLARATION

I/We,hereby declare that all the information and data furnished by our organization with regard to this tender specification are true and complete to the best of our knowledge. I/we have gone through the specification, conditions and stipulations in details and agree to comply with the requirements and intent of specification.

Particulars of the bidder as per following details:

1	Name of the firm / organization	:	
2	Type of the firm / organization: Public Ltd. / Private Ltd. / Registered firm	:	
3	Registered address	:	
4	Address of office	:	
5	Contact people	:	
6	Name & Designation	:	
7	Landline & Mobile numbers	:	
8	E-mail IDs	:	
9	PAN No.	:	
10	GST No.	:	
11	EPFO Reg. No.	:	
12	ESIC Reg. No.	:	
13	Annual Turnover for the last 3 years (Enclose copies of audited balance sheet and P&L A/c.)	:	
13.1	2021-2022	:	
13.2	2020-2021	:	
13.3	2019-2020	:	
14	EMD Declaration attached with signature	:	
15	Has the applicant ever been required to suspend any project for a period of more than six months continuously after Commencement of work?	:	If so, give the name of the project and reasons of suspension of project

16	Has the applicant ever been convicted by a court of law?	YES / NO, If yes, give details of the case
17	Details of any litigation in which the applicant is/was involved.	
18	All forms submitted as desired in the bid	Yes / No
19	Undertaking regarding no subletting of work	

We further declare that our organization has not been blacklisted /delisted or put to any holiday by any Institutional agency / Govt. Department / Public Sector Undertaking in the last three years.

Date:

Signature of Bidder(s) with seal

5.8 Details of Similar Nature of Works Completed

Proforma for submission of Details of Eligible Similar Nature of Works Completed* during the Last Seven Years ending previous day of the last date of submission of tenders (Scanned copy of the Performance Reports to be uploaded)

The contractor needs to submit the supporting documents and information in the following tabular format:

Sr.No	Name of work/project and location	Owner or sponsoring organization	Cost of work in crores of rupees	Date of commencement as per contract	Stipulated date of completion	Actual date of completion	Litigation / arbitration cases pending / in progress with details*	Name and address/ telephone number of officers to whom reference maybe made	Whether the work was done on back to back basis Yes / No
1	2	3	4	5	6	7	8	9	10

* Indicate gross amount claimed and amount awarded by the Arbitrator.

Date:

Signature(s) of Bidder with seal

5.9 Declaration About Site Inspection

Declaration about Site Inspection

(By Bidder)

To

The Dean Infrastructure and Planning

Subject: Submission of Tender for the work of “SITC of K smart kit (PCO5 Plus) Controller with PGD display, Temperature sensor, Pressure Transducer, Current Transformer and controller related cards/ other components etc complete as required for CESE AC plant at IIT Kanpur”.

Dear Sir/Madam,

It is hereby declared that as per terms and conditions of this tender document, I/ We the bidder inspected and examined the subject site and its surrounding and satisfy myself / ourselves as to the forms and nature of the site./ ourselves before submitting the bid, the accommodation which may require and all necessary information as to risks, contingencies and other circumstances which may influence or affect our bid have been obtained. I/We the bidder shall have full knowledge of the site and no extra charge consequent upon any misunderstanding or otherwise shall be claimed in later date. I /We bidder shall be responsible for arranging and maintaining at own cost all materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a bid by me/us implies that I / We have read this notice and all other contract documents and has made myself /ourselves aware of the scope and specifications of the work to be done and local conditions and other factors having a bearing on the execution of the work.

Sincerely

(Duly authorized signatory of the Bidder)

5.10 Letter of Transmittal

To

The Dean, Infrastructure and Planning
Indian Institute of Technology Kanpur
Kanpur, UP - 208016

Name of Work: [SITC of K smart kit \(PCO5 Plus\) Controller with PGD display, Temperature sensor, Pressure Transducer, Current Transformer and controller related cards/ other components etc complete as required for CESE AC plant at IIT Kanpur](#)

Dear Sir/Madam

Having examined details given in Notice and bid document for the above work, I/we hereby submit the relevant information.

1. I/We hereby certify that all the statements made and information supplied in the enclosed forms and accompanying statement are true and correct.
2. I/we have furnished all information and details necessary for eligibility and have no further pertinent information to supply.
3. I/We also authorize the Dean, Infrastructure and Planning, Indian Institute of Technology Kanpur or his representative(s) to approach individuals, employers, firms and corporation to verify our competence, work experience, and general reputation.
4. I/we submit the following certificates in support of our suitability, technical knowledge and capability for having successfully completed the following eligible completed works:

Sl. No.	Name of work	Amount	Certificate issued by
1.			
2.			
3.			
4.			

CERTIFICATE

It is certified that the information given in the enclosed eligibility bid are correct. It is also certified that I/We shall be liable to be debarred, disqualified/ cancelation of enlistment in case any information furnished by me/us found to be incorrect.

Enclosures:

Date of submission:

Signature(s) of Bidder with seal

5.11 CPWD-7

CPWD-7

PERCENTAGE RATE TENDER & CONTRACT FOR WORKS

Tender for the “SITC of K smart kit (PCO5 Plus) Controller with PGD display, Temperature sensor, Pressure Transducer, Current Transformer and controller related cards/ other components etc complete as required for CESE AC plant at IIT Kanpur”

1. To be uploaded as per details uploaded in CPP portal at www.eprocure.gov
2. To be opened in the presence of tenderers who may be present at the time of opening in the Dean, Infrastructure and Planning, IIT Kanpur.
3. The pre-qualification/Technical bid shall be opened first on due date and time as mentioned above. The time and date of opening of financial bid of contractors qualifying the technical bid shall be communicated to them at a later date.

TENDER

((To be signed in Company's Letterhead))

I/We have read and examined the notice inviting tender, schedule, A, B, C, D, E & F Specifications applicable, Drawings & Designs, General Rules and Directions, General Conditions of Contract (For construction works) 2023, clauses of contract, Special conditions, Schedule of Rate & other documents and Rules referred to in the conditions of contract and all other contents in the tender document for the work.

I/We hereby tender for the execution of the work specified for the Board of Governors within the time specified in Schedule 'F' viz., schedule of quantities and in accordance in all respect with the specifications, designs, drawing and instructions in writing referred to in Rule-1 of General Rules and Directions and in Clause 11 of the Conditions of contract and with such materials as are provided for, by, and in respect of accordance with, such conditions so far as applicable.

We agree to keep the tender open for **Ninety (90) days** from the due date of its opening and not to make any modification in its terms and conditions.

In lieu of EMD, I/We hereby submit Earnest Money Deposit (EMD) Declaration as per **5.1**

If I/We, fail to furnish the prescribed performance guarantee within prescribed period, I/We agree that the said Board of Governors or his successors, in office shall without prejudice to any other right or remedy, be at liberty to take action as per my/our EMD declaration as per Annexure-I. Further, if I/We fail to commence work as specified, I/We agree that Board of Governors or the successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said performance guarantee absolutely. The said Performance Guarantee shall be a guarantee to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to those in excess of that limit at the rates to be determined in accordance with the provision contained in Clauses 12.2 and 12.3 of the tender form.

Further, I/We agree that in case of myself / our self-becoming liable for action as per my/our EMD declaration or forfeiture of Performance Guarantee as aforesaid, I/We shall be debarred for participation in the re-tendering process of the work.

I/We undertake and confirm that eligible similar work(s) has/have not been got executed through another contractor on back-to-back basis. Further that, if such a violation comes to the notice of Department, then I/we shall be debarred for tendering in Indian Institute of Technology Kanpur in future forever. Also, if such a violation comes to the notice of Indian Institute of Technology Kanpur before date of start of work, the Dean, Infrastructure and Planning shall be free to forfeit the entire amount of Performance Guarantee.

I/We hereby declare that I/We shall treat the tender documents drawings and other records connected with the work as secret/confidential documents and shall not communicate information/derived there from to any person other than a person to whom I/We am/are authorized to communicate the same or use the information in any manner prejudicial to the safety & integrity of IIT Kanpur

Date:

Signature(s) of Contractor(s) with seal

Address:

Occupation:

6 Proforma of Schedules

PROFORMA OF SCHEDULES (Tender)

6.1 SCHEDULE 'A': Schedule of Quantities

Schedule of Quantities : BOQ uploaded separately

6.2 SCHEDULE 'B': Schedule of materials to be issued to the contractor

Schedule of materials to be issued to the contractor: NIL

6.3 SCHEDULE 'C': Tools and plants to be hired to the contractor

Tools and plants to be hired to the contractor: NIL

6.4 SCHEDULE 'D': Extra schedule for specific requirements/document for the work, if any

Extra schedule for specific requirements/document for the work, if any: NIL

6.5 SCHEDULE 'E': Reference to General Conditions of contract

Reference to General Conditions of contract	:	General Conditions of Contract 2023 for Construction Works & Maintenance work and as amended / modified up to the last date of submission of Bid.
Name of Work	:	“SITC of K smart kit (PCO5 Plus) Controller with PGD display, Temperature sensor, Pressure Transducer, Current Transformer and controller related cards/ other components etc complete as required for CESE AC plant at IIT Kanpur”
Total Estimated cost of work	:	Rs. 5,50,800/-
Earnest Money	:	EMD declaration to be submitted
Performance Guarantee	:	5% of tendered value
Security Deposit	:	2.5% of tendered value will be deducted from each bill. Same would be released after successful completion of One year defect liability period and as mentioned in special conditions of the contract.

6.6 SCHEDULE 'F': General Rules and Directions

GENERAL RULES & DIRECTIONS:

Officer Inviting tender: Dean, Infrastructure and Planning

6.6.1 Definitions

1 Inviting Authority	:	Dean, Infrastructure and Planning
2(v) Engineer-in-Charge: For Electrical and Mechanical Items of Work	:	Engineer Authorized by Dean, Infrastructure and Planning
2(viii) Accepting Authority	:	Dean of Infrastructure and Planning
2(x) Percentage on cost of materials and Labour to cover all overheads and profits	:	15%
2(xi) Standard Schedule of Rates	:	For Electrical Work: DSR (E&M) - 2022,& MR with up-to-date correction slip
2(xii) Department	:	Infrastructure and Planning, IIT Kanpur
9(ii) General Conditions of Contract 2023, SOPs 2022, CPWD Form 7 as amended / modified up to the last date of submission of Bid.		

6.6.2 Clauses

Clause 1		
Time allowed for submission of Performance Guarantee, Programme Chart (Time and Progress) and applicable labour licenses, registration with EPFO, ESIC and BOCW welfare board or proof of applying thereof from the date of issue of the letter of acceptance	:	7 days
Maximum allowable extension with late fee @ 0.1% per day of Performance Guarantee amount beyond the Period provided in (i) above	:	7 days
Clause 1A	:	Applicable. The Defect liability period shall be One year from the date of handing over of the assigned works to the user/Institute
Clause 2		
Authority for fixing compensation under Clause 2	:	Dy. Director/Director, IIT Kanpur

Clause 2A	Whether Clause 2A shall be applicable	: YES
Clause 5		:
(i):	Number of days from the date of issue of letter of acceptance for reckoning date of start	: 15 days
ii:	Milestones	: As per Table 6
Clause 6:	Computerized Measurement Bill	: <i>Applicable</i>
Clause 7A		: Applicable
Clause 10A		: Applicable
Clause 10B (ii)		: Not Applicable
Clause 10B (iii)		: Not Applicable
Clause 10C		: <i>Not Applicable</i>
Clause 10CA		: <i>Not Applicable</i>
Clause 10CC		: Not applicable
Clause 11		: CPWD specifications of all E&M items, General Specifications for Heating, Ventilation & Air-Conditioning (HVAC)-2017 with amendments and correction Slips issued up to the last date of receipt of tenders (herein called CPWD Specifications also) and as per NIT for E&M works and HVAC Works .
Clause 12: Type of work		: Original Work
Clause 12.2 & 12.3: Deviation limit beyond which clause 12.2 & 12.3 shall apply for Building & foundation work (except items mentioned in earth work in DSR and related items)		: -
Clause 16 Competent Authority for deciding reduced rates: For Civil items and For Electrical items of work		: <i>As per Table 7</i>
Clause 17 - Defect liability period completion of contract whichever is later		: <i>One year and those listed in Special Conditions of Contract</i>

Clause 18 - List of mandatory machinery, tools & plants to be deployed by the contractor at site	:	Those Listed in Special Conditions of Contract, if any
Clause 32 - Requirement of Technical Representative(s)	:	as per Table 8
Clause 38	:	NA

If the Contractor commits default in commencing the execution of the work as aforesaid, the performance guarantee shall be forfeited.

Table 6: Major milestones of the project

Sl. No.	Description of Milestone (Physical)	Time allowed from date of start	Maximum Duration of work	Amount to be withheld in case of non-achievement of milestone (% of composite tendered amount)
1	SITC of K smart kit (PCO5 Plus) Controller with PGD display, Temperature sensor, Pressure Transducer, Current Transformer and controller related cards/ other components etc complete as required for CESE AC plant	8 weeks	8 weeks	5

The detailed program chart approved by the engineer-in-charge shall indicate how the resources will be deployed by the contractor to maintain desired progress and for the completion of the work within the specified period. If the submitted program is approved, the milestone shall be redefined accordingly by the [Dean, Infrastructure and Planning, Indian Institute of Technology Kanpur](#). The amount to be withheld in such a case, for non-achievement of milestone(s), shall remain unaltered i.e., 5% of tendered amount.

Time allowed for execution of work : Two (2) months

Table 7: Authority to decide

(i)	Extension of time (EOT)	:	Dy. Director/Director, IIT Kanpur
(ii)	Rescheduling of milestones	:	Dean, Infrastructure and Planning, IIT Kanpur
(iii)	Shifting of date of start in case of delay in handing over of site	:	Dean, Infrastructure and Planning, IIT Kanpur

Table 8: Requirement of one of these technical staffs for the work, Clause 32

Sl No.	Requirement of Technical staff (of major + minor component)		Minimum experience in Year	Designation	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of Clause 32	
	Qualification	Number			Figures	Words
1	Graduate Engineer (Or Diploma Engineer)	1	5 years	Project Planning/ quality/ billing Engineer (Electrical & Mechanical Allied Works)	Rs. 21,000/-pm per month per person	Rupees Twenty One Thousand only per month per person

Note: For supervision of air-conditioning/refrigeration activities throughout the period of supply, testing and installation, technical representatives of the respective disciplines will be required to be deployed

7 Scope of work

7.1 Brief of the works

1. SITC of K smart kit (PCO5 Plus) Controller with PGD display, Temperature sensor, Pressure Transducer, Current Transformer and controller related cards/ other components etc complete as required for CESE AC plant

Note: The scope of the works listed above is indicative only. The work has to be done strictly as per the specifications in the BoQ and the make of the chiller equipments should be as per BOQ.

Tentative item list required:

1. PCO5 plus controller - 1 nos.
2. PGD HMI - 1 nos.
3. Expansion Board - 1 nos.
4. Temp Sensor - 08 nos.
5. Pressure Transducer - 2 nos.
6. Auxiliary contact
7. Controller wiring
8. Current Transformer

Any other item/sensor which is required to run the chiller is covered. No extra cost will be paid on this regard.

7.2 Materials Verification

The contractor shall inform the Engineer in charge in advance, for verifying the measurement of the concealed items like pipes, pipes laying, cable laying, conduiting, wiring etc. done by the contractor on the very day of the above said events.

7.3 Specifications for HVAC Works

7.3.1 ELECTRIC CABLING

1. General:

The electric cable connections of motors and earthing of all equipments shall be carried out, as per specifications, given hereunder.

2. Cabling

- (a) The cabling of various equipment shall be carried using PVC Insulated and armoured cables.
- (b) The PVC armoured power cable for use on 415 volts system shall be 3 or 3.5 Core with aluminium conductors and be of 660/1100 volts grade, as per IS 1554 (Part I) 1964. The cross section of the cable shall be to suit the load and rating of the equipment. The cables shall be of aluminium conductor, PVC insulated, strip armoured with overall PVC sheathing.

The cables shall be laid as per IS-1255/1967, Indian standard code of practice. The cables shall be laid, as per drawings in the ducts/pipes/trays etc. along a short and convenient route between switch board and the equipment, (either in trenches, on wall or on hangers, supported from the slab). Cable routing shall be checked at the site of work to avoid interference with structure, equipment etc. Where more than one cables are running close to each other, proper spacing should be provided between them. The radius of bends of the cable should not be less than 12 times the overall dia. of cable in order to prevent undue stress and damage at the bends, the cables should be supported with wooden cleats on M.S. Supports, when laid in trenches, or wall/ceiling suspended hangers. When laid underground the cables should be covered with fine soft earth and protected with 2nd Class bricks. Suitable G.I. Pipe shall be used wherever cables are laid under the roads etc. Wooden bushes shall be provided at the ends of pipes through which cables are connected through.

3. Surface Wiring

- (a) The surface wiring shall be cased in conduits which shall be of 1100 volts grade and conform to IS 9587-1987 (revised to date) The conduits used shall be of high quality & all joints shall be made with sockets. The bends and elbows shall have inspection covers fixed with grease free screws. The joints shall be water tight. Approved metal saddles shall be used to secure the exposed conduits at a space of 1 meter or less. The connection of the conduits to switches etc., shall be secured by check nuts and ebonite bushes provided at the ends of conduits. The M.S. conduits shall be heavy duty and rigid type-ISI marked/conforming to IS specifications. The wall thickness shall not be less than 2 mm. For conduits above 32 mm dia. Metallic conduits of 19 mm dia. and below shall not be used. Conduit accessories (Boxes etc.) shall conform to IS-5133-1968 and IS-2667-64 (amended-revised to date). Conduit pipes shall be jointed, wherever necessary by means of screwed couples and screwed accessories only. In Long distance straight, run of conduits inspection type couplers at suitable intervals shall be provided. Threads on conduit pipes shall be between 13 mm to 19 mm long. The wiring shall be carried-out as per IS 732-1989 (Amended and revised to date).
- (b) Flush inspection covers shall be provided in case of Concealed, recessed conduits. The staples for the conduits shall not be spaced more than 0.60 meters apart. Before filling up the chase with concrete the conduits should be given a coat of rust proof paint.
- (c) The wires shall be drawn only after all the conduits have been properly fixed in position. Fish wires (steel wire : 16 SWG) shall be laid in conduits for drawing of wires subsequently.

4. Control Cabling/wiring

Control cables shall be 1100 volts grade, as per IS 1554, made from copper conductor of 1.5 Sq mm PVC insulated single Core, strip armoured with an overall PVC sheathing. The cables and conduits wiring shall be carried out as per details given under 2.2 and 2.3 above.

5. Earthing

All equipment connected with electric supply shall also be provided with double earthing continuity conductors. The size of G.I. earthing conductors shall be :-

Size of phase wire sq.mm Aluminium	Size of G.I. conductor Tape/Wire (Swg)
185	25 mm x 6 mm (strip)
150	25 mm x 6 mm (strip)
120	25 mm x 6 mm (strip)
95	4 Swg
70	4 Swg
50	6 Swg
35	6 Swg
25-6	6 Swg
4	6 Swg

Note : Aluminium earthing conductors of equivalent Size may be used in lieu of GSS conductors mentioned above.

6. Miscellaneous

- (a) The final connections to the equipment shall be through Flexible connections in case of conduit wiring and also where the equipment is likely to be moved back and forth, such as on slide rails.
- (b) An isolator switch shall be provided at any motor which is separated from the main switch panel by a wall or partition or other barrier or is more than 15 metres away from the main panel.
- (c) Two separate and distinct earthing conductors shall be Connected from the equipment upto the main switch board panel.
- (d) The branch lines from the main panel to each equipment shall be separated and should not criss cross other lines.
- (e) The entire installation shall be tested as per Electricity rules and I.S.S. 732-1973 with amendments 1,2&3 prior to the commissioning of the plant and a suitable test report furnished by a competent and authorized person. The test report will be obtain by contractor himself at his own expenses.
- (f) All exposed switch board panels, conduits, hangers etc. shall be given 2 coats of suitable paint of approved colour, when all work has been completed.

7.3.2 TESTING AND COMMISSIONING

1. General

The contractor must perform all inspection and tests of the system as a whole and of components individually as required, under the supervision of the architect, in accordance with the provisions of the applicable ASHRAE standards or approved equal in addition to furnish necessary test certificates from manufacturers.

The system shall then be commissioned, tested and balanced to fulfil the intent and purpose for which it is designed.

In addition continuous Run Tests shall be carried out during peak weather condition.

2. Compressors Condensers/Chillers/Evaporators/Pumps etc.

Hydraulic test for various components and assembled equipments at 1.5 times design pressure or double the operating pressure, whichever is higher.

Pneumatic leak test after assemblies at design pressure

Static and dynamic balancing on electronic precision machine for rotating parts, links, impellor/ crank shaft assemblies etc.

Testing of oil passages in compressor at 1.5 times pump discharge pressure.

Pressure drop test for condenser, chiller and evaporator.

For compressor assembly, electronic leak, air running test, pneumatic test with dry nitrogen and leak test in water.

3. Associated Works at Site.

- (a) All electrical items will be subjected to inspection at any stage during manufacturing activity. Routine electrical test as per relevant codes. Inspection of manufacturer's test certificates.
- (b) Inspection of raw materials to be used for fabrication and assembly and inspection of manufacturer's certificates.
- (c) Inspection of welding including welders qualification as desired by inspection engineers. Inspection of fabricated items.
- (d) Pressure testing of pipe fittings used for the refrigerant and water and other services.
- (e) Pressure testing, leak testing of complete piping network for chilled water. (Condenser water and refrigerant/services).
- (f) Checking of electrical circuits (power & controls) and checking functioning of controls of refrigerant systems and other circuits of air conditioning plant.
- (g) Checking of calibration of controls and instrumentation
- (h) Checking of assemblies or electrical control panel, instruments panels, local panels (dimensional and functional) annunciator panels etc.
- (i) Inspection of complete electrical installation at site.
- (j) Performance testing of complete A.C. Plant as per specifications.

4. Vendor Responsibility

The above inspection procedure is given for general guidance and information of vendors. The inspection of purchaser/consultant is strictly not limited to these.

The inspection engineer of purchaser/consultant will have full right, to have detailed inspection at any stage right from placement of order to completion of project, as and when desired by inspection engineer.

Co-ordination of inspection agency of purchaser/consultant with his factory/subvendor's factory/erection site will be the sole responsibility of successful vendor, subsequent to placement of order for complete air conditioning plant, covered under these technical specifications.

5. Electrical Equipment

(a) All electrical equipment shall be cleaned and adjusted on site before application of power.

(b) The following tests shall be carried out:

Cables and Wires continuity tests.

Insulation resistance tests, phase to phase and phase to earth, on all circuits and equipment, using a 500 Volts meggar. The meggar reading shall be not less than one megaohm.

Earth resistance between conduit system and earth must not exceed half (1/2) CMH.

Phasing out and phase rotation tests.

Operating tests on all protective relays to prove their correct operation before energising the main equipment.

Operating tests on all starters, circuit breakers etc.

6. Plant Audit & Certification work

(a) The work of plant audit & certification shall be done by an approved outside agency.

(b) The whole system balancing shall be tested with microprocessor based Hi-tech instruments with an accuracy of + 0.5

(c) The instrument shall be capable of storing data and then down loading into a PC. The agency shall provide a minimum but not limited to the following instruments.

Microprocessor based velocity calculation meter to measure DB and WB temperature, RH and dew point.

Velocicalc meter to measure air volume and air velocity.

Pitot tube.

Electronic Rotary Vane Anemometer.

Accubalance Flow Measuring Hood.

(d) The outside agency shall analyse all the data and shall be responsible for the capacity and performance audit and certification of the plant.

(e) The successful Bidder shall be responsible to provide necessary sockets and connections for fixing of the Testing Instruments, probes etc.

7. Commissioning of the System

(a) The system shall be commissioned by adopting the following procedure.

(b) The installation as a whole shall be balanced and tested upon completion, and all relevant information, including the following shall be submitted to the architects.

Air volume passing through each unit, duct, grilles, apertures.

Static pressure in each air duct.

Water flow passing through each condenser, chiller, AHU etc.

Differential pressure readings across each filter, fan and coil, and through each pump.

Electrical current readings, in amperes of full and average load running and starting, together with name plate current of each electrical motor.

Continuous recording over a specified period, of ambient wet and dry bulb temperatures under varying degrees of internal heat loads and use and occupation, in each zone of each part of the building.

- (c) Daily records should be maintained of hourly readings, taken under varying degrees of internal heat load and use and occupation, of wet and dry bulb temperatures, upstream "On-Coil" of each cooling coil. Also suction temperatures and pressures for each refrigerating unit. The current and voltage drawn by each machine.
- (d) Any other readings shall be taken which may subsequently be specified by the architect.

8. Miscellaneous

- (a) The above tests and procedures are mentioned herein, for general guidance and information only, but not by way of limitation to the provisions of conditions of contract and specification.
- (b) The date of commencement of all tests listed above, shall be subject to the approval of the architect and In accordance with the requirements of this specification.
- (c) The contractor shall supply the skilled staff and all necessary instruments and carry out any test of any kind on a piece of equipment, apparatus, part of system or on a complete system, if the architect requests such a test for determining specified or guaranteed data, as given in the specification or on the drawings.
- (d) Any damage resulting from the tests shall be repaired and/or damaged material replaced, to the satisfaction of the architect without any extra cost.
- (e) In the event of any repair or any adjustment having to be made, other than normal running adjustment, the tests shall be void and shall be recommenced after the adjustment or repairs have been completed.
- (f) The contractor must inform the architect when such tests are to be made, giving sufficient notice, in order that the architect or his nominated representative may be present.
- (g) Complete records of all tests must be kept and 3 copies of these and location drawings must be furnished to the architect.
- (h) The contractor may be required to repeat the test as required, should the Ambient conditions at the time, do not give, in the opinion of the architect, sufficient and suitable indication of the effect and performance of the installation as a whole or of any part, as required.

7.3.3 FILTERS

1. General

The various types of Filters to be used in the Different Systems, to achieve the required degree of air purification shall conform to the following specifications.

2. Standard Filters

The standard filters shall have an efficiency of 90 % down to 10 Microns.

The frames of the filter shall be of G.I. of suitable rigidity.

The filtering media shall be 5 ply pleated synthetic media, closely packed to give the required efficiency.

3. Miscellaneous

Suitable packing shall be provided in the frames of all filters, to prevent any leakage of air through the gaps, between the filter joints. All such joints shall be properly sealed against any leakage of unfiltered air.

7.3.4 VARIABLE FREQUENCY DRIVES FOR HVAC SYSTEM

1. GENERAL REQUIREMENTS

- (a) This specification covers complete variable frequency drives (VFDs) designated on the drawing schedules to be variable speed. All standard and optional features shall be included within the VFD.
- (b) The frequency converter shall not be a general purpose product, but a dedicated HVAC engineered product.
- (c) The VFD and its options shall be factory mounted and tested as a single unit under full load before dispatch.
- (d) The VFD shall be tested to UL 508C. The appropriate UL label shall be applied.
- (e) The VFD shall be CE marked and conform to the European Union Electro Magnetic Compatibility directive.
- (f) The VFD shall be UL listed for a short circuit current rating of 100 kA and labeled with this rating.

2. TECHNICAL REQUIREMENTS

- (a) The VFD shall convert incoming fixed frequency three-phase AC power into an adjustable frequency and voltage for controlling the speed of three-phase AC motors. The motor current shall closely approximate a sine wave. Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for the driven load and to eliminate the need for motor derating.

When properly sized, the VFD shall allow the motor to produce full rated power at rated motor voltage, current, and speed without using the motor's service factor. VFDs utilizing sine weighted/coded modulation (with or without 3rd harmonic injection) must provide data verifying that the motors will not draw more than full load current during full load and full speed operation.

- (b) The VFD shall convert incoming fixed frequency three-phase AC power into an adjustable frequency and voltage for controlling the speed of three-phase AC motors. The motor current shall closely approximate a sine wave. Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for the driven load and to eliminate the need for motor derating.

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- (c) The VFD shall include an input full-wave bridge rectifier and maintain a fundamental (displacement) power factor near unity regardless of speed or load.
- (d) The VFD shall have a dual 5% impedance DC link reactor (harmonic filters) on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating. Swinging chokes that do not provide full harmonic filtering throughout the entire load range are not acceptable.
- (e) VFDs with saturating (non-linear) DC link reactors shall require an additional 3% AC line reactor to provide acceptable harmonic performance at full load, where harmonic performance is most critical.

IEEE519, 1992 recommendations shall be used for the basis of calculation of total harmonic distortion (THD) at the point of common coupling (PCC). On request VFD manufacturer shall provide THD figures for the total connected load. The contractor shall provide details of supply transformer rating, impedance, short circuit current, short circuit impedance etc to allow this calculation to be made.

- (f) All VFDs shall contain integral EMC Filters to attenuate Radio Frequency Interference conducted to the AC power line. The VFDs shall comply with the emission and immunity requirements of IEC 61800-3 : 2004, Category C1 with 50m motor cable (unrestricted distribution). The suppliers of VFDs shall include additional EMC filters if required to meet compliance to this requirement.
- (g) The VFD's full load output current rating shall meet or exceed the normal rated currents of standard IEC induction motors. The VFD shall be able to provide full rated output current continuously, 110
- (h) The VFD shall provide full motor torque at any selected frequency from 20 Hz to base speed while providing a variable torque V/Hz output at reduced speed. This is to allow driving direct drive fans without high speed derating or low speed excessive magnetization, as would occur if a constant torque V/Hz curve was used at reduced speeds. Breakaway current of 160
- (i) A programmable automatic energy optimization selection feature shall be provided as standard in the VFD. This feature shall automatically and continuously monitor the motor's speed and load to adjust the applied voltage to maximize energy savings.
- (j) The VFD must be able to produce full torque at low speed to operate direct driven fans.

- (k) Output power circuit switching shall be able to be accomplished without interlocks or damage to the VFD.
- (l) An Automatic Motor Adaptation algorithm shall measure motor stator resistance and reactance to optimize performance and efficiency. It shall not be necessary to run the motor or de-couple the motor from the load to perform the test.
- (m) Galvanic isolation shall be provided between the VFD's power circuitry and control circuitry to ensure operator safety and to protect connected electronic control equipment from damage caused by voltage spikes, current surges, and ground loop currents. VFDs not including either galvanic or optical isolation on both analog I/O and discrete digital I/O shall include additional isolation modules.
- (n) VFD shall minimize the audible motor noise through the used of an adjustable carrier frequency. The carrier frequency shall be automatically adjusted to optimize motor and VFD operation while reducing motor noise. VFDs with fixed carrier frequency are not acceptable.
- (o) The VFD shall allow up to at least 100 meters of SWA (Single Wire Armour) cable to be used between the FC and the motor and allow the use of MICS (Mineral Insulated Copper Sheath) cable in the motor circuit for fire locations.

3. PROTECTIVE FEATURES

- (a) A minimum of Class 20 I2t electronic motor overload protection for single motor applications shall be provided. Overload protection shall automatically compensate for changes in motor speed.
- (b) Protection against input transients, loss of AC line phase, output short circuit, output ground fault, over voltage, under voltage, VFD over temperature and motor over temperature. The VFD shall display all faults in plain language. Codes are not acceptable.
- (c) Protect VFD from input phase loss. The VFD should be able to protect itself from damage and indicate the phase loss condition. During an input phase loss condition, the VFD shall be able to be programmed to either trip off while displaying an alarm, issue a warning while running at reduced output capacity, or issue a warning while running at full commanded speed. This function is independent of which input power phase is lost.
- (d) Protect from under voltage. The VFD shall provide full rated output with an input voltage as low as 90
- (e) VFD shall include current sensors on all three output phases to accurately measure motor current, protect the VFD from output short circuits, output ground faults, and act as a motor overload. If an output phase loss is detected, the VFD will trip off and identify which of the output phases is low or lost.
- (f) If the temperature of the VFD's heat sink rises to 80 C, the VFD shall automatically reduce its carrier frequency to reduce the heat sink temperature. It shall also be possible to program the VFD so that it reduces its output current limit value if the VFD's temperature becomes too high.
- (g) In order to ensure operation during periods of overload, it must be possible to program the VFD to automatically reduce its output current to a programmed value during

periods of excessive load. This allows the VFD to continue to run the load without tripping.

- (h) The VFD shall have temperature controlled cooling fan(s) for quiet operation, minimized losses, and increased fan life. At low loads or low ambient temperatures, the fan(s) may be off even when the VFD is running.
- (i) Protect from output switching : The VFD shall be fully protected from switching a contactor / isolator at the output without causing tripping e.g.: for switching on/off the isolators of the AHU / ventilation fans / pumps near the motor with VFD in ON mode.
- (j) The VFD shall store in memory the last 10 alarms. A description of the alarm, and the date and time of the alarm shall be recorded.
- (k) When used with a pumping system, the VFD shall be able to detect no-flow situations, dry pump conditions, and operation off the end of the pump curve. It shall be programmable to take appropriate protective action when one of the above situations is detected.

4. INTERFACE FEATURES

- (a) Hand, Off and Auto keys shall be provided on the control panel to start and stop the VFD and determine the source of the speed reference. It shall be possible to either disable these keys or password protect them from undesired operation.
- (b) There shall be an "Info" key on the keypad. The Info key shall include "on-line" context sensitive assistance for programming and troubleshooting.
- (c) The VFD shall be programmable to provide a digital output signal to indicate whether the VFD is in Hand or Auto mode. This is to alert the Building Automation System whether the VFD is being controlled locally or by the Building Automation System.
- (d) Password protected keypad with alphanumeric, graphical, backlit display can be remotely mounted. Two levels of password protection shall be provided to guard against unauthorized parameter changes.
- (e) All VFDs shall have the same customer interface. The keypad and display shall be identical and interchangeable for all sizes of VFDs.
- (f) To set up multiple VFDs, it shall be possible to upload all setup parameters to the VFD's keypad, place that keypad on all other VFDs in turn and download the setup parameters to each VFD. To facilitate setting up VFDs of various sizes, it shall be possible to download from the keypad only size independent parameters. Keypad shall provide visual indication of copy status.
- (g) Display shall be programmable to communicate in multiple languages including English, Chinese, Korean, Japanese, Thai and Indonesian.
- (h) A red FAULT light, a yellow WARNING light and a green POWER-ON light shall be provided. These indications shall be visible both on the keypad and on the VFD when the keypad is removed.
- (i) A quick setup menu with factory preset typical HVAC parameters shall be provided on the VFD. The VFD shall also have individual Fan, Pump, and Compressor menus specifically designed to facilitate start-up of these applications.

- (j) A three-feedback PID controller to control the speed of the VFD shall be standard.
- (k) This controller shall accept up to three feedback signals. It shall be programmable to compare the feedback signals to a common setpoint or to individual setpoints and to automatically select either the maximum or minimum deviating signal as the controlling signal. It shall also be possible to calculate the controlling feedback signal as the average of all feedback signals or the difference between a pair of feedback signals.
- (l) The VFD shall be able to apply individual scaling to each feedback signal.
- (m) For fan flow tracking applications, the VFD shall be able to calculate the square root of any or all individual feedback signals so that a pressure sensor can be used to measure air flow.
- (n) The VFD's PID controller shall be able to actively adjust its setpoint based on flow. This allows the VFD to compensate for a pressure feedback sensor which is located near the output of the pump rather than out in the controlled system.
- (o) The VFD shall have three additional PID controllers which can be used to control damper and valve positioners in the system and to provide setpoint reset.
- (p) Floating point control interface shall be provided to increase/decrease speed in response to contact closures.
- (q) Five simultaneous meter displays shall be available. They shall be selectable from (at a minimum), frequency, motor current, motor voltage, VFD output power, VFD output energy, VFD temperature in degrees, feedback signals in their own units, among others.
- (r) Programmable Sleep Mode shall be able to stop the VFD. When its output frequency drops below set "sleep" level for a specified time, when an external contact commands that the VFD go into Sleep Mode, or when the VFD detects a no-flow situation, the VFD may be programmed to stop. When the VFD's speed is being controlled by its PID controller, it shall be possible to program a "wake-up" feedback value that will cause the VFD to start. To avoid excessive starting and stopping of the driven equipment, it shall be possible to program a minimum run time before sleep mode can be initiated and a minimum sleep time for the VFD.
- (s) A run permissive circuit shall be provided to accept a "system ready" signal to ensure that the VFD does not start until dampers or other auxiliary equipment are in the proper state for VFD operation. The run permissive circuit shall also be capable of initiating an output "run request" signal to indicate to the external equipment that the VFD has received a request to run.
- (t) VFD shall be programmable to display feedback signals in appropriate units, such as inches of water column (in-wg), pressure per square inch (psi) or temperature (F). Examples can be room temperature in 0C , return air temperature in 0C , supply air temperature in 0C, CO2 concentration in ppm, pressure in bar, differential pressure in PSI etc.
- (u) VFD shall be programmable to sense the loss of load. The VFD shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus. To ensure against nuisance indications, this feature must be

based on motor torque, not current, and must include a proof timer to keep brief periods of no load from falsely triggering this indication.

(v) Standard Control and Monitoring Inputs and Outputs

Four dedicated, programmable digital inputs shall be provided for interfacing with the systems control and safety interlock circuitry.

Two terminals shall be programmable to act as either as digital outputs or additional digital inputs.

Two programmable relay outputs, Form C 240 V AC, 2 A, shall be provided for remote indication of VFD status.

Each relay shall have an adjustable on delay / off delay time.

Two programmable analog inputs shall be provided that can be either direct-or-reverse acting.

Each shall be independently selectable to be used with either an analog voltage or current signal.

The maximum and minimum range of each shall be able to be independently scalable from 0 to 10 V dc and 0 to 20 mA.

A programmable low-pass filter for either or both of the analog inputs must be included to compensate for noise. The VFD shall provide front panel meter displays programmable to show the value of each analog input signal for system set-up and troubleshooting,

One programmable analog current output (0/4 to 20 mA) shall be provided for indication of VFD status. This output shall be programmable to show the reference or feedback signal supplied to the VFD and for VFD output frequency, current and power. It shall be possible to scale the minimum and maximum values of this output.

It shall be possible to read the status of all analog and digital inputs of the VFD through serial bus communications.

It shall be possible to command all digital and analog output through the serial communication bus.

(w) Optional Control and Monitoring Inputs and Outputs

It shall be possible to add optional modules to the VFD in the field to expand its analog and digital inputs and outputs.

These modules shall use rigid connectors to plug into VFD's control card.

The VFD shall automatically recognize the option module after it is powered up. There shall be no need to manually configure the module.

Modules may include such items as:

Additional digital outputs, including relay outputs

Additional digital inputs

Additional analog outputs

Additional analog inputs, including Ni or Pt temperature sensor inputs

It shall be possible through serial bus communications to control the status of all optional analog and digital outputs of the VFD.

- (x) Standard programmable firefighter's override mode allows a digital input to control the VFD and override all other local or remote commands. It shall be possible to program the VFD so that it will ignore most normal VFD safety circuits including motor overload. The VFD shall display FIREMODE whenever in firefighter's override mode. Firemode shall allow selection of forward or reverse operation and the selection of a speed source or preset speed, as required to accommodate local fire codes, standards and conditions.
- (y) A real-time clock shall be an integral part of the VFD.

It shall be possible to use this to display the current date and time on the VFD's display.

Ten programmable time periods, with individually selectable ON and OFF functions shall be available. The clock shall also be programmable to control start/stop functions, constant speeds, PID parameter setpoints and output relays. It shall be possible to program unique events that occur only during normal work days, others that occur only on non-work days, and others that occur on specific days or dates. The manufacturer shall provide free PC-based software to set up the calendar for this schedule.

All VFD faults shall be time stamped to aid troubleshooting.

It shall be possible to program maintenance reminders based on date and time, VFD running hours, or VFD operating hours.

The real-time clock shall be able to time and date stamp all faults recorded in the VFD fault log.

The VFD shall be able to store load profile data to assist in analyzing the system demand and energy consumption over time.

The VFD shall include a sequential logic controller to provide advanced control interface capabilities. This shall include: Comparators for comparing VFD analog values to programmed trigger values Logic operators to combine up to three logic expressions using Boolean algebra

Delay timers

A 20-step programmable structure

- (z) The VFD shall include a Cascade Controller which allows the VFD to operate in closed loop set point (PID) control mode one motor at a controlled speed and control the operation of 3 additional constant speed motor starters.

5. SERIAL COMMUNICATIONS

The VFD shall include a standard EIA-485 communications port, Modbus & Bacnet and capabilities to be connected to the following serial communication protocols at no additional cost and without a need to install any additional hardware or software in the VFD:

Metasys N2 Modbus RTU Bacnet

VFD shall have standard USB port for direct connection of Personal Computer (PC) to the VFD. The manufacturer shall provide no-charge PC software to allow complete setup and access of the VFD and logs of VFD operation through the USB port. It shall be possible to communicate to the VFD through this USB port without interrupting VFD communications to the building management system.

The VFD shall have provisions for an optional 24 V DC back-up power interface to power the VFD's control card. This is to allow the VFD to continue to communicate to the building automation system even if power to the VFD is lost.

6. ADJUSTMENTS

- (a) The VFD shall have a manually adjustable carrier frequency that can be adjusted in 0.5 kHz increments to allow the user to select the desired operating characteristics. The VFD shall also be programmable to automatically reduce its carrier frequency to avoid tripping due to thermal loading.
- (b) Four independent setups shall be provided.
- (c) Four preset speeds per setup shall be provided for a total of 16.
- (d) Each setup shall have two programmable ramp up and ramp down times. Acceleration and deceleration ramp times shall be adjustable over the range from 1 to 3,600 seconds.

Each setup shall be programmable for a unique current limit value. If the output current from the VFD reaches this value, any further attempt to increase the current produced by the VFD will cause the VFD to reduce its output frequency to reduce the load on the VFD. If desired, it shall be possible to program a timer which will cause the VFD to trip off after a programmed time period.

If the VFD trips on one of the following conditions, the VFD shall be programmable for automatic or manual reset: external interlock, under-voltage, over-voltage, current limit, over temperature, and VFD overload.

The number of restart attempts shall be selectable from 0 through 20 or infinitely and the time between attempts shall be adjustable from 0 through 600 seconds.

An automatic "start delay" may be selected from 0 to 120 seconds. During this delay time, the VFD shall be programmable to either apply no voltage to the motor or apply a DC braking current if desired.

Four programmable critical frequency lockout ranges to prevent the VFD from operating the load at a speed that causes vibration in the driven equipment shall be provided. Semi-automatic setting of lockout ranges shall simplify the set-up.

7. OPTIONAL FEATURES

All optional features shall be built and mounted by VFD manufacturer as an inbuilt factory solution. All optional features shall be UL listed by the VFD manufacturer as a complete assembly and carry a UL label.

8. SERVICE CONDITIONS

- (a) Ambient temperature at full speed, full load operation with continuous drive rated output current:

- (b) -10 to 45 deg C for ratings upto 90 kW without derating
- (c) -10 to 40 deg C for ratings 110 kW and higher without derating
- (d) Relative Humidity : 0 to 95%, non-condensing.
- (e) Elevation : Up to 3,300 feet without derating.
- (f) AC line voltage variation : + 10% of nominal with full output.
- (g) VFD Enclosure protection : IP 55, integral, with no additional cabinets.
- (h) Side Clearances : No side clearance shall be required for cooling.
- (i) All power and control wiring shall be done from the bottom.
- (j) All VFDs shall be plenum rated.

9. QUALITY ASSURANCE

To ensure quality, the complete VFD shall be tested by the manufacturer. The VFD shall drive a motor connected to a dynamometer at full load and speed and shall be cycled during the automated test procedure.

All optional features shall be functionally tested at the factory for proper operation.

10. RESISTANCE TEMPERATURE DEVICE(RTD)

The device should be mineral Insulated. Available in all sheath diameters. Mineral Insulation enables flexibility and durability .Class 'A' Tolerance as per IEC-751. It should come with enclosures in all Categories

RTD should be simplex type having element of pt 10 with a temperature range of 0 to 60 C. Also it should have 2 wire configuration with a sheath diameter of 10 mm.

Following process connection should be used :

- 03B 1/8" BSP (M)
- 03N 1/8" NPT (M)
- 06B 1/4" BSP (M)
- 06N 1/4" NPT (M)
- 06BT 1/4" BSPT (M)
- 10B 3/8" BSP (M)
- 10BT 3/8" BSPT (M)
- 10N 3/8" NPT (M)
- 15N 1/2" NPT (M)
- 15B 1/2" BSP (M)
- 15BT 1/2" BSPT (M)
- M12 M 12 X 1 (M)
- M16 M 16 X 1.5 (M)
- M20 M 20 X 1.5 (M)

The head extension should be adjustable type with single wire entry.

8 Special Conditions of Contract

8.1 Timely Completion

1. The work included in this tender is of urgent nature.
2. The work of all components must be started simultaneously and has to be delivered together or early within the given time schedule.
3. The contractor has to deploy the labor and supervisory staff in shifts to meet the targeted completion date. The work may be executed in extended shifts or two shifts.
4. Number of days from the date of issue of letter of acceptance for reckoning date of start shall be as per Schedule. *If the Contractor commits default in commencing the execution of the work as aforesaid, the performance guarantee shall be forfeited.*
5. The detailed program chart approved by the engineer-in-charge shall indicate how the resources will be deployed by the contractor to maintain desired progress and for the completion of the work within the specified period. If the submitted program is approved, the milestone shall be redefined accordingly by the Dean of Infrastructure and Planning, IITK. The amount to be withheld in such a case, for non-achievement of milestone(s), shall remain unaltered. Any delay in achieving the milestone must be compensated within the limitations of time imposed in the Contract document
6. The contractor shall procure the required materials in advance so that there is sufficient time for testing of the materials and approval of the same before use in the work, as required.

8.2 Rates

1. Unless otherwise provided in the schedule of quantities of the work the rates tendered by the contractor shall be all inclusive and shall apply to all heights, lifts, leads and depths of the building (Exclusive of GST) and nothing extra shall be payable to him on this account.
2. The rates for all items of work shall, unless clearly specified otherwise, include cost of all labours, materials and other inputs involved in the execution of the item irrespective of whether they have been specifically mentioned in the tender document or not.
3. In case the same item (s) appear more than once in the schedule of work / BOQ under the same sub head or among the different subhead of works, the lowest rate quoted for that item (s) shall be considered for the particular item(s) wherever appeared in any part of BOQ / Schedule of works for the purpose of tender evaluation although web generated e-price bid may incorporate different quoted rate for same item(s) as per the quoting pattern of the tenderer. The tendered amount thus worked out shall be final & shall be binding on the contractor.
4. The rates quoted by the contractor will be deemed to be inclusive of any extra expenditure of this reason. The contractor has to increase the manpower or other tools etc. to do the work as per requirement of the work at his own expenses. Nothing shall be paid on this account.
5. The contractor shall provide at his own cost suitable weighing, surveying and leveling and measuring arrangements as may be necessary at site for checking. All such equipments shall be got calibrated in advance from laboratory, approved by the Engineer-in-Charge. Nothing extra shall be payable on this account.

6. Other agencies may also simultaneously execute and install the works and the contractor shall afford necessary facilities for the same. The contractor shall leave such recesses, holes, openings, trenches etc. as may be required for such related works (for which inserts, sleeves, brackets, conduits, base plates, clamps etc. shall be available as specified elsewhere in the contract) and the contractor shall fix the same at the time of casting of concrete, stone work and brick work, if required, and nothing extra shall be payable on this account.
7. All material shall only be brought at site as per program finalized with the Engineer-in-Charge. Any pre-delivery of the material not required for immediate consumption shall not be accepted and thus not paid for.
8. Water tanks, taps, sanitary, water supply and drainage pipes, fittings and accessories should conform to approved manufacturers specifications where CPWD Specifications are not applicable. The contractor should get the materials (fixtures/fittings) tested from approved labs wherever required at his own cost.
9. The contractor shall be responsible for the watch and ward / guard of the buildings, safety of all fittings and fixtures including sanitary and water supply fittings and fixtures provided by him against pilferage and breakage during the period of installations and thereafter till the building is physically handed over to the client department. No extra payment shall be made on this account.
10. The rates quoted by the Contractor are deemed to be inclusive of site clearance, setting out work, profile, establishment of reference bench mark(s), taking spot levels, construction of all safety and protection devices, barriers, preparatory works, working during monsoon, working at all depths, height, lead, lift and location etc until / unless specified otherwise and any other incidental works required to complete this work. Nothing extra shall be payable on this account.

8.3 Quality and Workmanship

1. The contractor shall be entirely responsible and answerable for all the works done by him regarding quality, adherence to the laid down specifications, terms and conditions, warranty/guarantee etc. and he shall be liable to bear any compensation that may be levied by the department under any of the clauses of the agreement.
2. The materials having ISI mark shall have precedence over the one conforming to IS Specifications.
3. The proposed is for Institute premises and quality of work is paramount importance. Contractor shall have to engage well experienced skilled labour and deploy modern T & P and other equipment to execute the work.
4. Samples of all materials and fittings to be used in the work in respect of brand manufacturer and quality shall be approved from the Engineer-in-Charge, well in advance of actual execution and shall be preserved till the completion of the work.
5. All materials used in the work shall be new and of good quality, conforming to the relevant specifications as per good engineering practice. All the materials proposed to be used in the work should be approved from Engineer in Charge before use in work.
6. Articles bearing BIS certifications mark shall only be used unless no manufacturer has got BIS/ISI mark for the particular material. Any material/fitting whose sample has not been approved in advance and any other unapproved material brought by the contractor shall

be immediately removed as soon as directed. Where the make of any particular material is not specified in the Contract document, the material shall be supplied as per makes desired by the engineer-in-charge.

7. It will be the responsibility of the contractor / bidder to ensure use of genuine materials in the work. The department reserves the right to get (any / all materials / components) inspected by the manufacturer or their authorized representatives at any stage of the execution of work. If any of the materials, supplied and used in work is found spurious at any stage, then the department reserves the right to ask the contractor to replace it by genuine one and make suitable recovery till it is done, even if any payment against that material is already made.
8. The contractor should get the make/TDS documents approved before procuring any material at site. The TDS/Make once approved shall not be changed without any valid recorded reasons. No material to be brought and used at site without the prior knowledge & approval of Engineer-in-Charge.
9. The department may ask for any valid document like manufacturer's test certificate, document for purchase of the material, document for import/shipment of imported materials etc. as deemed fit by the engineer-in-charge to ascertain genuineness of material supplied by/used in the work by the contractor. The contractor shall remain bound to submit all such documents to the department failing which payment may not be made or if already paid may be recovered/ withheld from subsequent running account payment.
10. All equipment and their components, and all the materials to be used in the work shall be suitable for the environmental conditions at the location of the work.
11. The contractor shall ensure quality control measures on different aspects of construction including materials, workmanship and correct construction methodologies to be adopted. He shall have to submit quality assurance programme within two weeks of the award of work. The quality assurance programme should include method statement for various items of work to be executed along with check lists to enforce quality control.
12. The contractor shall get the source of all other materials, not specified elsewhere in the document, approved from the Engineer-in-Charge. The contractor shall stick to the approved source unless it is absolutely unavoidable. Any change shall be done with the prior approval of the Engineer-in-Charge for which tests etc. shall be done by the contractor at his own cost. Similarly, the contractor shall submit brand/ make of various materials not specified in the agreement, to be used for the approval of the Engineer-in-Charge along with samples and once approved, he shall stick to it.
13. **Other Laboratories:** The contractor shall arrange carrying out of all tests required under the agreement through the laboratory as approved by the Engineer-in-Charge and shall bear all charges in connection therewith including fee for testing. The said cost of tests shall be borne by the contractor/department in the manner indicated below.
 - (a) By the contractor, if the results show that the test does not conform to relevant CPWD Specifications / BIS code or specification mentioned elsewhere in the documents.
 - (b) By the department, if the results conform to relevant CPWD Specifications / BIS code or specification mentioned elsewhere in the documents.

If the tests, which were to be conducted in the site laboratory, are conducted in other laboratories for whatever the reasons, the cost of such tests shall be borne by the contractor.

14. Sample of building materials fittings and other articles required for execution of work shall be got approved from the Engineer-in-Charge. Articles manufactured by companies of repute and approved by the Engineer-in-Charge shall only be used. Articles bearing BIS certification mark shall be used in case the above are not available, the quality of samples brought by the contractor shall be judged by standards laid down in the relevant BIS specifications. All materials and articles brought by the contractor to the site for use shall conform to the samples approved by the Engineer-in-Charge which shall be preserved till the completion of the work.
15. The contractor shall ensure quality construction in a planned and time bound manner. Any sub-standard material/work beyond set out tolerance limit shall be summarily rejected by the Engineer-in-Charge.
16. BIS marked materials except otherwise specified shall be subjected to quality test at the discretion of the Engineer-in-Charge besides testing of other materials as per the specifications described for the item/materials. Wherever BIS marked materials are brought to the site of work, the contractor shall if required, by the Engineer-in-Charge furnish manufacturers test certificate or test certificate from approved testing laboratory to establish that the material produced by the contractor for incorporation in the work satisfies the provisions of BIS codes relevant to the material and/or the work done.
17. The contractor shall procure all the materials at least in advance so that there is sufficient time to testing and approving of the materials and clearance of the same before use in work.
18. All materials brought by the contractor for use in the work shall be got checked from the Engineer-in-Charge or his authorized representative of the work on receipt of the same at site before use.
19. The contractor shall be fully responsible for the safe custody of the materials issued to him even if the materials are in double lock and key system.

8.4 Natural calamity:

No payment will be made to the contractor for any damage caused by rain, snow fall, floods, dampness, fire, sun or any other natural cause whatsoever during the execution of work. The damage to the work due to above reason, if any, shall have to be made good by the contractor at his own cost and no claim on this account shall be entertained.

8.5 Stocking and Disposal of Materials & Debris

1. The contractor shall take instructions from the Engineer-in-Charge regarding collection and stacking of materials at any place. No excavated earth or building rubbish shall be stacked on areas where other buildings, roads, compound wall, services etc. are to be constructed.
2. After completion of work the agency shall remove materials and debris etc. from site as per the direction of Engineer-in-Charge, at no extra cost.
3. Contractor's job will also include removing of all malba and debris arising in the process of painting including washing of floor to remove stains of paint, at no extra cost.
4. The contractor shall conduct work so as not to interfere with or hinder the progress or completion of the work being performed by other contractor(s) or by the Engineer-in-Charge

and shall as far as possible arrange his work and shall place and dispose of the materials being used or removed so as not to interfere with the operations of other contractor or he shall arrange his work with that of the others in an acceptable and coordinated manner and shall perform it in proper sequence to the complete satisfaction of others.

5. For construction/renovation works which are likely to generate malba/rubbish to the tune of more than a tempo/truck load, contractor shall dispose of malba, rubbish & other unserviceable materials and wastes at their own cost to the notified/specified dumping ground and under no circumstances these shall be stacked/dumped, even temporarily outside the construction premises.
6. Dismantled but useful materials/components/equipment, if any, should be returned to the Institute as per the direction of Engineer-in-Charge.

8.6 Safety and Security

1. The contractor has to follow all safety norms as laid down in National Building Code of India. All the workers shall be equipped with the required safety gadgets while working at site such as ISI marked helmets, Shoes and safety belts, gumboots, gloves etc.
2. The contractor, the authorized representative(s), workmen etc., shall strictly observe orders pertaining to fire precautions prevailing in the area.
3. The contractor shall be fully responsible for the safe custody of materials brought by him/ issued to him even though the materials may be under double lock key system.
4. Contractor will arrange proper metal ladders, M.S. double scaffolding (for working, painting, etc. at higher levels) at his own cost and will take all safety measures like double harness safety belt, mechanized electrically operated platform etc. If it is observed that work is proceeding without adequate safety precautions, work may be stopped by Engineer-in-charge and in such cases, contractor will be solely responsible for delay and its consequences thereof.
5. The contractor shall be responsible for the watch and ward/guard of the buildings, safety of all fittings and fixtures including sanitary and water supply fittings and fixtures provided by him against pilferage and breakage during the period of installations and thereafter till the building is physically handed over to the department. No extra payment shall be made on this account.
6. The contractor shall take all precautions to avoid accidents by exhibiting necessary caution boards day and night speed limit boards red flags, red lights and providing barriers. He shall be responsible for all dangers and incidents caused to existing / new work due to negligence on his part. No hindrances shall be caused to traffic during the execution of the work.
7. It shall be ensured by the contractor that no electric live wire is left exposed or unattended to avoid any accidents in this regard.
8. The Institute shall not have any responsibility or liability in case of any accident injury to the personnel to the contractor at work site or to the general public at the work site due to mishandling equipment by the personnel of the contractor or any other similar reason. The responsibilities and liabilities for such accidents and incidents shall be borne by the contractor.

8.7 Approach to Site

1. The tenderer shall see the approaches to the site. In case any approach from main road is required at site or existing approach is to be improved and maintained for cartage of materials by the contractor, the same shall be provided, improved and maintained by the contractor at his own cost.
2. Contractor shall take all precautionary measures to avoid any damage to adjoining property. All necessary arrangement shall be made at his own cost.

8.8 Water and Flooding

1. The contractor shall have to arrange water of desirable quality for the construction purpose for which he may have to install water purifier at site or might have to bring/ purchase water from outside as per decision of Engineer-in-charge. Nothing extra shall be paid on this account.
2. For works below ground level the contractor shall keep that area free from water. If dewatering or bailing out of water is required the contractor shall do it and nothing extra shall be paid except otherwise provided in the items of schedule of quantities.
3. In case of flooding of site on account of rain or any other cause and any consequent damage, whatsoever, no claim financially or otherwise shall be entertained not withstanding any other provisions elsewhere in the contract agreement. Also, the Contractor shall make good, at his own cost, the damages caused, if any.
4. The water charges (for water connection as well as tanker water) shall be borne by the contractor. Also, if the contractor obtains water connection for the drinking purposes from the Institute or any other statutory body, the consequent sewerage charges shall be borne by the contractor.

8.9 Acts and Laws

1. The Contractor shall keep himself fully informed of all acts and laws of the Central & State Governments, all orders, decrees of statutory bodies, tribunals having any jurisdiction or authority, which in any manner may affect those engaged or employed and anything related to carrying out the work. All the rules & regulations and bye-laws laid down by Collector / MC etc. and any other statutory bodies shall be adhered to, by the contractor, during the execution of work.
2. The Contractor shall also adhere to all traffic restrictions notified by the local authorities.
3. All statutory taxes, levies, charges (including water and sewerage charges, charges for temporary service connections and / or any other charges, as applicable) payable to such authorities for carrying out the work, shall be borne by the Contractor.
4. The Contractor shall arrange to give all notices as required by any statutory / regulatory authority and shall pay to such authority all the fees that is required to be paid for the execution of work. He shall protect and indemnify the Institute and its officials & employees against any claim and /or liability arising out of violations of any such laws, ordinances, orders, decrees, by himself/herself or by his/her employees or his/her authorized representatives. Nothing extra shall be payable on these accounts.

5. The fee payable to statutory authorities for obtaining the various permanent service shall be borne by the Institute.

8.10 Labour and Laws

1. The Contractor shall display all permissions, licenses, registration certificates, bar charts, other statements etc. under various labour laws and other regulations applicable to the works, at his site office.
2. Huts for labour are not permitted within the premises of the Institute. No extra cost shall be payable even if the contractor provides such accommodation at a place as is acceptable to the local body.

8.11 Nondisclosure Agreement

1. The Agency shall take all precautions not to disclose, divulge and/or disseminate to any third party any confidential information, proprietary information on the Institute business or security arrangements (including but not limited to the Assignment instructions, Schedules and other subsequent Arrangements) and/or business of the Institute. The obligation is not limited to any Scope and the Agency shall be held responsible in case of breach of the confidentiality of Institute's information.
2. If the Agency receives enquiries from Press/Media/Radio/Television or other bodies/persons, the same shall be referred by the Agency to Institute immediately on receipt of such queries.

8.12 Indemnification:

1. The agency shall be directly responsible to indemnify the Institute against all charges, dues, claims, etc. arising out of the disputes relating to the dues and employment of the personnel deployed and further for any claim/compensation against all damages and accidents caused due to negligence on the part of the agents, employees and other personnel of the agency.
2. That the contractor shall keep the IITK indemnified against all claims whatsoever in respect of the employees deployed by the contractor. In case any employee of the contractor so deployed enters in dispute of any nature whatsoever, it will be the primarily responsibility of the contractor to contest the same. In case IITK is made party and is supposed to contest the case, IITK will be reimbursed for the actual expenses incurred towards Counsel Fee and other expenses which shall be paid in advance by the Contractor to IITK on demand. Further, the contractor shall ensure that no financial or Any other liability comes on IITK in this respect of any nature whatsoever and shall keep IITK indemnified in this respect.

8.13 Force Majeure:

If at any time, during the continuance of this contract, the performance in whole or in part by either party of any obligation under this contract is prevented or delayed by reasons of any war, hostility, acts of public enemy, civil commotion, sabotage, fires, floods, explosion, epidemics quarantine restriction, strikes, lockouts or acts of god (hereinafter referred to as events) provided notice of happenings of any such event, is served by party seeking concession to the other as soon as practicable, but within 21 days from the date of occurrence and termination thereof.

Provided the Party satisfies Institute adequately of the measures taken by it. Neither party shall, by reason of such event, be entitled to terminate this contract, nor shall either party have any claim for damages against the other in respect of such non-performance or delay in performance. Further, the services under the contract shall be resumed as soon as practicable after such event has come to an end or ceased to exist and the decision of Institute as to whether the services have to resume or not shall be final and conclusive, provided further, that if the performance in whole or in part of any obligation under this contract is prevented or delayed by reason of any such event for a period exceeding 60 days, Institute may at his option, terminate the contract.

8.14 Dispute resolution

1. The institute reserves the right to amend rules whenever and wherever considered necessary and appropriate. The same shall be intimated to the agency in due course.
2. Any dispute arising out of and in relation to this agreement shall be referred to the arbitration by sole arbitrator to be appointed by Director of the Institute. The arbitration would be conducted and governed by and under the provisions of Arbitration Act, 1996 and its amendments. Any legal dispute will be subject to jurisdiction of Kanpur Courts only and no other court shall have the jurisdiction.
3. Any dispute arising out of and in relation to this agreement shall be referred to the arbitration by sole arbitrator to be appointed by Director of the Institute. The arbitration would be conducted and governed by and under the provisions of Arbitration Act, 1996. Any legal dispute will be subject to jurisdiction of Kanpur Courts only and no other court shall have the jurisdiction.

8.15 Arbitration

1. Except as otherwise provided anywhere in this Agreement, if any dispute, difference, the question of disagreement or matter, whatsoever, arises between the parties, as to the meaning, operation or effect of the Agreement or out of or relating to the Agreement or breach thereof, the same shall be referred to a Sole Arbitrator, to be appointment by the Director of the Institute at the time of the dispute.
2. If the Arbitrator, to whom the matter is originally referred, dies or refuses to act or resigns for any reasons from the position of arbitration, it shall be lawful for the Director of the Institute to appoint another person to act as Arbitrator in the manner aforesaid. Such person shall be entitled to proceed with the reference from the stage at which it was left by its predecessor, provided both the parties consent to this effect, failing which, the arbitrator shall be entitled to proceed on the matter de- novo.
3. It is a term of the Agreement that the party invoking the arbitration shall specify all disputes to be referred to arbitration at the time of invocation of arbitration under the clause.
4. It is a term of the contract that the cost of arbitration shall be borne by the parties themselves.
5. The place of the arbitration shall be Kanpur Nagar, Uttar Pradesh, India.
6. Subject as aforesaid, the provisions of the Arbitration and Conciliation Act, 1996 and any statutory modifications, amendments or re-enactment thereof and rules made thereunder and for the time being in force, shall apply to the arbitration proceeding under this clause.

7. Except as otherwise provided anywhere in this Agreement, the Arbitration proceedings shall be conducted in English and the Agreement shall be constructed, interpreted and governed by the law of India, for the time being in force.

8.16 Jurisdiction of Courts

The court(s) at Kanpur Nagar, Uttar Pradesh, shall have the exclusive jurisdiction to try any as all the disputes(s) between the parties arising out this Agreement.

8.17 E& M Works

1. In interpreting the specifications, the following order of decreasing importance shall be followed in case of contradictions:
 - (a) Schedule of quantities
 - (b) Technical specifications of the NIT
 - (c) Approved Drawing (If any)
 - (d) CPWD General specifications Part-I (Internal) 2014, BIS Codes amended up to date, practices.
 - (e) CPWD General Specifications for Electrical Works Part-II (External), 2014 amended up to date.
 - (f) Relevant IS or other international code in case IS code is not available.
 - (g) Indian Electricity Act 2003 and Indian Electricity Rules 1956 amended up to date.
 - (h) Local Fire Regulations applicable at the place of installation. Relevant and applicable foreign standards and specifications amended up to date.
 - (i) Any other relevant act or rules and local by-laws.
2. contractor will identify one of the supervisors for taking care of implementation of Safety systems.
3. Smoking is strictly prohibited at workplace.
4. Nobody is allowed to work without wearing safety helmet. Chinstrap of safety helmet shall be always on. Drivers, helpers and operators are no exception.
5. No one is allowed to work at or more than three meters height without wearing safety belt and anchoring the lanyard of safety belt to firm support preferably at shoulder level.
6. No one is allowed to work without adequate foot protection.
7. Usage of eye protection equipment shall be ensured when workmen are engaged for grinding, chipping, welding and gas-cutting. For other jobs as and when site safety co-coordinator insists eye protection has to be provided.
8. All safety appliances like Safety shoes, Safety gloves, Safety helmet, Safety belt, Safety goggles etc. shall be arranged before starting the job.
9. All excavated pits shall be barricaded & barricading to be maintained till the backfilling is done. Safe approach to be ensured into every excavation.
10. Adequate illumination at workplace shall be ensured before starting the job at night.

11. All the dangerous moving parts of the portable / fixed machinery being used shall be adequately guarded.
12. Ladders being used at site shall be adequately secured at bottom and top. Ladders shall not be used as work platforms.
13. Material shall not be thrown from the height. If required, the area shall be barricaded and one person shall be posted outside the barricading for preventing the trespassers from entering the area.
14. Other than electricians no one is allowed to carry out electrical connections, repairs on electrical equipment or other jobs related thereto.
15. All electrical connections shall be made using 3 or 5 core cables, having a earth wire.
16. Inserting of bare wires for tapping the power from electrical sockets is completely prohibited.
17. A tools and tackles inspection register must be maintained and updated regularly.
18. Debris, scrap and other materials to be cleared from time to time from the workplace and at the time of closing of work every day.
19. All the unsafe conditions, unsafe acts identified by contractors, reported by site supervisors and/ or safety personnel to be corrected on priority basis.
20. No children shall be allowed to enter the workplace.
21. All the lifting tools and tackles shall be stored properly when not in use.
22. Clamps shall be used on Return cables to ensure proper earthing for welding works.
23. Return cables shall be used for earthing.
24. All the pressure gauges used in gas cutting apparatus shall be in good working condition.
25. Proper eye washing facilities shall be made in areas where chemicals are handled.
26. Connectors and hose clamps are used for making welding hose connections.
27. All underground cables for supplying construction power shall be routed using conduit pipes.
28. Spill trays shall be used to contain the oil spills while transferring / storing them.
29. Tapping of power by cutting electric cables in between must be avoided. Proper junction boxes must be used.
30. All the E & M works shall be carried out as per direction and to the satisfaction of the Engineer-in-charge.
31. If the specifications for any item or its component are not available in the CPWD specifications cited above, relevant BIS specification as amended up to date shall be followed, whether or not the specific reference of a particular BIS specification has been made in this specification/ tender document.
32. Wherever any reference to any Indian Standard specification occurs in the document relating to this contract the same shall be inclusive of all amendments issued there to or revisions thereof, if any, up to the date of opening of tenders.

33. All materials should conform to relevant BIS specifications wherever the same exists in absence of stipulation in this tender document.
34. Where manufacturers furnish specific instructions / recommendations relating to the materials used in this job and/or their installation, covering points not specifically mentioned in these documents, these instructions shall be followed in all cases and shall be deemed to be included in the schedule of work whether they have been specifically mentioned or not.
35. All chase cuttings in the wall, for recessed conduits & boxes and drilling the holes shall be done with power operated machines only. No chase shall be allowed to be cut manually with the use of hammer & chisel.
36. All cuttings in cement plaster and brick shall be made good by using cement mortar 1:3 (1 part cement, 3-part coarse sand) The cut surfaces shall be repaired by an experienced mason only so as to match the repaired plaster with the original. All such repaired surfaces shall be cured for 3 to 4 days to keep the surfaces wet, using water spray machine (hand/motor operated) and avoid unnecessary flooding of the area.
37. The structural and architectural drawings shall at all times be properly co-related before executing any work.
38. For the purpose of recording measurements and preparing running account bills, the abbreviated nomenclature indicated in the publications Abbreviated Nomenclature of Items of DSR 2022 shall be accepted. The abbreviated nomenclature shall be taken to cover all the materials and operations as per the complete nomenclature of the relevant items in the agreement and relevant specifications. In case of items for which abbreviated nomenclature is not available in the aforesaid publication and also in case of extra and substituted items for which abbreviated nomenclature are not provided for in the agreement, full nomenclature of item shall be reproduced in the measurement books and bill forms for running account bills. For the final bill, however, full nomenclature of all the items shall be adopted in preparing abstract in the electronic measurement books and in the bill forms.
39. Drawings/Data required prior to commencement of electrical/air-conditioning works and must be submitted to Office of Infrastructure and Planning seven days of award of work. Following drawings shall be furnished by the contractor for the approval of the Engineer-In-charge before execution of the work.
 - i) G.A and schematic drawings of equipments etc.
 - ii) Technical particulars/specifications of the equipments from approved makes.
40. Completion drawings: On completion of works and before issuance of completion certificate, the contractor submit completion drawings in the form of three complete set of originals (reproducible)
 - i) As built G.A and schematic drawings of equipments etc.
 - ii) Technical literature, test certificates, and operation and maintenance manuals for equipments.
41. Works Inspection and Testing of Equipment: Prior to dispatch of equipment the Institute reserves the right to inspect the same at the manufacturer's works and the contractor shall provide and secure every reasonable access and facility at the manufacturers works for inspection, for witness of all acceptance and routine tests as per relevant Indian Standards. Contractor shall give a reasonable notice of about 15 days for the purpose of test, and

witness of all major equipments.

42. Pre-commissioning test: All routine tests shall be carried out on the electrical equipment. Protective & measuring devices should be checked for calibration of MCCB's/MCB's, panel & cable meggaring , earthing measurements etc.
43. The defect liability shall be for **One year** from the actual date of completion of the work.
44. Since the chiller is of Kirloskar make, compatibility of the supplied equipments is utmost important.