INDIAN INSTITUTE OF TECHNOLOGY DELHI
HAUZ KHAS, NEW DELHI – 110016
<u>AC DIVISION</u>
TENDER DOCUMENT

NAME OF WORK	:	**Providing, Installation, Integration and Commissioning of Building Management System for Central Air Conditioning System of LHC Building, IIT Delhi**
ESTIMATED COST ₹	:	**3,66,69,547.00**
EMD ₹	:	**7,33,391.00 (No exemption allowed)**
N.I.T. No.	:	**131/0996/IITD/AC/2025-26**
Date of Opening	:	**03-02-2026**

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

NIT for the subject work has been prepared with the following:

1	Amount of NIT (INR)	:	3,66,69,547.00
2	Earnest money (INR)	:	7,33,391.00
3	Completion time	:	90 days (SITC) + 5 Yrs CAMC post DLP
4	Last date of submission (online)	:	02-02-2026 upto 3 PM
5	Date of opening	:	03-02-2026 after 3 PM
6	Form of NIT	:	CPWD / IITD – 8
7	Schedule applicable	:	Market Rate
8	Material stipulated	:	As per Schedule of Work
9	Chargeable heads	:	35.04.01 & 31.06.30
10	Work code no.	:	2021/006/0996 & 0997
11	NIT No.	:	131/0996/IITD/AC/2025-26

Certified that this NIT contains **1** to **99** pages.

AEE- in-charge, AC Divn   Junior Engineer (E), AC Divn.   Sr. Asstt. [AC]

NIT amounting to Rs.3,66,69,547.00 is approved.

Institute Engineer

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JE / Sr. Asstt.   AEE-in-charge AC Division

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JE / Sr. Asstt.   AEE-in-charge AC Division

INDIAN INSTITUTE OF TECHNOLOGY DELHI

AC DIVISION

NOTICE INVITING E-TENDER

IITD/WORKS (SP- 5235)/2026

Assistant Executive Engineer-in-charge, AC Division, Indian Institute of Technology Delhi, Hauz Khas, New Delhi – 110016, Ph. No. 011-2659 1746 on behalf of Board of Governors invites online **Item Rate Tender** from **OEM of Chiller AC or their Authorised Dealers** **in two bid system** as per details given below.

1	Name of work	:	Providing, Installation, Integration and Commissioning of Building Management System for Central Air Conditioning System of LHC Building, IIT Delhi
2	NIT No.	:	131/0996/IITD/AC/2025-26
3	Estimated Cost (Rs.)	:	3,66,69,547.00
4	Earnest Money Deposit (Rs.)	:	7,33,391.00 (No exemption allowed)
5	Period of completion	:	90 days (SITC) + 5 Yrs CAMC post DLP
6	Last date & time of bid submission	:	Upto 3 PM of 02-02-2026
7	Performance Bank Guarantee	:	5 percent of the tendered amount

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 enrol / 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.

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

Assistant Executive Engineer-in-charge, AC Division
For & on behalf of BOG, IIT Delhi

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JE / Sr. Asstt.   AEE-in-charge AC Division

Ch. Head	:	35.04.01	**PLN**	Work Code	:	2021/006/0996
	:	31.06.30	**NPN**		:	2021/006/0997

Copy to: -

1. A.R. (Works Accounts)
2. A.R. (A/C)
3. A.R. (Store Purchase Section)
4. Notice Board
5. Website Administrator, IIT Delhi
6. Office copy

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JE / Sr. Asstt.   AEE-in-charge AC Division

SCHEDULE

1	Name of organisation	:	Indian Institute of Technology Delhi
2	Tender / Quotation type (open / limited / EOI / auction / single)	:	Open
3	Tender / Quotation category (services / goods / works)	:	Goods & Works
4	Type of Contract (work / supply / auction / service / buy / empanelment / sell)	:	Work & Supply
5	Form of contract (IITD – 7/8)	:	IITD – 8
6	Work Category (civil / electrical / fleet management / computer systems)	:	Electrical
7	Is multi-currency allowed?	:	No
8	Date of publishing / issue / start	:	22.1.2026 5 pm
9	Document download start date	:	22.1.2026 5 pm
10	Document download end date	:	Upto 3 PM of 02-02-2026
11	Date & time of pre-bid meeting	:	No pre-bid meeting be held
12	Venue of pre-bid meeting	:	Not applicable
13	Last date & time of uploading of bids	:	Upto 3 PM of 02-02-2026
14	Date & time of opening of Technical Bids	:	03-02-2026 after 3 PM
15	Tender fee	:	Free of cost
16	Earnest Money Deposit (EMD) Rs.	:	**7,33,391.00 (No exemption allowed)**
17	Mode of payment of EMD	:	To be paid through online mode. IIT Delhi Bank details are as under: Name of the Bank A/C : **IITD Revenue Account** SBI A/C No. : **10773572622** Name of the Bank : **State Bank of India, IIT Delhi, Hauz Khas, New Delhi-110016** IFSC Code : **SBIN0001077** MICR Code : **110002156** Swift No. : **SBININBB547** (This is mandatory that UTR Number is provided in the on-line quotation/bid. (Kindly refer to the UTR Column of the Declaration Sheet at Annexure-I) Or Demand Draft / FDR favouring **Registrar, IIT Delhi** Payable at SBI, IIT Delhi Branch. **Scanned copy of DD / FDR needs to be uploaded alongwith the Technical Bid. Exact Original DD/ FDR** shall have to be submitted to the tender inviting authority by the bidder as and when required after opening of bid.
17	Bid without EMD / Non-submission of original DD	:	To be considered as UNRESPONSIVE and bid shall summarily be rejected

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JE / Sr. Asstt.   AEE-in-charge AC Division

18	No. of bids / covers (1 / 2 / 3 / 4)	:	**2**
19	Address for communication	:	**Assistant Executive Engineer-in-charge, AC Division**, Works Department, IIT Delhi, Hauz Khas, New Delhi – 110016
20	Contact No.	:	011 2659 1746
21	e-mail address for communication	:	a26984@admin.iitd.ac.in;

INSTRUCTIONS FOR ONLINE BID SUBMISSION

As per the directives of Department of Expenditure, this quotation / 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

REGISTRATION

1. Bidders are required to enrol 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 enrol". 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 user name and assign a password for their 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 recognised 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 into the site through the secured log-in by entering their user ID / password and the password of the DSC / eToken.

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, organisation name, location, date, value, etc. There is also an option of advanced

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search for tenders, wherein the bidders may combine a number of search parameters such as organisation 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.

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.

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 tender fee / EMD as applicable and enter details of the instrument. Whenever, EMD / Tender fees is sought, bidders need to pay the tender fee and EMD separately on-line through RTGS (Refer to Schedule, Page no. 3)

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 coloured [unprotected] cells with their respective financial quotes and other details (such as

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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 unauthorised 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 authorised 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. Kindly add scanned PDF of all relevant documents in a single PDF file of compliance sheet.

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. The contact number of the helpdesk is 18002337315.

GENERAL INSTRUCTIONS TO THE 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 authorised certifying agencies, details of which are available in the website https://eprocure.gov.in/eprocure/app under the link "Information about DSC".

3. 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.

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JE / Sr. Asstt.   AEE-in-charge AC Division

INFORMATION & INSTRUCTION TO BIDDERS FOR E-TENDERING

Assistant Executive Engineer-in-charge, AC Division, Indian Institute of Technology Delhi, Hauz Khas, New Delhi – 110016, Ph. No. 011-2659 1746 on behalf of Board of Governors invites online **Item Rate Tender** from OEM of Chiller AC or their Authorised Dealers in two bid system as per details given below:

Sr. No.	NIT No.	Name of Work & Location	Estimated cost put to bid (Rs.)	Earnest money (Rs.)	Period of completion	Last date & time of submission of bid	Time & date of opening of Technical Bid	Time & date of opening of Financial Bid
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	131/0996/IITD/AC/2025-26	Providing, Installation, Integration and Commissioning of Building Management System for Central Air Conditioning System of LHC Building, IIT Delhi	3,66,69,547.00	7,33,391.00 (No exemption allowed)	90 days (SITC) + 5 Yrs CAMC post DLP	Upto 3 PM of 02-02-2026	03-02-2026 after 3 PM	To be decided after assessing Technical Bids

1. The successful bidder shall be required to submit a performance guarantee of 5% of the tendered amount in the form of Bank Guarantee or F.D.R. from a Nationalized / Scheduled Bank within fifteen days of issue of letter of intent before award of work. In case of failure by the Contractor to submit the performance guarantee within the specified period, full earnest money will be forfeited by the Institute, and the tender shall be treated as null and void. EMD shall be refunded after submission of PBG. **The performance guarantee shall be initially valid up to the stipulated date of completion (i.e. 90 days) plus one hundred eighty days beyond that. Fresh PBG for CAMC period shall be submitted @5% of CAMC amount and to be submitted after completion / commissioning of original work. Original PBG shall be refunded following that event.**

2. **Earnest money (**EMD) shall have to be deposited / submitted as stipulated in the schedule.

3. Contractors who fulfil the following requirements shall be eligible to apply. Joint ventures are not accepted.

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JE / Sr. Asstt.   AEE-in-charge AC Division

a. Should have satisfactorily completed the works as mentioned below during the last Seven years ending **last day of the month previous to one in which tenders are invited.**

b. Should have proper Authorisation from OEM of Chiller AC. **Original ink-signed authorisation letter has to be submitted by the bidder on demand after opening of technical bid.**

c. **Both OEM and their Authorised Dealers can't participate simultaneously. In that case bids of authorised bidders' of the particular OEM shall become null and void.**

   i. **Three** similar works each costing not less than **Rs.97,47,000.00**, or **two** similar works each costing not less than **Rs.1,46,21,000.00**, or one similar work costing not less than **Rs.1,94,95,000.00.**

4. The value of executed work shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to previous day of last day of submission of bids.

5. **Similar work means Providing and installation of Central AC Plant with BMS system integrated with the Central AC Plant.**

6. **Work means** work done with some Central Government Department / State Government Department / Central Autonomous Body / *State Autonomous Body* / Central Public Sector Undertaking / *State Public Sector Undertakin*g / *City Development Authority* / *Municipa*l *Corporation of City formed under any Act by Central* / *State Government and published in Central* / *State Gazette* / any Public Authority / reputed Private Organisation in India.

7. Completion certificates are required to be got issued by an officer not below the rank / level / equivalent of Executive Engineer or managerial level (in case of non-public organisation) of similar works completed by the Firm. The work experience certificates submitted by the bidders shall clearly indicate that:

   a. The similar work executed shall be **as per '5' above**

   b. The completed cost of the work

   c. Actual date of completion of the work

8. IITD is committed to follow the principle of transparency, equity, and competitiveness in public procurement. Before submission of bid, **each bidder should sign integrity pact at respective places** and submit the bid. **If duly signed integrity pact is not submitted by bidder, such bid shall not be considered.**

9. **The intending bidder must read the terms and conditions [both commercial & Additional] & IITD - 6 carefully** which will be the part of the Contract. He should only submit his bid if he considers himself eligible and he is in possession of all the documents required.

10. Information and Instructions for bidders posted on website shall form part of bid document.

11. The bid document consisting of plans, specifications, 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 e-procure.gov.in free of cost.

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12. But the bid can only be submitted after submission/uploading of EMD as prescribed in the schedule.

13. Copy of all mandatory documents as desired in the NIT shall be scanned and up-loaded to the e-Tendering website within the period of bid submission. During scrutiny of technical bids, if required, bidders may be asked to submit original documents for cross checking. However, certified / original copy of all the scanned and up-loaded documents shall have to be submitted by the lowest bidder only within a week physically in the office of the tender inviting authority.

14. Online bid documents submitted by intending bidders shall be opened only of those bidders, who has submitted prescribed EMD, and other documents scanned and uploaded are found in order.

15. Those contractors not registered on the website mentioned above, are required to get registered beforehand. Bidders should refer "Instruction for Online Bid Submission" given earlier for further assistance.

16. When bids are invited in two / three stages systems and if it is desired to submit revised financial bid it shall be mandatory to submit revised financial bid. If not submitted, then the bid submitted earlier shall become invalid.

17. The department reserves the right to reject any prospective application without assigning any reason and to restrict the list of qualified contractors to any number deemed suitable by it, if too many bids are received satisfying the laid down criterion.

18. Contractors must ensure to quote rate of each item.

19. **The bid submitted shall become invalid if:**
    a. The bidder is found ineligible.
    b. The bidder does not upload scanned copies of all the documents stipulated in the bid document.
    c. If any discrepancy is noticed between the documents as uploaded at the time of submission of bid and hard copies as submitted physically by the lowest bidder in the office of bid opening / accepting authority.
    d. 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.
    e. EMD not deposited as specified.

20. Equipment to be supplied shall satisfy Class-1 criteria. 'Class – 1 Local Supplier' means a supplier or service provider, whose goods, services or works offered for procurement has local content equal to or more than 50% as defined under Order No. P-45021/2/2017-PP(BE-II) dated 04-06-2020 issued by Department for Promotion of Industry and Internal Trade (Public Procurement Section), Ministry of Commerce and Industry, Govt of India.

    a. 'Local Content' means the amount of value added in India which shall unless and otherwise prescribed by the nodal ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all domestic duties) as a proportion of the total value, in percent.

    b. For the purpose of verification of 'Local Content', the Class-1 Local Supplier / Service Provider at the time of bidding, tender or solicitation shall be required to indicate percentage of local content and provide self-certification that the items offered meet the

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local content requirement for Class – 1 Local Supplier. They shall also give details of the location(s) at which the local value addition is made.

   c. In cases of procurement for a value in excess of 10 crore, the Class – 1 Local Supplier shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in case of the companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.

   d. Nodal Ministries may constitute committees with internal and external experts for independent verification of self-certifications and auditor's / accountant's certificates on random basis and in the case of complaints.

   e. False declarations will be in breach of Code of Integrity under rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for upto two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.

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JE / Sr. Asstt.   AEE-in-charge AC Division

List of MANDATORY DOCUMENTS to be scanned and uploaded within the period of bid submission:

Sr. No.	:	Details of Document
1	:	Annexure – 1 duly filled in and got signed by the bidder
2	:	Annexure – 3 duly filled in and got signed by the bidder
3	:	Annexure – 5 (EMD Declaration), if applicable
4	:	Proof of online EMD deposit / Scanned copy of DD / FDR submission (favouring 'Registrar, IIT Delhi') The undertaking as per Annexure – 4 shall be submitted if EMD is submitted as DD/FDR
5	:	Certificate of work experience as desired (vide clauses 3 to 7 above) *[N.B. – for experience in private organisation, see point 13 below for further Compliances]*
6	:	Certificate of GST Registration
7	:	Affidavit as per provision of the clause 1.2.2 of **IITD-6** vide in following page (To be submitted on <u>stamp paper</u> (not less than One Hundred Rupees only) and <u>date of affidavit</u> and <u>purchase</u> of stamp paper <u>shall not be earlier</u> than the publication of NIT. <u>NIT number, Name of work and matter of the clause 1.2.2</u> shall be written on the **1ˢᵗ page** of the Stamp Paper and can be continued upto backside of the page) No separate annexure paper should be attached. Affidavit shall be duly notarised. Bidder will be required to re-submit fresh Affidavit, if any deviations noticed. N.B. A sample Affidavit write up is illustrated for convenience of the bidder vide Annexure-4
8	:	Acceptance to execute INTEGRITY PACT (see integrity pact only page - 22) *N.B. - If the Contractor is a partnership or a consortium, this Pact must be signed by all the partners or by one or more partner holding power of attorney signed by all partners and consortium members. In case of a Company, the Pact must be signed by a representative duly authorized by Board Resolution.*
9	:	IITD 7 / 8 duly signed by the bidder
10	:	EPFO & ESIC registration with paid challan (challan shall be not older than two months from the month on which the tender is invited)
11	:	Valid Electrical Licence in the name of the contractor. *if the bidder does not possess electrical licence in his own name, he shall have to submit an undertaking on their letter head and* the bidder shall scan and upload following undertaking along with other bid documents. a. *"I/We undertake that, if I/we do not possess in my/our name a valid*

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JE / Sr. Asstt.   AEE-in-charge AC Division

		electrical license as required, I/we shall associate an agency having such a licence for execution of work which requires such a licence".
12	:	Power of Attorney, as applicable, as per following "In the event of tender being submitted by a firm, it must be signed separately by each partner thereof or in the event of the absence of any partner, it must be signed on his behalf by a person holding a power of attorney authorising him to do so, such power of attorney to be produced with the tender and it must disclose that the firm is duly registered under the Indian Partnership Act 1952."
13	:	Bid specific Chiller AC **OEM Authorisation Certificate in favour of the bidder.** The certificate should include following two lines: a) The OEM will unconditionally support the bidder technically throughout the execution of contract as well as for Comprehensive Maintenance Contract for the useful life of the system, and N.B. Original ink-signed certificate needs to be submitted by the bidder
14	:	**Following documents are to be provided by the bidder if Non-Public (Private) Organisation Experience certificate is submitted in support of eligibility:** a. TDS certificate of the work experience certificate (related to 4 above). Bidder has to highlight the particular work for which TDS has been recorded.
15	:	Any other document as specified

Note:
a. Hard copies of documents are to be submitted as per clause 9.1 of IITD-6
b. Original copies of documents are to be submitted for verifications as and when demanded by the tender inviting authority
c. Bidders are advised to keep the Original Affidavit, EMD (if not deposited online) 'as it is' in safe custody till finalisation of bid

Assistant Executive Engineer in-charge, AC Division
For & on Behalf of BOG, IIT Delhi

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

<u>CPWD/IITD – 6</u>

INDIAN INSTITUTE OF TECHNOLOGY DELHI
NOTICE INVITING E-TENDER

1.0 Item rate tenders are invited on behalf of The Board of Governors, IIT Delhi, Hauz Khas, New Delhi - 110016 from OEM of Chiller AC or their Authorised Dealers in two bid system as per details given below for the work of **Providing, Installation, Integration and Commissioning of Building Management System for Central Air Conditioning System of LHC Building, IIT Delhi**

1.1 The work is estimated to cost **Rs.3,66,69,547.00.** This estimate, however, is given merely as a rough guide.

1.2 Intending bidder is eligible to submit the bid provided he has definite proof from the appropriate authority, which shall be to the satisfaction of the competent authority, of having satisfactorily completed similar works of magnitude specified below: -

1.2.1 **Criteria of eligibility for submission of bid documents: Conditions for intending bidders / contractors**

1.2.1.1 **Three** similar works each costing not less than **Rs.97,47,000.00**, or **two** similar works each costing not less than **Rs.1,46,21,000.00**, or one similar work costing not less than **Rs.1,94,95,000.00** in last 7 years ending last day of the month previous to the one in which tenders are invited. The value of executed work shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to last date of submission of bid.

1.2.2 **To become eligible for issue of bid, the bidders shall have to furnish an affidavit as under: -** *"I / We undertake and confirm that eligible similar works(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 bidding in IIT Delhi in future forever. Also, if such a violation comes to the notice of Department before date of start of work, the Engineer-in-Charge shall be free to forfeit the entire amount of Earnest Money Deposit/Performance Guarantee (Scanned copy to be uploaded at the time of submission of bid)"*

2.0 Agreement shall be drawn with the successful bidders on prescribed Form No. IITD 7/8 which is available as IIT Delhi Publication. Bidders shall quote their rates as per various terms and conditions of the said form which will form part of the agreement.

3.0 The time allowed for carrying out the work (SITC part) will be **90 days** 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, if any, indicated in the bid documents.

4.0 The site for the work is available.

5.0 The bid document consisting of plans, specifications, 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 except Standard General Conditions of Contract Form can be seen from the web Site **e-procure.gov.in.**

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

6.0 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 tender as notified.

7.0 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 tender as notified.

8.0 If it is desired to submit revised financial bid then it shall be mandatory to submit revised financial bid. If not submitted then the tender submitted earlier shall become invalid.

9.0 EMD shall have to be deposited as stipulated in the schedule of the NIT.

9.1 Copy of all 'mandatory documents' and other documents as specified in the press notice shall be scanned and uploaded to the e-tendering website within the period of bid submission. *However, original affidavit, EMD (if not deposited online) and certified copies of all the scanned and uploaded documents as specified in press notice shall have to be submitted by the lowest bidder only within a week physically in the office of tender opening authority. Original copies of other documents are also to be shown for scrutiny and verifications by the tender opening / accepting authority.*

10.0 The bid submitted shall become invalid if:
10.1 The bidder is found ineligible.
10.2 The bidder does not upload scanned copies of all the documents stipulated in the bid document.
10.3 If any discrepancy is noticed between the documents as uploaded at the time of submission of bid and hard copies as submitted physically by the lowest bidder in the office of bid opening / accepting authority.
10.4 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.
10.5 EMD not deposited / submitted as specified.

11.0 The contractor whose bid is accepted will be required to furnish **performance guarantee** of 5% (Five Percent) of the bid amount within the period specified in Schedule F. This guarantee shall be in the form of Insurance Surety Bonds, Account Payee Demand Draft, Fixed Deposit Receipt or Bank Guarantee from any of the Commercial Banks in accordance with the prescribed form. 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 Earnest Money deposited by the contractor shall be forfeited automatically without any notice to the contractor. The earnest money deposited along with bid shall be refunded only after receiving the aforesaid performance guarantee as per stipulation.

12.0 Intending Bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their bids as to the nature of the ground and subsoil (so far as is practicable), the form and nature of the site, the means of access to the site, 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. A bidder shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charge consequent on any misunderstanding or otherwise shall be allowed. The bidders shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity access, facilities for workers and all

C … Nil   I ….. Nil   O …… Nil

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 Government and local conditions and other factors having a bearing on the execution of the work.

13.0 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 the assignment of any reason. All bids in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the bidder shall be summarily rejected.

14.0 Canvassing whether directly or indirectly, in connection with bidders is strictly prohibited and the bids submitted by the contractors who resort to canvassing will be liable for rejection.

15.0 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 bidder shall be bound to perform the same at the rate quoted.

16.0 The contractor shall not be permitted to bid for works in the IITD responsible for award and execution of contracts, in which his near relative is posted a Divisional Accountant or as an officer in any capacity between the grades of Superintending Engineer and Junior Engineer (both inclusive). 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 IIT Delhi. Any breach of this condition by the contractor would render him liable to be debarred from bidding process in future in IIT Delhi.

17.0 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 liable to be cancelled, 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.

18.0 **The bids for the work shall remain open for acceptance for a period of 90 (ninety) days from the date of opening of technical bids. Further**

18.1 If any tenderer withdraws his tender or makes any modification in the terms & conditions of the tender which is not acceptable to the department within 7 days after last date of submission of bids, then the Government shall without prejudice to any other right or remedy, be at liberty to forfeit 50% of the earnest money absolutely irrespective of letter of acceptance for the work is issued or not.

18.2 If any tenderer withdraws his tender or makes any modification in the terms & conditions of the tender which is not acceptable to the department after expiry of 7 days after last date of submission of bids, then the Government shall without prejudice to any other right or remedy, be at liberty to forfeit 100% of the earnest money absolutely irrespective of letter of acceptance for the work is issued or not.

18.3 In case of forfeiture of earnest money as prescribed in para (18.1) and (18.2) above, the bidders shall not be allowed to participate in the rebidding process of the same work.

C … Nil   I ….. Nil   O …… Nil

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19.0   This notice inviting bid shall form a part of the contract document. The successful bidder / contractor, on acceptance of his bid by the Accepting Authority shall **within fifteen days** from the stipulated date of start of the work, sign the contract consisting of:-

19.1   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.

19.2   Standard IITD Form –7/8 or other Standard IITD Form as applicable.

20.0   **Integrity Pact:** The contractor shall download the Integrity Pact, which is a part of tender documents, affix his signature and upload the same while submitting online bids. In the event of his failure to sign and upload the Integrity Pact along with other bid documents, his bid shall be rejected.

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

INTEGRITY PACT

To

……………………..,

……………………..,

……………………..

Sub: NIT No. 131/0996/IITD/AC/2025-26 for the work of **"Providing, Installation, Integration and Commissioning of Building Management System for Central Air Conditioning System of LHC Building, IIT Delhi"**

Dear Sir,

It is hereby declared that IIT Delhi (IITD) is committed to follow the principle of transparency, equity and competitiveness in public procurement.

The subject Notice Inviting Tender (NIT) is an invitation to offer made on the condition that the Bidder will sign the Integrity Agreement, which is an integral part of the tender/bid documents, failing which the tender/bidder will stand disqualified from the tendering process and the bid of the bidder would be summarily rejected.

This declaration shall form part and parcel of the Integrity Agreement and signing of the same shall be deemed as acceptance and signing of the Integrity Agreement on behalf of the IITD.

Yours faithfully,

**Assistant Executive Engineer in-charge, AC Division
For & on Behalf of BOG, IIT Delhi**

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

[TO BE SUBMITTED DULY SIGNED BY THE BIDDER ALONGWITH BID DOCUMENTS]

To

Assistant Executive Engineer-in-charge, AC Division,
IIT Delhi, Hauz Khas,
New Delhi – 110016

Subject: Submission of Bid for the work of **"Providing, Installation, Integration and Commissioning of Building Management System for Central Air Conditioning System of LHC Building, IIT Delhi"**

Dear Sir,

I / We acknowledge that IIT Delhi is committed to follow the principles thereof as enumerated in the Integrity Agreement enclosed with the tender/bid document.

I / We agree that the Notice Inviting Tender (NIT) is an invitation to offer made on the condition that I / We will sign the enclosed integrity Agreement, which is an integral part of tender / bid documents, failing which I / We will stand disqualified from the tendering process. I / We acknowledge that THE MAKING OF THE BID SHALL BE REGARDED AS AN UNCONDITIONAL AND ABSOLUTE ACCEPTANCE of this condition of the NIT.

I / We confirm acceptance and compliance with the Integrity Agreement in letter and spirit and further agree that execution of the said Integrity Agreement shall be separate and distinct from the main contract, which will come into existence when tender/bid is finally accepted by IITD. I / We acknowledge and accept the duration of the Integrity Agreement, which shall be in the line with Article 1 of the enclosed Integrity Agreement.

I / We acknowledge that in the event of my/our failure to sign and accept the Integrity Agreement, while submitting the tender/bid, IITD shall have unqualified, absolute and unfettered right to disqualify the tenderer /bidder and reject the tender/bid is accordance with terms and conditions of the tender/bid.

Yours faithfully,

(Duly signed by authorized signatory of the Bidder)

(To be signed by the bidder and same signatory competent / authorized to sign the relevant contract on behalf of IITD)

C … Nil   I ….. Nil   O …… Nil

INTEGRITY AGREEMENT

This Integrity Agreement is made at ……………… on this …………… day of……………… 20………………………………………………

BETWEEN

The Board of Governors, IIT Delhi, Hauz Khas, New Delhi - 16 represented through **Assistant Executive Engineer-in-charge, AC Division**, IIT Delhi, (Hereinafter referred as the '**Principal/Owner**', '**Principal/Owner**', which expression shall unless repugnant to the meaning or context hereof include its successors and permitted assigns)

AND

....
....
(Name and Address of the Individual/firm/Company)
Through…………………………………………………………..………………………………………………………..
…………………………………………………………………………. (Hereinafter referred
(Details of duly authorized signatory)
to as the "**Bidder/Contractor**" and which expression shall unless repugnant to the meaning or context hereof include its successors and permitted assigns)

PREAMBLE

WHEREAS the Principal / Owner has floated the Tender (NIT No. 131/0996/IITD/AC/2025-26) (hereinafter referred to as "**Tender/Bid**") and intends to award, under laid down organizational procedure, contract for **"Providing, Installation, Integration and Commissioning of Building Management System for Central Air Conditioning System of LHC Building, IIT Delhi"** (Name of work) hereinafter referred to as the "**Contract**".

AND WHEREAS the Principal/Owner values full compliance with all relevant laws of the land, rules, regulations, economic use of resources and of fairness/transparency in its relation with its Bidder(s) and Contractor(s) AND WHEREAS to meet the purpose aforesaid both the parties have agreed to enter into this Integrity Agreement (hereinafter referred to as "**Integrity Pact**" or **"Pact"**), the terms and conditions of which shall also be read as integral part and parcel of the Tender/Bid documents and Contract between the parties.

NOW, THEREFORE, in consideration of mutual covenants contained in this Pact, the parties hereby agree as follows and this Pact witnesses as under:

ARTICLE 1: COMMITMENT OF THE PRINCIPAL / OWNER

1. The Principal/Owner commits itself to take all measures necessary to prevent corruption and to observe the following principles:
    1.1. No employee of the Principal / Owner, personally or through any of his / her family members, will in connection with the Tender, or the execution of the Contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

person is not legally entitled to.

    1.1.1. The Principal/Owner will, during the Tender process, treat all Bidder(s) with equity and reason. The Principal/Owner will, in particular, before and during the Tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the Tender process or the Contract execution.

    1.1.2. The Principal/Owner shall Endeavour to exclude from the Tender process any person, whose conduct in the past has been of biased nature.

2. If the Principal/Owner obtains information on the conduct of any of its employees which is a criminal offence under the Indian Penal code (IPC)/Prevention of Corruption Act, 1988 (PoC Act) or is in violation of the principles herein mentioned or if there be a substantive suspicion in this regard, the Principal/Owner will inform the Chief Vigilance Officer and in addition can also initiate disciplinary actions as per its internal laid down policies and procedures.

ARTICLE 2: COMMITMENT OF THE BIDDER(S) / CONTRACTOR(S)

1. It is required that each Bidder/Contractor (including their respective officers, employees and agents) adhere to the highest ethical standards, and report to the Government / Department all suspected acts of **fraud or corruption or coercion or collusion** of which it has knowledge or becomes aware, during the tendering process and throughout the negotiation or award of a contract.

2. The Bidder(s)/Contractor(s) commits himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the Tender process and during the Contract execution:

    2.1. The Bidder(s)/Contractor(s) will not, directly or through any other person or firm, offer, promise or give to any of the Principal/Owner's employees involved in the Tender process or execution of the Contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the Tender process or during the execution of the Contract.

    2.2. The Bidder(s)/Contractor(s) will not enter with other Bidder(s) into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to cartelize in the bidding process.

    2.3. The Bidder(s) / Contractor(s) will not commit any offence under the relevant IPC/PoC Act. Further the Bidder(s) / Contractor(s) will not use improperly, (for the purpose of competition or personal gain), or pass on to others, any information or documents provided by the Principal / Owner as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

    2.4. The Bidder(s) / Contractor(s) of foreign origin shall disclose the names and addresses of agents / representatives in India, if any. Similarly Bidder(s) / Contractor(s) of Indian Nationality shall disclose names and addresses of foreign agents/representatives, if any. Either the Indian agent on behalf of the foreign principal or the foreign principal directly could bid in a tender but not both. Further, in cases where an agent participate in a tender on behalf of one manufacturer, he shall not be allowed to quote on behalf of another manufacturer along with the first manufacturer in a subsequent/parallel tender for the same item.

    2.5. The Bidder(s)/Contractor(s) will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the Contract.

3. The Bidder(s)/Contractor(s) will not instigate third persons to commit offences outlined above or

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

be an accessory to such offences.

4. The Bidder(s)/Contractor(s) will not, directly or through any other person or firm indulge in fraudulent practices **means a wilful misrepresentation or omission of facts or submission of fake/forged documents in order to induce public official to act in reliance thereof, with the purpose of obtaining unjust advantage by or causing damage to justified interest of others and/or to influence the procurement process to the detriment of the Government interests**.

5. The Bidder(s)/Contractor(s) will not, directly or through any other person or firm use Coercive Practices (means the act of obtaining something, compelling an action or influencing a decision through intimidation, threat or the use of force directly or indirectly, where potential or actual injury may befall upon a person, his/ her reputation or property to influence their participation in the tendering process).

ARTICLE 3: CONSEQUENCES OF BREACH

Without prejudice to any rights that may be available to the Principal / Owner under law or the Contract or its established policies and laid down procedures, the Principal/Owner shall have the following rights in case of breach of this Integrity Pact by the Bidder(s)/Contractor(s) and the Bidder/ Contractor accepts and undertakes to respect and uphold the Principal/Owner's absolute right:

1. If the Bidder(s)/Contractor(s), either before award or during execution of Contract has committed a transgression through a violation of Article 2 above or in any other form, such as to put his reliability or credibility in question, the Principal/Owner after giving 14 days' notice to the contractor shall have powers to disqualify the Bidder(s)/Contractor(s) from the Tender process or terminate/determine the Contract, if already executed or exclude the Bidder/Contractor from future contract award processes. The imposition and duration of the exclusion will be determined by the severity of transgression and determined by the Principal/Owner. **Such exclusion may be forever or for a limited period as decided by the Principal/Owner**.

2. **Forfeiture of EMD/Performance Guarantee/Security Deposit**: If the Principal/Owner has disqualified the Bidder(s) from the Tender process prior to the award of the Contract or terminated/determined the Contract or has accrued the right to terminate/determine the Contract according to Article 3(1), the Principal/Owner apart from exercising any legal rights that may have accrued to the Principal/Owner, may in its considered opinion forfeit the entire amount of Earnest Money Deposit, Performance Guarantee and Security Deposit of the Bidder/Contractor.

3. **Criminal Liability**: If the Principal/Owner obtains knowledge of conduct a Bidder or Contractor, or of an employee or a representative or an associate of a Bidder or Contractor which constitutes corruption within the meaning of IPC Act, or if the Principal / Owner has substantive suspicion in this regard, the Principal/Owner will inform the same to law enforcing agencies for further investigation.

ARTICLE 4: PREVIOUS TRANSGRESSION

1. The Bidder declares that no previous transgressions occurred in the last 5 years with any other Company in any country confirming to the anticorruption approach or with Central Government or State Government or any other Central/State Public Sector Enterprises in India that could justify his exclusion from the Tender process.

2. If the Bidder makes incorrect statement on this subject, he can be disqualified from the Tender process or action can be taken for banning of business dealings/ holiday listing of the Bidder/Contractor as deemed fit by the Principal/ Owner.

3. If the Bidder/Contractor can prove that he has resorted / recouped the damage caused by him

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C … Nil   I ….. Nil   O …… Nil

and has installed a suitable corruption prevention system, the Principal/Owner may, at its own discretion, revoke the exclusion prematurely.

ARTICLE 5: EQUAL TREATMENT OF ALL BIDDERS/CONTRACTORS/SUBCONTRACTORS

1. The Bidder(s)/Contractor(s) undertake(s) to demand from all subcontractors a commitment in conformity with this Integrity Pact. The Bidder/Contractor shall be responsible for any violation(s) of the principles laid down in this agreement/Pact by any of its Sub-contractors/sub-vendors.
2. The Principal/Owner will enter into Pacts on identical terms as this one with all Bidders and Contractors.
3. The Principal/Owner will disqualify Bidders, who do not submit, the duly signed Pact between the Principal/Owner and the bidder, along with the Tender or violate its provisions at any stage of the Tender process, from the Tender process.

ARTICLE 6: DURATION OF THE PACT

1. This Pact begins when both the parties have legally signed it. It expires for the Contractor/Vendor 6 months after the completion of work under the contract or till the continuation of defect liability period, whichever is more and for all other bidders, till the Contract has been awarded.
2. If any claim is made/lodged during the time, the same shall be binding and continue to be valid despite the lapse of this Pacts as specified above, unless it is discharged/determined by the Competent Authority of IIT Delhi.

ARTICLE 7: OTHER PROVISIONS

1. This Pact is subject to Indian Law, place of performance and jurisdiction is the Head Quarters of the Division of the Principal/Owner, who has floated the Tender.
2. Changes and supplements need to be made in writing. Side agreements have not been made.
3. If the Contractor is a partnership or a consortium, this Pact must be signed by all the partners or by one or more partner holding power of attorney signed by all partners and consortium members. In case of a Company, the Pact must be signed by a representative duly authorized by Board Resolution.
4. Should one or several provisions of this Pact turn out to be invalid; the remainder of this Pact remains valid. In this case, the parties will strive to come to an agreement to their original intensions.
5. It is agreed term and condition that any dispute or difference arising between the parties with regard to the terms of this Integrity Agreement / Pact, any action taken by the Owner/Principal in accordance with this Integrity Agreement/ Pact or interpretation thereof shall not be subject to arbitration.

ARTICLE 8: LEGAL AND PRIOR RIGHTS

1. All rights and remedies of the parties hereto shall be in addition to all the other legal rights and remedies belonging to such parties under the Contract and/or law and the same shall be deemed to be cumulative and not alternative to such legal rights and remedies aforesaid. For the sake of brevity, both the Parties agree that this Integrity Pact will have precedence over the Tender/Contact documents with regard any of the provisions covered under this Integrity Pact.

   IN WITNESS WHEREOF the parties have signed and executed this Integrity Pact at the place and

C … Nil   I ….. Nil   O …… Nil

date first above mentioned in the presence of following witnesses:

....
(For and on behalf of Principal / Owner)

....
(For and on behalf of Bidder / Contractor)

WITNESSES:

1.   ....

                 (signature, name and address)

2.   ....
                 (signature, name and address)

Place: Dated :

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

INDIAN INSTITUTE OF TECHNOLOGY DELHI
HAUZ KHAS, NEW DELHI - 110016

Percentage Rate Tender / Item Rate Tender & Contract for Works

Tender for the work of **"Providing, Installation, Integration and Commissioning of Building Management System for Central Air Conditioning System of LHC Building, IIT Delhi"**

1. To be submitted online by **Upto 3 PM of 02-02-2026**
2. To be opened on **03-02-2026 after 3 PM** online

e-TENDER

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, Conditions of Contract, 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, IIT Delhi 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 / ninety days from the date of opening of financial bid in case tenders are invited on 2/3 envelop system (**strike out as the case may be**) and not to make any modification in its terms and conditions.

A sum of **Rs. 7,33,391.00** is hereby deposited in IIT Delhi Revenue Account No. 10773572622 as earnest money / / **A Demand Draft / FDR of Rs.7,33,391.00** favouring Registrar, IIT Delhi has been scanned and uploaded with the Technical Bid. If I / We, fail to furnish the prescribed performance guarantee within prescribed period I / We agree that the said The Board of Governors, IIT Delhi, Hauz Khas, New Delhi - 16 or his successors, in office shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely. Further, if I / We fail to commence the work as specified, I / We agree that The Board of Governors, IIT Delhi, Hauz Khas, New Delhi - 16 or the successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said earnest money and the performance guarantee absolutely, otherwise the said earnest money shall be retained by him towards security deposit 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 Clause 12.2 and 12.3 of the tender form. Further, I / We agree that in case of forfeiture of Earnest Money & 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 IIT Delhi in future forever. Also,

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt. | AEE-in-charge AC Division

if such a violation comes to the notice of Department before date of start of work, the Engineer-in-Charge shall be free to forfeit the entire amount of Earnest Money Deposit/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 of the State.

Dated:

Signature of Contractor

Witness:

Postal Address

Address:

Occupation:

ACCEPTANCE

The above tender (as modified by you as provided in the letters mentioned hereunder) is accepted by me for an on behalf of The Board of Governors, IIT Delhi, Hauz Khas, New Delhi - 110016   for   a   sum   of (Rupees…………...…………………………………………………………………….).

The letters referred to below shall form part of this contract / agreement: -

(a)

(b)

(c)

For & on behalf of Board of Governors, IIT Delhi

Signature …………………………………..

Dated:

Designation ……………………………….

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

PROFORMA OF SCHEDULES

SCHEDULE "A"

Schedule of Quantities (PWD-3)

SCHEDULE "D"

Extra schedule for specific requirements / documents for the work, if any.

------ NIL -----

SCHEDULE "E"

Reference to General Conditions of Contract: GCC of Maintenance Work 2023 published by CPWD as amended up to last date of submission of bid.

1.	**Name of work**	:	Providing, Installation, Integration and Commissioning of Building Management System for Central Air Conditioning System of LHC Building, IIT Delhi
2.	Estimated cost of work (₹)	:	3,66,69,547.00
3.	Earnest Money (₹)	:	7,33,391.00 (to be refunded after receiving performance guarantee as per stipulation)
4.	Performance Guarantee	:	5 percent of tendered value
5.	Security Deposit	:	2.5% (percent) of tendered value

SCHEDULE "F"

GENERAL RULES & DIRECTIONS:

Officer inviting tender	:	**Assistant Executive Engineer-in-charge, AC Division**
Maximum percentage for quantity of items of work to be executed beyond which rates are to be determined in accordance with Clauses 12.2 & 12.3	:	**See below**

   DEFINITIONS:

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

2 (V)	Engineer-in-charge	:	**Assistant Executive Engineer in-charge, AC Division**
2 (viii)	Accepting authority	:	**Institute Engineer**
2 (x)	Percentage on cost of materials and labour to cover all overheads and profits	:	15 percent
2 (xi)	Standard Schedule of Rates	:	Market Rate
2 (xii)	Department	:	Estate & Works, IIT Delhi
9 (ii)	Reference to General condition of contract	:	CPWD / IITD Form 7 / 8 as modified and corrected upto date, GCC 2023 for Maintenance work of CPWD with latest modifications

CLAUSE 1

i)	Time allowed for submission of Performance Guarantee from the date of issue of letter of acceptance	:	15 days
ii)	Maximum allowable extension beyond the period provided in (i) above with late fees @0.1% per day of performance guarantee	:	10 days

CLAUSE 2

(i)	Authority for fixing compensation under Clause 2	:	Institute Engineer

CLAUSE 2A

(i)	Whether Clause 2A shall be applicable	:	No

CLAUSE 5

(i)	Number of days from the date of issue of letter of acceptance for reckoning date of start	:	10 days

TABLE OF MILESTONE(S):

Sr.	Description of Milestone	Time allowed in	Amount to be with-held

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

No.	(physical)	days (from date of start)	in case of non-achievement of milestone
(1)	(2)	(3)	(4)
1	3/8th (of the whole work)	½ of total time	In the event of non-achieving the necessary progress as assessed from the running payment 1% of the tendered value of the work will be withheld as per applicable clause of GCC
2	3/4th (of the whole work)	3/4th of total time	Do
3	Full	Full	

Time allowed for execution of work	:	90 days

Authority to decide:	Extension of time	:	Engineer-in-charge
	Rescheduling of milestones	:	Institute Engineer
	Shifting of date of start in case of delay in handing over of site	:	Engineer-in-charge

CLAUSE 5

Clause applicable 5 / 5A	:	5

CLAUSE 6

MB applicable: Computerised Measurement Book (CMB) / Electronic Measurement Book (EMB)	:	CMB

CLAUSE 7

Gross work to be done together with net payment / adjustment of advances for materials collected, if any, since the last such payment for being eligible to interim payment	:	30 Lakhs

CLAUSE 7A

Whether Clause 7A shall be applicable	:	No

C … Nil   I ….. Nil   O …… Nil

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CLAUSE 1OA

List of testing equipment to be provided by the contractor at site					
1	500 Volt Megger	2	Digital Multimeter	3	Tong tester
4	NIL	5	NIL	6	NIL

CLAUSE 1OB (ii)

Whether Clause 10 B (ii) shall be applicable (Yes / No)	:	No

CLAUSE 1O C

Component of labour expressed as percent of value of work	:	15 Percent

CLAUSE 1OCC

Whether Clause 1OCC shall be applicable	:	Not applicable

CLAUSE 11

Specification to be followed for execution of work	:	CPWD General Specifications Electrical Work and for HVAC Work with other relevant parts as amended up to date

CLAUSE 12

12.2	Deviation limit beyond which clauses 12.2 shall apply for building work / HVAC work	:	100%

CLAUSE 16

Competent authority for deciding reduced rates	:	Institute Engineer

CLAUSE 18

List of mandatory machinery, tools & plants to be deployed by the contractor at site

C … Nil   I ….. Nil   O …… Nil

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| 1 | 500 V megger | 2 | Digital Multimeter | 3 | **Tong Tester** |
| 4 | **NIL** | 5 | **NIL** | 6 | **NIL** |

CLAUSE 19C

Authority to decide penalty for each default	:	Engineer-in-charge

CLAUSE 19D

Authority to decide penalty for each default	:	Engineer-in-charge

CLAUSE 19G

Authority to decide penalty for each default	:	Engineer-in-charge

CLAUSE 19K

Authority to decide penalty for each default	:	Not applicable

CLAUSE 25

Constitution of Dispute Redressal Committee (DRC)

Conciliator	:	Dean / Associate Dean Infra
Arbitrator Appointing Authority	:	Director
Place of Arbitration	:	IIT Delhi

C … Nil   I ….. Nil   O …… Nil

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CLAUSE 32

Requirement of Technical Representative(s) and recovery rate

Sr. No.	Minimum qualification of Technical Representative	Discipline	Designation (Principal Technical / Technical representative)	Minimum experience	Number	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of clause 36 (i)	
						Figures	**Words**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Graduate or Diploma Engg.	Electrical or Elect & Electronics or Mechanical	Project Manager	2 years Graduate or 5 years Diploma	1	Rs.15,000/- per month per Representative	Fifteen Thousand
2	Graduate or Diploma Engg.	Electrical or Elect & Electronics or Mechanical	Site Engineer cum billing Engineer	2 years Graduate or 5 years Diploma	1	Rs.15,000/- per month per Representative	Fifteen Thousand

Assistant Engineers retired from Govt. / IIT Delhi services that are holding Diploma will be treated at par with Graduate Engineers. Diploma holder with minimum 10-year relevant experience with a reputed construction co. can be treated at par with Graduate Engineers for the purpose of such deployment subject to the condition that such diploma holders should not exceed 50% of requirement of degree engineers.

CLAUSE 38

Applicability of Clause 38	:	Not applicable

C … Nil   I ….. Nil   O …… Nil

COMMERCIAL AND ADDITIONAL CONDITIONS

1.   GENERAL

1.1.   This specification covers supply and delivery of materials at site, all preparatory work assembly and installation, commissioning and putting into operation of BMS system & final testing & commissioning at site. This is a turnkey job.

1.2.   Location: **The system will be installed in LHC Bldg and to be integrated with Central Chiller AC system at IIT Delhi.**

1.3.   The work shall be executed as per CPWD General Specifications for Electrical Works Part-I (Int.) 2013, Part-II (Ext.) 1994, HVAC Work 2024, as amended upto date, relevant I.E. Rules, BIS/IEC and as per directions of Engineer-in- Charge. These additional specifications/conditions are to be read in conjunction with above and in case of variations; specifications given in these additional conditions shall apply. However, nothing extra shall be paid on account of these additional specification and conditions, as the same are to be read along with schedule of quantities for the work.

1.4.   The tenderer should in his own interest visit the site and get familiarized with the site conditions before tendering.

1.5.   No T&P shall be issued by the Department and nothing extra shall be paid on account of this.

2.   COMMERCIAL CONDITIONS:

2.1.   **Type of contract:** The work to be awarded by this tender shall be treated as indivisible works contract.

2.2.   **Submission and opening of Tenders:**

2.2.1. The tender is in two parts:

2.2.1.1.   Part-I -Technical cum Un-priced commercial Bid

2.2.1.2.   Part-II-Price Bid

2.3.   The tender shall be submitted online, duly completed as per NIT conditions within period of bid submission.

2.4.   The tenderers are advised not to deviate from the technical specifications / item, commercial terms and conditions of NIT like terms of payment, guarantee, arbitration clause, escalation etc.

2.5.   Technical cum un-priced commercial bid only shall be opened on the due date and time in the presence of tenderers or their authorized representative who wish to remain present.

2.6.   Scrutiny/evaluation of the technical-cum-commercial bid shall be done by the department. In case, it is found that the technical-cum-commercial bid of a tenderer is not in line with NIT specifications/requirements and/or contains too many deviations, the department reserves the right to reject the technical bid of such firms(s) without making any reference to the tenderer(s).

C … Nil   I ….. Nil   O …… Nil

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2.7. Necessary clarifications required by the department shall have to be furnished by the tenderer within the time given by the department for the same. The tenderer will have to depute his representative to discuss with the officer(s) of the department as and when so desired. In case, in the opinion of the department a tenderer is taking undue long time in furnishing the desired clarifications, his bid will be rejected without making any reference.

2.8. After obtaining clarification from all the tenders, the department will intimate the tenders whose technical cum commercial bids are acceptable.

2.9. The price bids of only those tenderers shall be opened whose technical bids are found to be technically acceptable. The time and date of opening of price bid shall be fixed after the technical cum unpriced commercial bid is accepted and intimated to them by post/Fax/e-mail.

2.10. The department reserves the right to reject any or all the price bids and call for fresh prices/tenders as the case may be without assigning any reason.

3.   TERMS OF PAYMENTS

3.1. The following percentage of contract rates for the various items included in the contract shall be payable against the stage of work shown herein: -

3.1.1. 80% after initial inspection and delivery at site in good condition on prorata basis.

3.1.2. 10% after completion of installation in all respect,

3.1.3. Balance 10% will be paid after testing, commissioning, trial run and handing over to the department for beneficial use including fire inspection.

3.2. Bidder should note that necessary documents (PAN card, cancelled cheque, GST Reg. proof and RTGS mandate form as per prescribed proforma of IIT Delhi) be submitted as soon as the work is awarded to them. Separate Contractor's Code shall be generated in IIT Delhi if the bidder is a new contractor to IIT Delhi ('Code' is perpetual in nature). Payment shall be processed after submission of Invoice and necessary documents / certificates (as mentioned in the NIT). There is a prevailing practice of pre-audit (for total tendered amount more than 6 lakhs) at IIT Delhi before releasing final payment. Bidder shall have to comply all necessary documents as outlined in the Contract as to be desired by the Auditor and or by the accountant. It may take one to two months in the whole process (from submission / acceptance of bill in CMB / MB by the contractor upto processing by Accounts section) to release payment subject to quick compliance of all submittals by the contractor. Applicable Taxes shall be got deducted from the bill as per prevailing orders of the Government. 'GST part of the bill' shall be released after submission of proof of payment of GST, i.e., B2B challan, etc. as may be, by the contractor.

3.3. Income tax, GST, labour cess & other statutory deduction etc. shall be made at source as per the prevalent laws. The deduction of Security Deposit, Income Tax, etc., shall be done after calculation for the above due payment as per clause 3.1 above and net payment shall reduce accordingly.

4.   AWARD OF WORK

4.1. Work shall be awarded to the successful bidder only after concurrence of the **Auditor of the Internal Audit Section** of the IIT Delhi as per extant Rules of the Institute.

C … Nil   I ….. Nil   O …… Nil

5.   SECURITY DEPOSIT

6.   Security Deposit shall be deducted from each running bill to the extent of 5% of the gross amount payable till the total security deposit becomes 2.5% of the tendered amount. **The security deposit shall be released after Defect Liability Period is over.**

7.   PERFORMANCE GUARANTEE

7.1.   The successful tenderer shall submit an irrevocable performance guarantee of 5% of the tendered amount in addition to other deposit mentioned elsewhere in the contract for his proper performance of the contract agreement within 15 days of issue of letter of acceptance of tender. This guarantee shall be in the form of Demand Draft/Pay order of irrevocable bank guarantee bond of any schedule bank or the State Bank of India in the specified perform a of Government Security, fixed deposit receipt pledged in favour of **Registrar, IIT Delhi** or as specified in the letter of acceptance of tender. The performance guarantee shall be initially valid up to the stipulated date of completion plus sixty days. This bank guarantee shall be kept valid till the recording of completion certificate for the work by the competent authority. Separate PBG @5% of CAMC value shall be submitted before release of main PBG.

8.   RATES

8.1.   The work shall be treated as on works contract basis and the rates tendered shall be for complete items of work (except the materials, if any, stipulated for supply by the department) inclusive of all taxes, GST (including works contract tax, if any), duties, and levies etc. and all charges for items contingent to the work, such as, packing, forwarding, insurance, freight and delivery at site for the materials to the supplied by the contractor, watch and ward of all materials (including those, if any, supplied by the department), post installation services till defect liability period etc. for the work at site etc.

9.   COMPLETENESS OF TENDER

9.1.   All sundry equipments, fitting, unit assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections and all other items which are useful and necessary for efficient assembly and installation of equipment and components of the work shall be deemed to have been included in the tender irrespective of the fact whether such items are specially mentioned in the tender documents or not.

10.   STORAGE AND CUSTODY OF MATERIAL

10.1.   The agency has to make his own arrangement for storage. No separate storage accommodation shall be provided by the department Watch and ward of the storage and their safe custody shall be responsibility till the final taking over of the installation by the department.

11.   CARE OF THE BUILDING

11.1.   Care shall be taken by the contractor while handling and installing the various equipment and components of the work to avoid damage to the building. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove at his cost all unwanted and waste material arising out of the installation from the site of work.

C … Nil   I ….. Nil   O …… Nil

12.   COMPLETION PERIOD

12.1.   The completion period indicated in the tender documents is for the entire work of planning, designing, approval of drawings etc., arrangement of materials & equipments, delivery at site including transportation, installation, testing, commissioning and handing over of the entire system to the satisfaction of the Engineer-in-charge.

13.   GUARANTEE

13.1.   The contractor shall guarantee all installation as per specifications both for components and for system as a whole. All equipments shall be guaranteed for the date of commissioning against unsatisfactory performance and / or breakdown due to defective design, workmanship or material upto one year. The equipment or component, or any part thereof, so found defective during guarantee period shall be forthwith replaced free of cost to the satisfaction of the Engineer-in-Charge. In case it is felt by the department that undue delay is being caused by the contactor in doing this, the same will be got done by the department at the risk and cost of the contractor.

13.2.   The tenderer shall guarantee among other things, the following:

13.2.1. Quality, strength and performance of the material used as per manufacturer's standards.

13.2.2. Safe mechanical and electrical stress on all part under all specified conditions of operation.

14.   POWER SUPPLY

14.1.   Power supply shall be made available by the department at one point near the location of installation free of cost, if required. Further, the arrangement for tapping power supply from this point shall be made by the contractor.

15.   EXTENT OF WORK

15.1.   The work shall comprise of entire labour including supervision and all material necessary to make a complete installation and such tests and adjustment and commissioning as may be required by the department. The term complete installation shall not only mean major items of the plant and equipment covered by the specification but all incidental sundry components necessary for complete execution and satisfactory performance of installation with all layout charts whether or not those have been mentioned in details in the tender documents in connection with this contract as this is a turnkey job.

15.2.   In addition to supply, installation, testing and commissioning of split/window type AC system including wall mounted indoor units, following works shall be deemed to be included with the scope of work to be executed by the tenderer-

15.2.1. Minor building works necessary for installation of equipment, foundation making of opening in walls or in floors and restoring them to their original condition / finish and necessary grouting etc. as required.

16.   VALIDITY

16.1.   Tenders shall be valid for acceptance for a period 90 days of days from the last date of submission of bid.

17.   COMPLIANCE WITH REGULATIONS AND INDIAN STANDARDS

C … Nil   I ….. Nil   O …… Nil

17.1. All works shall be carried out in accordance with relevant regulation both statutory and those specified by the Indian Standards related to the works covered by this specification in particular, the equipment and installation will comply with the following:

17.1.1. Factories Act

17.1.2. Indian Electricity Rules

17.1.3. B.I.S. & other standards as applicable

17.1.4. Workmen's compensation Act

17.1.5. Statutory norms prescribed by local bodies like fire department, CEA, Power Supply Co. etc.

18. INDEMNITY

18.1. The successful tenderer shall at all times indemnify the department, consequent on this works contract. The successful tenderer shall be liable, in accordance with the Indian Law and Regulations for any accident occurring due to any cause and the contractor shall be responsible for any accident or damage incurred or claims arising there from during the period of erection, construction and putting into operation the equipments and ancillary equipment under the supervision of the successful tenderer in so far as the latter is responsible. The successful tenderer shall also provide all insurance including third party insurance as may be necessary to cover the risk. No extra payment would be made to the successful tenderer on account of the above.

19. ERECTION TOOLS

19.1. No tools and tackles either for unloading or for shifting the equipments for erection purposes would be made available by the department. The successful tender shall make his arrangement for all these facilities.

20. COOPERATION WITH OTHER AGENCIES AND OCCUPANTS OF THE BUILDING

20.1. The successful tenderer shall co-ordinate with other working contractors, if any and other occupants of different offices / Labs, etc., and exchange freely all technical information so as to make the execution of this work / contract smooth. No remuneration should be claimed from the department for such technical cooperation. If any unreasonable hindrance is caused to other agencies and any completed portion of the work has to be dismantled and re-done for want or cooperation and coordination by the tenderer during the course of work, such expenditure incurred will be recovered from the successful tenderer if the restoration work to the original condition or specification of the dismantled portion of work was not under taken by the tenderer himself.

21. MOBILIZATION ADVANCE

21.1. No mobilization advance shall be paid for this work.

22. INTERPRETING SPECIFICATION

22.1. In interpreting the specification, the following order of decreasing importance shall be followed in case of contradictions:

22.1.1. Schedule of quantities

C … Nil   I ….. Nil   O …… Nil

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22.1.2. Technical Specification

22.1.3. Drawing (if any)

22.1.4. General Specification for Electrical Works of CPWD (relevant Parts)

22.1.5. Relevant BIS or other international code in case BIS code is not available.

23.   POLICY OF THE INSTITUTE

23.1. **Insti**tute has a policy against **sexual harassment** and is committed to providing an environment free from **sexual harassment of women** at the workplace. Contractor shall have to abide by the policy of the Institute with due diligence. Any violation on the part of the contractor shall be dealt with the extant rules of the Institute.

24.   QUALITY OF MATERIALS

24.1. All materials and equipment supplied by the contractor shall be new. They shall be of such design, size and materials as to satisfactorily function under the rated conditions of operation and to withstand the environmental conditions at site. **None of the material/ items/ equipment etc supplied shall be more than six months old from date of supply at site**. Copy of GST Gate Pass/ Invoice/ Shipment / Custom Clearance certificate/ details (in case of imported equipment) shall be submitted to prove the date of manufacture & genuineness of the equipment/ machines supplied.

C … Nil   I ….. Nil   O …… Nil

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SPECIAL TERMS AND CONDITIONS
COMPREHENSIVE MAINTENANCE AND OPERATION

1. This section covers the maintenance schedule during guarantee period and 5 years subsequent to guarantee period.
2. The maintenance provided during the guarantee period and 5 years beyond that shall be fully comprehensive and shall include but not limited to all equipments, labour part and emergency calls providing and site response within 24 hours. However, during the maintenance period, the material shall be arranged by the contractor, if any replacement is warranted.
3. The maintenance shall also include a minimum 12 monthly preventive maintenance visits by qualified personnel who are thoroughly familiar with the type of equipment and system provided for this project.
4. BMS operator shall be provided by the contractor and to be stationed at site for monitoring and operation and control as per the Schedule of item.

5. RECOVERY RATES FOR NON-COMPLIANCES DURING CAMC PERIOD

The various amounts as mentioned below are the recovery rates to be deducted from the bills payable to the contractor. Activities of maintenance shall be recorded in **maintenance register** and to be verified by E-in-C or his representative.

Sr. No.	Description of non-compliance	:	Amount to be recovered (Rs.)
1	Routine servicing, checking and submission of service report visit at least once in a month	:	Rs. 5,000.00 per each missing (to be done in presence of Engineer-in-charge or his representative and to be recorded in maintenance register)
2	Not repairing / replacing of any other spare parts within 3 days after occurrence	:	After having been notified of the defects / service requirement during warranty as well as CAMC period, Contractor has to complete the required Service / Rectification within 3 days' time limit. If the Contractor fails to complete service / rectification with defined time limit, a penalty of 0.5% of the contract amount shall be charged as penalty for each week of delay from the Contractor. Engineer-in-charge shall have a right to recover all such penalty amount from the bill payable to the contractor or from Performance Security (PBG). Cumulative Penalty cannot exceed more than 10% of the total contract value after which the E-in-C shall have the right to get the service / rectification done from alternate sources at the risk and cost of the Contractor besides forfeiture of PBG.

C … Nil   I ….. Nil   O …… Nil

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ANNEXURE - 1

<< **Organization Letter Head** >>
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.

1	Name & Address of the bidder	:	
2	Phone	:	
3	E-mail	:	
4	Contact person name	:	
5	Mobile number	:	
6	GSTIN number	:	
7	PAN number	:	
8	UTR no. for EMD	:	
9	Date of deposit / submit of EMD	:	
	BANK DETAILS of the Bidder		
10	Bank name	:	
11	Branch address	:	
12	Branch telephone no.	:	
13	MICR Code of the bank	:	
14	IFSC code	:	
15	Bank Account no.	:	
16	Type of account	:	
17	Pl attach one cancelled cheque	:	

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.

(Signature& name of the bidder)
Seal of the bidder

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

ANNEXURE - 2

ON NON-JUDICIAL STAMP PAPER OF MINIMUM Rs.100

(Guarantee offered by Bank to IIT Delhi in connection with the execution of contracts)
Sample Form of Bank Guarantee for Performance Guarantee

1   Whereas the Assistant Executive Engineer-in-charge of AC Division of IIT Delhi on behalf of the Board of Governors of IIT Delhi (hereinafter called "IIT Delhi") has entered into an agreement bearing number ……….............. with …….................(name and address of the contractor) …………….. (hereinafter called "the Contractor") for execution of work ……………………………………… (Name of work) …………………………………………………….. The IIT Delhi has further agreed to accept an irrevocable Bank Guarantee for Rs. …………….……. (Rupees ………………………… only) valid upto …….. (date)…..… as Performance Guarantee/Security Deposit/Mobilization Advance from the said Contractor for compliance of his obligations in accordance with the terms and conditions of the agreement.

2   We, ………..…… (indicate the name of the bank) …………………. (herein after referred to as "the Bank"), hereby undertake to pay to the IIT Delhi an amount not exceeding Rs. ……………………….. (Rupees………………. only) on demand by the Government within 10 days of the demand.

3   We, …………………. (indicate the name of the Bank) …………………., do here by undertake to pay the amount due and payable under this guarantee without any demur, merely on a demand from the Government stating that the amount claimed is required to meet the recoveries due or likely to be due from the said Contractor. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. …….. (Rupees ………………. only).

4   We, ……………… (indicate the name of the Bank) …………………, further undertake to pay the IIT Delhi any money so demanded notwithstanding any dispute or disputes raised by the contractor in any suit or proceeding pending before any Court or Tribunal, our liability under this Bank Guarantee being absolute and unequivocal. The payment so made by us under this Bank Guarantee shall be a valid discharge of our liability for payment there under and the Contractor shall have no claim against us for making such payment.

5   We, ……………….. (indicate the name of the Bank) ……………………, further agree that the IIT Delhi shall have the fullest liberty without our consent and without affecting in any manner our obligation here under to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the IIT Delhi against the said contractor and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Contractor or for any forbearance, act of omission on the part of the IIT Delhi or any indulgence by the IIT Delhi to the said Contractor or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6   We, ……………….. (indicate the name of the Bank) …………………….. , further agree that the IIT Delhi at its option shall be entitled to enforce this Guarantee against the Bank as a

C … Nil   I ….. Nil   O …… Nil

principal debtor at the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee IIT Delhi may have in relation to the Contractor's liabilities.

7   This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor.

8   We, ………………… (indicate the name of the Bank) ……………………., undertake not to revoke this guarantee except with the consent of the IIT Delhi in writing.

9   This Bank Guarantee shall be valid up to …………………………. unless extended on demand by IIT Delhi. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs. …………………… (Rupees ……………….. only) and unless a claim in writing is lodged with us within the date of expiry or extended date of expiry of this guarantee, all our liabilities under this guarantee shall stand discharged.

Date …………

Witnesses:
1. Signature………………   Authorized signatory
Name and address   Name
                                                                Designation
                                                                Staff code no.

2. Signature ……………………..   Bank seal
Name and address

*Date to be worked out on the basis of validity period of 90 days where only financial bids are invited and 180 days for two/three bid system from the date of submission of tender.
**In paragraph 1, strike out the portion not applicable. Bank Guarantee will be made either for earnest money or for performance guarantee/security deposit/mobilization advance, as the case may be.

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

DETAILS OF ELIGIBLE SIMILAR NATURE WORKS COMPLETED DURING THE LAST SEVEN YEARS ENDING PREVIOUS DAY OF LAST DAY OF SUBMISSION OF TENDERS

Sr. no.	Name of work / project and location	Owner or sponsoring organisation with e-mail ID and Phone No.	Cost of work done (INR)	Date of commencement as per contract	Stipulated date of completion	Actual date of completion	Name and address / telephone number of officer to whom reference may be made
1	2	3	4	5	6	7	8
1							
2							
3							

N.B: All columns shall be filled diligently. This is a mandatory document.

(Signature& name of the bidder)
Seal of the bidder

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

SAMPLE AFFIDAVIT
(How the write up should be on the stamp paper)

INDIAN NON JUDICIAL

Certificate Issued Date	:	After the publication of NIT
First Party	:	'Name of Bidder' should be written
Second Party	:	'IIT Delhi'
Stamp duty	:	Minimum Rs.100.00 (one hundred)

--- Please write below this line ---
Affidavit

NIT No.	:	Mention NIT number
Name of Work	:	Write name of the work

I, _____ (name of bidder), resident of _____ (full address) partner / proprietor / authorised representative having power of attorney (write as applicable) do hereby solemnly affirm and state as follows:

"I / We undertake and confirm that eligible similar works(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 bidding in IIT Delhi in future forever. Also, if such a violation comes to the notice of Department before date of start of work, the Engineer-in-Charge shall be free to forfeit the entire amount of Earnest Money Deposit/Performance Guarantee"

Dated:
Place:

Signature with stamp of the bidder

The Affidavit shall be Notarised & shall have to be submitted in original on demand

(This is purely illustrative. Bidder must buy stamp paper and write the above matters in respective space on the front page of stamp paper)

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

<< **Organization Letter Head** >>
EMD DECLARATION

(The following undertaking on firm's letter head shall be retyped and uploaded by the bidder if scanned copy of DD/FDR is uploaded by the bidder)

Whereas I/We ……………………………………………… (name of the agency) have submitted bids for ……………………………………………………………………….. (name of work).

I/We hereby submit following declaration in lieu of submitting Earnest Money Deposit (EMD) electronically (online mode).

The **exact** physical EMD (as uploaded, DD / FDR) shall be deposited/submitted by me / us with the authority inviting tender, in case I / we become the lowest tenderer, within a week of the opening of financial bid.

If after the opening of tender, I/We fail to submit the said EMD within the stipulated time, I/We shall be suspended for one year and shall not be eligible to bid for IIT Delhi tenders from the date of issue of suspension order.

<div align="right">

(Signature& name of the bidder)
Seal of the bidder

</div>

C … Nil   I ….. Nil   O …… Nil

JE / Sr. Asstt.   AEE-in-charge AC Division

SYSTEM DESCRIPTION CUM SPECIFICATION

1.1   General

1.1.1 Building automation and control system requirements

System requirements

General requirement including energy monitoring.

Include a digital (DDC) building technology control system to operate technical equipment in buildings. The system must be able to carry out comprehensive measuring, control, optimization, and monitoring functions. The possibility for free programming of individual system components should be available to individually modify customer-specific requests.

All systems deployed supply information on operating states and energy use to render current energy efficiency transparent or to display weaknesses. Measures can be made pursuant to this information that contributes to increased energy efficiency.

User designation

The entire system (management, automation level including room automation) must be designed to define a clear, user designation UD encompassing 255 characters. The UD must be fully usable in the user programs on the management level. The UD structure must allow to use separators (e.g. -*/| etc.) to be better readable for the operator. On the automation level as well, the UD must at a minimum be able to query details via local operating units.

Requirement for a project as per BACnet

Communications through the entire building automation and control system must be based on the BACnet standard in a recent BACnet revision version (that qualifies as a "minimum protocol revision" according to the official BTL test policies at the time of the bidding). It must be possible to change/assign the BACnet Object in according to the user preferences during the engineering process.

System up-to-datedness

Product lifecycle

The system provider must offer a transparent product lifecycle to ensure the required consistency. All equipment offered for this project must be contained in the current product portfolio. The existing system environment must allow for easy and smooth integration of devices and extensions.
The system provider must offer Software- and Firmware-Patches during the lifecycle.

System continuity

Products used must have a label for a global standard that ensures interaction with products from various manufacturers. Products with these labels can also be combined if manufactured at intervals of more than 10 years.

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Architecture

Three system levels

A building automation and control system featuring system architecture as per ISO EN 16484-3 is required. The three system levels must be interconnected via communications.

- Management level
- Automation level (building automation stations and individual room automation stations)
- Field level (field device)

Building automation stations

The system offered must provide largely decentralized intelligence to achieve high operational and plant availability. The devices are autonomous components that can independently execute assigned building automation and control.

Implement third-party systems.

Third-party systems must be able to be integrated on both management and automation levels to ensure full system consistency. Default interfaces must be provided. Third-party protocol implementation must be possible and require little effort. To do this, all hardware and software required for integration, all required services, clarifications with other technical and mechanical building installations, interface testing, data transmission testing, data point generation/integration as well as plant picture creation, backup, test protocol generation and specific documentation must be included in total costs.

Location-independent operation

The building automation and control system technology must allow for location-independent operation and management of all messages and trends on all available types and views for the entire building automation and control system.

Consistency

Uniform system

The supplier must prove that the required functions originate from a single manufacturer and using one automation and control system, where the hardware and software are developed in a manner that allow for simple modification while operational for subsequent function extensions or changes.

Implement new data points.

Building automation and control must be coherent to ensure possibility of future extensions and changes. This means that data points must be acquired once only, and then be provided automatically as needed to operator units and management level.

Integration of open standards

General

Implement via BACnet

Default protocols and suitable physical communications media must guarantee interoperability (ISO standard). Use only listed protocols and communications media. Third-party systems are

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integrated via BACnet. Provide only data required to operate building services plants efficiently and economically. BACnet communication, in compliance with the BACnet standard including B-BC profile.

Decentralized integration of communication devices/equipment

A decentralized interface module must allow for connecting communicating pumps to a BACnet-capable building automation station. The building automation station provides the following functions:

- Event-oriented communications
- Peer-to-peer (cross communication)
- Alarm and message processing, distribution to local operator units and building automation and control system.
- Scheduler with days of the week
- Calendar function
- local trend recording in device buffer (long-term trend)

Communication & protocols

KNX PL-Link bus connection for sensors, actuators, and control units (including power supply of the devices) with "Plug and Play" connection to field devices with KNX PL-Link as well as integration of standard devices with KNX S-Mode (ETS Engineering)

Integrate Modbus devices.

Integrate third-party devices via Modbus.

Modbus-capable devices must be able to be connected to a BACnet-capable automation station for bidirectional data exchange. This connection must be direct via RS232 or RS485 interface and without conversion. The data points of the third-party system are mapped to input/output functions in BACnet and are then available as fully communicating data points for further processing and connection, e.g. for:

- Alarm handling and prioritization
- Override control, priority control and commands for central operation.
- Grouping
- Scheduler
- Trend recording

System must support the following Modbus properties:

- natively support Integration of Modbus devices via RTU and / or TCP
- Baud rate options of 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
- integration of multiple Modbus RTU devices on the same trunk, even if the devices have different characteristics (e.g. baud rate, parity, stop bits)
- on-board bus termination, switchable with DIP switch
- on-board pull-up/pull-down resistances, switchable with DIP switch
- signed, unsigned, floats and double register data types.
- support up to 64 bit big- and little-endian registers.

Power failure

Building automation station – on board power back-up

Individual building automation stations must have onboard power back-up provided via a super capacitor.

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Data backup

The data must be saved for extended periods of time in case of power failure or extensions or removal of building automation stations.
The applications and all vital operating parameters (including setpoints, scheduler values, etc.) must not be lost due to a power outage. Other operating values such as alarms, etc. must be capable of being saved locally on the building automation station.

Power restoration strategy based on backup power supply in case of power failure.

Important and vital plant data including controls (building automation station) must continue to run during power failure (switch-off via power switch or control fuse, etc.).
The backup power supply continues to provide power to the power portion as well as plant control including building automation station. Power failure must be signaled via software, vital plants must continue to operate, non-vital plants and their aggregates and components must be switched to a safe operating mode or shut down immediately. After power returns, all building automation stations and plants including their aggregates and components must start automatically. The various plants must be switched on and released at intervals to prevent switch-on peak loads. The current status for all switching and positioning commands, setpoints, manual interventions, etc. remains saved in the building automation station and/or is reenabled following power restoration and used for the current operating mode.

Power restoration strategy in case of power failure

All plants and their aggregates and components as well as all building automation stations fail during a power failure (switch-off via power switch or control fuse, etc.).
After power returns, all building automation stations and plants including their aggregates and components must start automatically. The various plants must be switched on and released at intervals to prevent switch-on peak loads. The current status for all switching and positioning commands, setpoints, manual interventions, etc. remains saved in the building automation station and/or is reenabled following power restoration and used for the current operating mode.

System time

General

System must support the maintenance of a real time clock up to 7 days.

Time synchronization in BACnet: Local time

The building automation and control system must have a uniform system time. To this end, a time master supporting BACnet BIBB DM-TS-A as per the PICS document must be defined. The time master must receive the DCF77, GPS or Internet NTP signal and provide it synchronized to all remaining system devices.

Time synchronization in BACnet: UTC time (coordinated universal time)

The building automation and control system must have a uniform system time. To this end, a time master supporting BACnet BIBB DM-UTC-A as per the PICS document must be defined. The time master must receive the DCF77, GPS or Internet NTP signal and provide it synchronized to all remaining system devices.

Subsystem autonomy

The building automation stations must autonomously run their own time if the time master fails.

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The building automation and control time must be resynchronized automatically after the time master becomes available again.

Self-monitoring and self-diagnosis

Watchdog

The building automation and control system must monitor itself to always know its latest and current status. A watchdog function helps detect and signal failed system devices and restarts them in a defined mode.

Self-diagnosis

Self-diagnosis must be available to quickly detect errors. It must provide information on system function and load.
e.g. CPU and memory load must be displayed.

General plant operating states

Overview of operating modes

There are five higher operating modes for all plants:
- Local emergency operation without building automation station functionality (direct via I/O module or directly on the control cabinet as agreed to with owner).
- Local manual operation with building automation station functionality (control panel in the control cabinet).
- Local - manual operation via visualization on the management level (all functions on the local building automation station are set to Auto).
- Scheduler program under the condition that all plants are enabled for automatic operation.
- Automatic detection.

All control functions of the building automation stations must be set to and remain on automatic for highest plant availability if a plant or aggregate is switched to MANUAL. In individual cases, automatic mode must change over to this unit in case of redundancies when a plant or aggregate is switched off locally.

All safety and interlocking functions must take highest priority for operation independent of operating mode.

Automatic detection

The plants of the building automation and control system are switched on and off either automatic, or dependent on time or event. The following functions apply to the actual plant descriptions. All control loops, safety and interlocking functions must be guaranteed to work regardless of operating mode.

Controlled via scheduler program.

All plants must be set to automatic for this operating mode. The plants of the building automation and control system must be switched on and off by individual use via a day, week, month, or annual scheduler program.

Manual operation

Different options are required for manual operation.
- Manual operation via management level (remote operation)

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- Manual operation via local operator unit or laptop directly at the control cabinet.
- Manual operation via operator unit or directly at the control cabinet.

Manual operation generally is possible only if the corresponding building automation station is running. Manual operation allows for manually overriding scheduled plant switchings. Plants switched off by schedule can be switched on via plant switching command. Manual control of the plant switching command is equal to automatic control, i.e. the scheduled control is retained for as long as the scheduler remains active.

Emergency operation

Local priority override takes place directly via the I/O modules. To this end, the I/O modules must have an integrated local override priority as per ISO 16484-2. All aggregates on the module must be able to be switched via this operation. To this end, the I/O modules must feature preselection switches Automatic - Manual as well as LED status displays or LCDs.

Valves, dampers, etc. must allow for continuous manual adaption. All interventions are signaled to the management station via building automation station and are then logged and visualized accordingly.

A manual operating level at the control cabinet must be included in the unit price if no integrated local priority override can be offered due to the system type.

Energy efficiency and references to applicable standards

General

The building is constructed under strict energy guidelines. The control technology deployed must contain all functions required to efficiently consume energy.

Monitoring and evaluation

Automation level

Key performance indicators on the automation level

Monitoring and evaluation of measured values for primary plants (components and plant parts, software/program/system functions, setpoints, et.) must occur directly on the automation level. Monitoring and evaluation is intended to recognize unfavorable operations of plants/components early on and thus lower or optimize energy consumption and wear and tear.

Monitoring and evaluating analog measured values.

The following monitoring and evaluation must be able to be implemented for analog measured values (sensors, setpoint, modulating control of valves, dampers, variable speed drives, etc.):
• Determine the minimum value (lowest value) within a defined timeframe.
• Determine the maximum value (lowest value) within a defined timeframe.
• Determine the average value (lowest value) within a defined timeframe.
• Determine the linger period (in hours) during which the measured value moves between freely definable limit values.
• Determine deviation that the measured value deviated from the upper and lower setpoint within a defined timeframe.

The determined value is monitored to a minimum and maximum and displayed as quality state for breach and/or exceedingly thereof. The value from the current timeframe is displayed; the value from the previous timeframe is also displayed and made available to the trend data. The evaluation ceases for a fault to the measured value (sensor interrupt, module fault, etc.), until the measured value once again assumes a reliable state. This fact must also be recognizable in the trend data.

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Monitoring and evaluation of digital and multi-stage measured values.

Digital measured values (messages, switching commands, operating modes, etc.) must be definable as key performance indicators and make possible the following evaluation and monitoring:
• Determine the runtime (operating hours) within a defined timeframe.
• Determine the switch-on frequency within a defined timeframe.
• Determine the runtime (operating hours) for each stage within a defined timeframe.
• Determine the switch-on frequency for each stage within a defined timeframe.
The determined value is monitored to a minimum and maximum and displayed as quality state for breach and/or exceeding thereof. The value from the current timeframe is displayed; the value from the previous timeframe is also displayed and made available to the trend data. The evaluation ceases for a fault to the measured value (sensor interrupt, module fault, etc.), until the value once again assumes a reliable state. This fact must also be recognizable in the trend data.

Monitoring and evaluating metered values.

Metered values (consumption meters, pulse meters, etc) must be definable as key performance indicators and make possible the following evaluation and monitoring:
• Determine the difference value (consumption value within a defined timeframe.
The determined value is monitored to a minimum and maximum and displayed as quality state for breach and/or exceeding thereof.
The value from the current timeframe is displayed; the value from the previous timeframe is also displayed and made available to the trend data. The evaluation ceases for a fault to the measured value (sensor interrupt, module fault, etc.), until the value once again assumes a reliable state. This fact must also be recognizable in the trend data.

Evaluation over different timeframes

Monitoring and evaluation must be able to occur over definable timeframes (annually, monthly, weekly, daily, hourly, 15-minutes).

Weighting of monitoring and evaluation criteria

Since an aggregate or component may include multiple evaluations, it is required to be able to weigh them so that they are included differently in the calculation of the resulting quality state.

1.1.2 Network security

Network hardware

In general

Automation hardware shall have built in standard security features, including:

- support firmware signature for verifying the integrity of installed firmware.
- provide encrypted communication via HTTPS with the embedded web interface, incl. TLS/SSL certificates handling.
- ensure a password protection policy and the force of password change on the first use.
- on board WLAN connection to be protected by WPA2

Specification and selection of required network devices

The supplier specifies and selects required network devices, required to build BACS network and

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interfaces to other networks as well as implementation of specified IT security functions. All network devices must have the latest available firmware.

1.1.3 Engineering tools and engineering efficiency

Engineering efficiency

System and tool platform

Creating solutions must be as efficient as possible, i.e. programming on construction sites; use of pre-defined application blocks, fast exchange of standard functions, etc. The goal is to achieve the maximum required level of flexibility at as little expense as possible.

A version of the engineering tool must be freely distributed and license free base software. It must be possible to keep the tool up to date via unattended user interactions (e.g. patch distribution over cloud)

Harmonized tools and workflows

Consistent tools

Uniform data and functions must be used by the building automation and control system in a consistent manner throughout all tools to achieve a high level of data consistency. In other words, all data is only entered once in the system. Consistent tool processes avoid a manual exchange of data (Import/Export).

One tool shall provide optimized workflow for both engineering and commissioning processes across the automation system. Commissioning workflows will also be supported with a mobile device based application, available for iOS and Android devices – it will enable simple workflows possible for non-expert users.

System must be freely programmable with resemblance to CEN standard 11312 using block programming

Transparency for customers

Data backup

A data backup concept must be presented that provides the current state of a project in a form that is useable and complete to the customer. In includes raw data from plants, applications, engineering data (e.g. DP, labeling, links, parameters), documentation.

Customer changes

The technical operator at the customer be able independently make simple changes to the project. Potential training proposals must be appended to the bid.

1.2 Management Level Requirement

General

All information comes together at the management level. The management level is the graphical, interactive interface for the operator to the automation station and the integrated plants and plant parts. System operation must be based on a simplified approach. The operator can display, query, process, save, or print any plant information via the peripheral units at the management level.

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The plants are displayed in synoptic images and the values and states are presented and displayed dynamically. Special programs are used for higher control, optimization functions, maintenance, and energy management.

1.2.1 Scada Platform

The building management system must be based on a SCADA platform that is compatible with the BACnet revision 1.18 and the B-AWS (Advanced Workstation) profile, B-ALSWS (BACnet Advanced Life Safety

Workstation), B-AACWS (BACnet Advanced Access Control Workstation), B-RTR (BACnet Router), B-BBMD (BACnet Broadcast Management Device). It must permit integration of any building installation including HVAC and lighting.

1.2.2 Multi-discipline

The building management system must be able to handle natively different disciplines in a building: Building Automation, Power Management, Fire, Industrial PLC's, Access Control, Intrusion, Video…

The disciplines must allow distribution across independent servers if required. Scope of access for controlling and monitoring discipline data must allow customization per user in every client station.

Each management station of the system must be able to be assigned one or more disciplines, allowing customizable single or multiple discipline access mode.

1.2.3 Drafted for Use by Fire Detection and Security Systems (UL certified)

The building management system must have passed Underwriters Laboratories (UL) performance and environmental tests.

The management station must offer all relevant functions to connect comfort and fire detection systems:

- Display and handle events
- Graphically monitor and control the fire detection system.
- Highlight the highest priority events.
- Direct navigation to the element triggering an event.
- Quickly go to user-defined instructions and graphically display event locations.
- Save and query activity data from the fire detection system.
- Distribute fire monitoring and control capabilities.
- Provide operating instruction checklists for operators during stressful situations for handling fire events.
- Send automatic remote messages of impacted device per e-mail.
- Display and plan automatic history reports.

1.2.4 System Openness

The building management system must support standard protocols used in building technology, including:

- BACnet and BACnet/SC
- OPC DA (Data Access) and OPC UA (Unified Architecture)
- Modbus TCP
- SNMP

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- KNX and KNX Square
- S7, S7 Plus and S7 secure communication
- IEC 61850

1.2.5 Long Term Storage

The building management system must be able to store and archive data for a period of more than 10 years, allowing as an option segregation of stored data in different groups that can be tuned individually with different recording frequencies. Remounting of offline archived data must also be allowed.

1.2.6 Validated and Critical Environments (for Farma sector only)

The building management system must allow compliance to regional certifications for validated environments, such as GMP Annex 11, US FDA 21 CFR Part 11 or similar. A special technical document verifying the compliance of the system in critical environments must be available.

1.2.7 Building Information Modeling (BIM)

The building management system must natively support Building Information Modeling (BIM) technology to perform the following actions:

- Display visual and data information from Building Automation components such as room controllers, field devices etc., in a 3D view.
- Display the 3D model of the building:
  - Allow operators to rotate, zoom in and zoom out the mode.
  - Allow manual navigation through the 3D model, using the mouse cursor.
  - Support simplified navigation with single mouse click to enter through doors, windows, and up/down staircases.
  - Allow navigation from a system object via the browser to the associated equipment in the BIM view and vice versa.
  - Allow selection of a BIM equipment and provide current (runtime) values and status properties. Commanding of objects shall be supported as well via the operating pane (such as switching on a light)
- Display 2D floor plan(s) of the building
  - Show the selected room in focus (zoom view)
  - Show various rom statuses as colored carpets.
  - Show current room values (runtime values) directly on the floor plan.
  - Allow selection of a room or a segment
- Display* room status in the 3D building view
  - Display the room operating mode (such as comfort, pre-comfort, etc.)
  - Display the presence detectors statuses.
  - Display window states (open or closed) in a clear graphical format.
  - Display the temperature status of a room.
  - Display the lights' state.
  - Display the positioning state of the blinds.
- Provide a summary of all active events that are present on a selected area (such as a floor)
- Show the location of the building in Google maps (where applicable)

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- Display the datasheet(s) and/or documentation of the selected equipment or field device if relevant properties are present in the BIM data.
- Supported Data formats:
- IFC4
- IFC2x3

  * Optimized for Desigo Room Automation

1.2.8 Automate Recurring Tasks

The building management system must take care of recurring tasks to lower the operator's workload.

This includes, for example, cyclical report generation triggering, plant release at various conditions, or automatic adjustment of setpoints or alarm limits.

1.2.9 Reactions

The building management system must allow automatically executable actions to be programmed at the management station when set conditions are verified.

Conditions can be time-based, event-based, on change of values or on a combination of some or all. When conditions are met, the system shall execute a pre-configured list of commands.

1.2.10 Scripting

The building management system must provide a Script Editor to create scripts based on a known scripting language. The script engine must allow the manual execution of scripts manually by the operator, or automatic execution triggered by the system based configurable conditions. Among others the scripts must support:

- Commanding of objects
- Reading attributes of object
- Subscription to value changes
- Read/Write text files.
- Loading of external DLLs
- Mathematical / logical operations

1.2.11 System-wide Self-monitoring

The building management system must be capable of monitoring running applications, printers, and all connected subsystems. The system must report an event in case of an exceptional state.

1.2.12 System Analysis

Detailed analysis on system and user activities must be available in chronological order.

1.2.13 Help Function

The software must include an online help, context sensitive as well as indexed, a glossary, and can be searched by terms or sentences. The help content must be structured according to the following format: Engineering or Operating help.

1.2.14 Migration

The building management system must allow a smooth migration of an existing management station. Via its embedded software utilities, it must be able to accumulate existing graphic pages and Trend Objects or datasets, from a legacy management station to the new software.

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1.3 Operating System for the Building Management System

All data servers, operator stations, etc., for the building management system must be compatible with the most current, generally available Microsoft Windows 64-bit operating system.

As a result, the current version of Windows (at least 6 months after release by Microsoft) as well as a minimum of the last Version is supported. Modifications to the customer network must be possible. The building management system must therefore be installable on any common PC or on tested embedded/industrial hardware and offer a multitasking environment where a user can run multiple applications simultaneously.

1.4 Product Lifecycle

The system provider must offer a transparent product lifecycle to ensure the required consistency. All equipment offered for this project must be contained in the current product portfolio.

The existing system environment must allow for easy and smooth integration of various devices and extensions.

1.4.1 Software Updates and Upgrades

The building management system must offer the possibility of software upgrades to the latest available version, in order to benefit from new features and from enhanced protection against possible cybersecurity threats.

This can be achieved by enabling a subscription to a software upgrade service, which must offer:

- Permanent protection against cybersecurity threats
- Availability of the latest software features (system and limits upgrade)
- Compatibility with the latest version of supported operating systems.
- Support of the latest versions of the integrated subsystems

1.5 System Continuity

Products used must have a label for a global standard that ensures interaction with products from various manufacturers. Products with these labels can also be combined if manufactured at intervals of more than 10 years.

1.6 Hardware Requirements

Embedded Hardware

Installation on an embedded hardware must be supported for small and / or mid-sized sites (1 server, up to 10,000 system objects). The hardware and software environment must fulfil the following minimal requirements:

- Type: Embedded
- Processor: Intel Celeron N2930 or equivalent
- Memory: 8GB
- Hard disk: 100GB SSD
- Network Card: Gigabit speed
- Graphics Card: Onboard graphics adapter with integrated processor
- Minimum Software environment:
- Win10 IOT Enterprise 2016 LTSB
- Microsoft SQL Server 2019 – Express Edition

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- Network Requirements:
- Local network
- Single subnet
- 100 Mbps up/down
- Support Wake on LAN

Standard Hardware for small or medium plants

(Approximately 500-2000 data points)

One client/server system for mid-sized sites (up to 50,000 system objects, total: 1,500,000 in a distributed architecture) with a high data transfer rate is required. The hardware environment must fulfill the following minimal requirements:

- Type: Standard PC
- Processor:
- Intel Core i7: 8th generation or later, CPU Mark of 13,000 or higher (or equivalent)
- Single Thread Rating minimum of 2,300 or equivalent
- Cores: 4 per running system
- Memory: 16GB
- Hard Disc: 1 * 1024GB SSD
- Network card: Gigabit speed
- Graphics card: Mid-range graphics card

Network requirements:

- Local network
- 1000 Mbps up/down
- Latency less than 10 ms
- For the integration of XNET Fire Safety Systems, the server hardware needs to have a PCI slot for the NCC-2F card

Standard Hardware for large plants

(Approximately 2000-35,000 data points)

One client/server system is required for large sites(up to 150,000 system objects, total: 1,500,000 in a distributed architecture).
The hardware environment must fulfill the following minimal requirements:

- Type: Server 19" rack
- Processor:
- Intel Core i7: 8th generation or later, CPU Mark of 13,000 or higher (or equivalent)
- Intel Xeon Platinum: 2nd generation or later, CPU Mark of 13,000 or higher (or equivalent)
- Intel Xeon Gold: 2nd generation or later, CPU Mark of 13,000 or higher (or equivalent)
- Intel Xeon Silver: 2nd generation or later, CPU Mark of 13,000 or higher (or equivalent)
- Single Thread Rating minimum of 2,300 or equivalent
- Cores:4 per running system
- Memory: 32GB
- Hard Disc: 1 * 1024GB SSD

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- Network card: Gigabit speed
- Graphics card: Mid-range graphics card
- Network requirements
- Backbone Gigabit
- 1000 Mbps up/down
- Latency less than 10 ms
- For the integration of XNET Fire Safety Systems, the server hardware needs to have a PCI slot for the NCC-2F card.
- IPV6 supported (NOTE: IPV6 for BACnet networks not supported)
- Standard secure mechanisms for DMZ, such as port forwarding, tunneling and redirection, PAT, NAT supported.
- Hosting of the server in DMZ

1.7 Software Requirements

1.7.1 Operating System

The software must be compatible with the following Microsoft operating systems and editions:

- Microsoft Windows 10 64-bit (Professional, Enterprise and IoT Enterprise)
- Windows 11 64 bit (Pro, Enterprise)
- Microsoft Windows Server 2019 64-bit
- Microsoft Windows Server 2022 64-bit

1.7.2 SQL Server

The software must be compatible with the following Microsoft SQL products:

- Microsoft® SQL Server 2019 (Express, Standard and Enterprise)
- Microsoft® SQL Server 2022 (Express, Standard and Enterprise)

The software must be compatible with the following Microsoft Office products:

- Microsoft Office 365 (Standard, Small Business, Professional, Enterprise)
- Microsoft Office 2019 (Standard, Small Business, Professional, Enterprise)
- Microsoft Office 2016 (Standard, Small Business, Professional, Enterprise)

1.7.3 Virtualization

The software must be compatible with the following virtualization software packages:

VMware®:
- Virtualization platform: vSphere 7.0 Update 3 and 8.0
- High Availability and Fault-tolerant software
- ESXi 7.0 Update 3 managed by vCenter Server Appliance v7.0 Update 3
  ESXi 7.0 managed by vCenter Server Appliance v7.0
- ● ESXi 8.0 managed by vCenter Server Appliance v8.0

Stratus®:
- Virtualization platform: KVM for Linux CentOS v7.0
- High Availability and Fault-tolerant software: EverRun Enterprise v7.8.x, v7.9.x

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- Storage: Local disks
- ztC™ Edge 110i: v2.2x, v2.3x

Microsoft
- Virtualization platform: Microsoft Hyper-V 2019 and 2022
- High Availability software: Microsoft Hyper-V Server 2019 and 2022
- Storage: Local disks, Block Storage (iSCSI, Fiber Channel) or Storage Space Direct on server 2019

Nutanix
- Virtualization platform: Nutanix v6.5.x

2 User Profiles

2.1 Individual Views

Individual, specific or user defined views must be adjustable for the plant overview. The views must cover various electrical and mechanical installations or follow geographic or organizational criteria and permit a customized, hierarchy view that depicts the management station, control systems, plant geographic layout as well as relationship of the mechanical facilities.

User Privileges

The building management system must allow users to define, change, or delete predefined reactions as per their user privileges.

Simplified Operator Interface

The building management system must allow operators to efficiently maneuver the controlled equipment. The navigation within system applications and components is achieved by tiles and via grouping of functionalities.

A simplified operator interface must be assigned to system users that require a simplified approach. The interface can be applied to more than one user. The following functionalities must be by default available for the system Operator:

- Managing of System Events (alarm management)
- Operate the installation via graphic application.
- Navigate via tiles.
- Time Scheduler
- Trend Viewer
- Log Viewer
- Report Application
- Document Viewer
- Notification

The operating interface must be documented by a workflow driven documentation that helps the operator to use the management station. The document shall be provided in PDF or online help format.

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2.2 Multilingual

Multiple languages must be supported in the same project configuration. Project data, as well as user interface texts shall be displayed in the language of the user who is logging on the system.

The user interface must support a minimum of 3 languages at the same time.

3 Graphics

3.1 Operating interface to CAD system

The user interface must allow users access to various system diagrams and floor plans using graphical depictions, menu selections, and data point assignments.

The graphics software must also permit the import of CAD symbols (DWG, DXF format) or scanned images for use in the system.

3.2 Operating Messages

Operating message must be able to be displayed and evaluated on the management level. Graphics must be able to display data point states that are overwritten by a local priority switch. This on data points that were developed to supplying by local override.

3.3 Full Graphics Mode

A fully graphics-based management level with ergonomic and freely scalable images must be available. The system must be developed to operating, monitor, optimize, and log all connected automation stations in real time.

3.4 Graphics Generation

Operators must be able to add, delete, and edit system graphics and state texts for digital data points from the standard user interface without external or special tools.

3.5 Navigation

A hierarchy tree can support as an option navigation to the various graphic images. Graphic displays must include the ability to dynamically zoom and switch among various layers with different information.

3.6 In-graphics Commanding

The building management system must offer graphic objects, which can be used to command or control the system. At a minimum, sliders, buttons, text boxes, drop-down lists and radio buttons must be included.

3.6.1 Visualize the Quality State in the Plant Graphics

A violation of energy efficiency limit values for measured values of primary plants (e.g. centralized air handling, energy generation) must also be displayed in the plant graphic directly on the application components or function.

The parameters for monitoring, evaluating, and forming the quality state can be set directly in the plant graphic based on read and write access rights. As an alternative: Make possible the simple navigation to an appropriate user program.

3.7 Graphic Symbols and Standards

Plant graphics must meet the ergonomic needs of the operator. The displayed graphic symbols must correspond to the generally valid standard for HVAC symbols (DIN EN 62424 (VDE0810-24)) and ASHRAE guidelines. The symbols must be supported as two- and three-dimensional graphics.

C … Nil   I ….. Nil   O …… Nil

The ability is required to create colored floor displays and system diagrams for each mechanical facility including AHU, chilled water plants, hot water boiler systems, and room operator units. Associated printouts of standardized plant images must be added to the bid.

3.8 Object-oriented Graphics

The building management system must offer dynamic, high-resolution graphics. The graphics must be object-oriented. Each symbol must be able to display several states in the same, consistent format. At the same time, several views must be able to be open concurrently, and all views must be updated dynamically.

3.9 Continuous Update and Display

Measured values, setpoints, user settings, and alarms must be displayed immediately and continuously. State changes must be indicated via symbol, e.g. using animation or changing the color, in general, however, graphic presentation, or text.

3.10 Room Management

The building management system must provide a dynamic room re-assignment functionality according to the building needs. HVAC, lighting and shading functions can be re-assigned from the building management system directly in order to fit the new needs.

The following functionality is provided:

- HVAC functions, such as, FCU, VRV etc.
- Lights/blinds push-buttons
- Brightness/occupancy sensors
- Collision detectors, etc.

No other engineering or commissioning tools must be used to finalize the assignments.

4   Scheduler Programs

4.1 Management via central Scheduler Programs

Operate all scheduler programs online from the management level to achieve consistent, transparent operation of all integrated systems and subsystems.

4.2 Scheduler Programs

The system must offer the ability to operate schedulers on automation stations as well as support management station-based time scheduling.

Each currently used plant image must offer user-friendly scheduler operation.

4.3 Scheduling and Override

Providing calendar type formats to simplify time and data planning and override building operation is required. Time definitions must be located on the PC workstation and building controller to ensure scheduling even if the PC is offline.

Providing override access through menus, graphical mouse, of function keys. Providing the following operations at a minimum:

- Comprehensive support of all BACnet objects for scheduler, calendar, and commands.
- Daily and weekly schedules
- Ability to compile multiple data points into a logical command group to simplify scheduling (e.g. Building 1 Lighting)
- Planning predefined reports.
- Ability to plan at least 10 years in advance.

C … Nil   I ….. Nil   O …… Nil

- Provide filters for schedulers by name, time, frequency, and schedule.
- Provide sorting schedulers by name and schedule type.

4.4 Customized Scheduler Program

The user can customize the schedule defining the operating mode for each plant. Switching times are defined via weekly schedule. Overriding recurring weekly schedules via local or global exceptions as well as operation via any operator unit must be possible.

4.5 Customized Calendar

Local or global calendar exceptions must be able to override the plant-specific weekly scheduler program. Equal calendars must be assigned priority over each other. Calendar operation must be possible via all operator units.

4.6 Create Calendar Online

Calendar programs must be able to be remotely created online to provide service personnel with a high level of flexibility.

4.7 Create Scheduler Online

Scheduler programs must be able to be remotely created online to provide service personnel with a high level of flexibility.

4.8 Create Offline and Online Trends

Trend log objects, both offline and online, must be able to be remotely created in order to provide service personnel with a high level of flexibility. This action must be performed directly from the building management system, without accessing directly the automation layer.

4.9 Multiple, concurrent Users

Multiple users must be able to work concurrently on various workspaces on the building automation and control system for efficient and comprehensive work. Plants must simultaneously be analyzed and e.g. monitored or operated via a remote station.

5 Security

5.1 Cybersecurity certification

The building management system must be implemented in accordance with the internationally recognized standards for industrial security ISA/IEC 62443, developed by the International Society of Automation (ISA) and adopted by the International Electrotechnical Commission (IEC).

- The provider organization must have secure development processes certified to IEC 62443-4-1 Maturity Level 3 (ML3) or higher.
- The building automation and control system must be certified to IEC 62443-4-2 Security Level 2 (SL2) or higher.

5.2 Cybersecurity Guidelines

Cybersecurity guidelines must be available to support secure commissioning and deployment of the building management system. The guidelines must describe how the system needs to be configured to foster secure operation of the products and solutions in the intended operating environment. The cybersecurity hardening guidelines must be maintained throughout the product lifecycle.

C … Nil   I ….. Nil   O …… Nil

5.3 Cybersecurity Penetration Test

Cybersecurity penetration test results based on Open Web Application Security Project (OWASP) Application Security Verification Standard for systems with sensitive data (OWASP ASVS Level 2) must be available.

5.4 Access Protection

Different people maintain and operate the plant. For this reason, passwords must be assigned to authorized persons to guarantee transparency for tracking or authorization purposes. A minimum of four different rights must be assignable.

- Administrator.
- Program and graphics creation.
- Operation to change or adjust setpoints.
- Guest.

5.5 Windows Authentication

The building management control system password management must meet the customer's IT guidelines. In other words, the customer's corporate standard also applies to the BAC system. Therefore, password management and the associated properties must comply with standard Windows log on and "track" the operator on each workstation.

5.6 Operating Functions

Central setpoint shift

The setpoints in the rooms must be adjustable and can be shifted for effective and clear room operation for the rooms as a whole and individually via the building automation and control system.

5.7 Alarm Function

The building management station contains an image of the physical data points. Each data point must be alarmable. Parameterization via operator units must be possible. The alarms either do not require acknowledgment, i.e. they come and go without acknowledgment, or must be acknowledged or reset and acknowledged.

5.8 Alarm Message

Alarms from the automation station must be displayed on the operator units within 1 second. Alarms must be acknowledged or acknowledged and reset dependent on access rights. Delay times (e.g. feedback supervision, triggering of differential pressure monitor, filter) must be changeable via operator units.

5.9 Alarm Suppression

During commissioning, plant servicing or automation station startup, it must be possible to suppress alarms and events from single objects or from entire plants. The suppression must include corresponding undesired reactions.

The building management system shall provide a clear indication in case of an active alarm suppression, and it shall easily be possible to list the suppressed objects.

5.10 System Safety

High availability is expected from the building automation and control system. This results in greater data availability, greatly reducing any down times.

C … Nil   I ….. Nil   O …… Nil

5.11 Alarm Generation

The building management system must be able to generate alarms based on events that are reaching the management station directly from the field level. The system must also provide a functionality for creating management station alarms that are configurable and satisfy the needs of event management, even for devices that are not supporting alarming natively.

5.12 Message Handling

The building management system must support alarms generated at the automation level (substations).

5.13 Notification of Alarms

5.13.1 Media independent Formats

Current alarms may need to be routed independent of media at certain times to a central service (Email, SMS, pagers, and mobile apps).

The number of data points that can be configured for remote messaging of alarm conditions as well as the number of remote devices that may receive system messages may not be limited. The system must support the sending of encrypted e-mails.

5.13.2 Multi-level Alarm Escalation

It shall be possible that unacknowledged notifications can be forwarded to additional devices of the same person and/or different groups of people to ensure that notifications are received on time to react properly.

5.13.3 Exclude Recipients

The building management system must be able to exclude recipients, for example, when they are on vacation, so that when excluded, they do not receive any notifications.

5.13.4 Deactivate Notifications

Users can set Notifications to active/inactive to avoid e.g. sending out notifications from buildings where a subsystem change is ongoing, generating alarms which do not need to be forwarded by Email, SMS, or Pager.

5.13.5 Import Recipients from Active Directory

It shall be possible that recipients can be imported/exported from/into CSV or XML formatted files. A regular automatic import of Active Directory import into the recipient DB shall be supported too. This helps to reduce the maintenance effort for recipients, when mobile numbers or email addresses change.

5.13.6 Message Optimization

In the situation of event related alarm bursts, the system shall avoid generating notification bursts to allow users to keep the overview in exceptional situations.

5.13.7 Enhanced Message Tailoring

The building management system must allow to tailor the notification message content and layout according to customer needs, using Java scripts for flexible tailoring.

5.13.8 Unicode UCS-2 Text Support

It shall be possible to use UCS-2 coding to send SMS texts for non-latin 2-byte characters used for Chinese-, Korean-, Cyrillic-, Arabic- and other -languages.

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5.13.9 Dynamic Email Attachments

It shall be possible to add attachments to notifications sent out via email. The attachments can be static or dynamic. In the case of dynamically attachments, the attachment is dependent of the data point in alarm. For example, if a fire alarm needs to be notified, the corresponding email can have an attached graphic of the ground floor with the fire detector in alarm.

5.13.10 Graphical easy Buttons to trigger Notifications.

The building management system must allow to send out notifications manually, using graphical buttons for triggering. These graphical buttons must be part of normal graphic pages (for example, campus, building and ground floor graphics).

5.14 Acknowledgment

Operator units for acknowledgement

All alarms (alarms and faults, errors) must be acknowledgeable after issue of individual rights from all connected workstations. For tracking reason, a time stamp and assignment (based on user account) is required.

This includes:

- Local acknowledgement (control cabinet, automation station)
- Management level
- Remote operating equipment

5.15 Alarm Management Strategy

The software must permit configuration of alarm management strategy for each data point. The editor provides a way to edit data points directly, online via the building management system.

The software for the user interface is also able to make batch changes to data point definitions and attributes to one or more data points selected by the user.

5.16 Colored Display of Alarms and Events

Incoming alarms must be colored for quick and easy interpretation. Both order and state, as well as alarm priority must be recognizable. The alarm window must be displayed as per operator needs. Alarm window displays must be added to the bid.

5.17 Alarm Message Content

The message texts must contain all information necessary to allocate and resolve the error. This includes at least the following attributes:

- Clear text
- Control cabinet name
- Plant name
- Priority
- Timestamp
- Time
- Status (acknowledged, unacknowledged).

Instructions on how to resolve the problem must be available in the background.

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5.18 Informational Text and Object Memo

For each system object it shall be possible to configure texts with object specific information and instructions that must be displayed in case of an alarm. In addition, a memo can be attached to any system and used as a reminder or a note to operators.

5.19 Filter Alarms

The building management system must offer alarm filtering. Filtering must be possible by alarm lists or priorities.

Step-by-step instructions on handling each alarm help the building automation and control system operator to find a solution.

5.20 Event Management

5.20.1 Event Routing and Sorting

Event messages can be displayed on each workstation in a table application and must include the following information: Name, value, event time and date, state, priority, acknowledge information, and alarm counter. The system must also be able to send out an acoustic message appropriate to the event category.

5.20.2 Even Message

Event messages can be displayed on each workstation in a table application and must include the following information on each event: Name, value, event time and date, state, priority, acknowledge information, and alarm counter. Each event must also be able to send out an acoustic message appropriate to the event category.

5.20.3 Event Acknowledgement

The user can acknowledge each event directly from the list, suppress the acoustic notification, print or delete it. The interface must also have an option to delete active, acknowledged events until it is reset to the normal state.

The user must be able to navigate to information associated with a data point, start an associated graphic or trended graphic diagram, or run a report for a data point selected directly from the event list.

5.21 Event Treatment

The building management system must provide multiple alarm-handling options. These are to be configured in alignment with the standard operating procedures.

5.21.1 Fast Treatment

The user must be able to acknowledge each event directly from the event list, suppress the acoustic notification, print or delete it. The interface must also have an option to delete active, acknowledged events until it is reset to the normal state.

The user must also be able to navigate to information associated with a data point, start an associated graphic or trended graphic diagram, or run a report for a data point selected directly from the event list.

5.21.2 Investigative Treatment

From the event list, operators shall have the ability to quickly focus on the source of the event, and all information (live and recorded video streams, recent history, schedules, and so on) related to the event source.

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5.21.3 Assisted Treatment with Operating Procedures

The building management system must have the ability to program operating procedures consisting of a sequence of steps or actions, which the operator must perform. For each step of a procedure, the system shall provide instructions and operating tools. With appropriate permissions, a user shall have the ability to create, view, edit, or delete operating procedures.

Each operating procedure shall be composed of steps - some of which may be mandatory - for the user to complete (for example, view the graphic of the object in alarm, view live and recorded video streams, or complete an event handling form) while some others shall have the ability to be configured to be executed automatically by the system (for example, send emails to recipients or print on paper the information of the event).

6   Reports

6.1 Report Generation

The building management system must support the generation of spontaneous or predefined reports to provide important plant data at any time. The reports must be printable and exportable as a PDF file. The data must be able to be edited in other programs (Microsoft Excel or Microsoft Access) for further analysis.

6.2 Standard Report Templates

The building management system must support templates to generate detailed reports at little effort. At least three different report templates must be available by default.

For example:

- Report of records at given user defined time intervals
- Reports to record alarm and fault states
- Reports to record log entries
- Reports to record plant and control cabinet states.
- List of all current data points in an override state
- List of all disabled data points
- List of alarm strategy definitions
- Overall data point report
- Data point trend data listing
- Initial value report
- User activity report
- Event history report

6.3 Customized Report Templates

The building management system must permit generated, specific reports as well as individual report templates that may include graphics and trend views.

7   Remote Operation

7.1 User Requirements on Operation

It must be possible to remotely operate and engineer the building management system regardless of the location by means of different types of clients.

Remote clients must offer the same functionality as those on other workstations. All user functions must be available on installed clients, Windows desktop Apps, or HTML5-based clients via browser.

Appropriate Cybersecurity measures must be in place for remote operation.

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7.2 Dedicated Desktop Installed Client

User must be able to remotely operate and engineer plants regardless of location. The client must operate as a fully installed software installation, locked with a desktop, and prevents in this manner software from being minimized or hidden by other applications.

7.3 Windows App Client

User must be able to remotely operate and engineer plants regardless of location. Of course, this openness cannot place the plant security at risk. A Windows App must be loadable by the server PC on the client that operates like an installed application and is automatically updated as soon as new apps are available on the server.

7.4 HTML5-based Client

An HTML5-based client must be available to remotely operate the building management system. It must be able to run in a standard HTML5 web browser, on different devices, operating systems and browsers supporting keyboard and mouse operation as well as touch operation.

The HTML5-based client must be identified on the building management system via certificates. It must support the following login mechanisms to the building management system:

- Integrated user accounts, or
- LDAP users, or
- External OIDC provider(s)

The HTML5-based client must provide at least the following functionality for operation:

- Event management supporting fast and investigative treatment.
- Notifications about new events or important system messages
- Monitoring and operation via graphic pages
- Commanding object properties
- Creation and analysis of trend data/trend records
- Configure and view schedulers.
- View documents of types of PDF, RTF, TXT and URLs.
- Generate and review reports.
- View and filter historical log data
- Manage recipients for remote notifications.
- Dark mode to ease work at night or provide higher-contrast display in artificial light.

User-specific and/or customized workspace settings must be automatically saved per user and for various screen sizes. Those settings must be automatically re-applied at the next session.

7.5 HTML5-based Desktop Application

An HTML5-based desktop application client must be available to remotely operate the building management system. It must be easy to download, install, and update, and must run on the supported Microsoft Windows operating systems of the building management system.

The HTML5-based desktop application must support multi-monitor environments and a closed mode based on the Microsoft Windows Kiosk Mode, which allows to create stations that are dedicated to the operation of the building management system.

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7.6 Mobile App

An App, optimized for smart phones and tablets, must be available for the management. The App shall contain tools to see and command events as well as a System Browser to read and command all objects based on the security privileges of the operator as defined at the management station. The App shall be available for both Apple and Android operating systems.

8   Trend data

8.1 Trend Data Collection

The system must support the collection of trend log objects. Logging of those objects must be achieved according to the following principles:

- Using COV (change of value): every time the value is changing, a record is logged into the database.
- Using time intervals: the record is logged into the database, given a specific and user defined time parameter (time filter).

The following time parameters must be supported:

- Default (no time filter applied)
- 30 seconds
- 1 minute
- 5 minutes
- 10 minutes
- 15 minutes
- 30 minutes
- 60 minutes
- 24 hours

8.2 Simultaneous, Multiple Trends

Multiple trend views must be possible simultaneously to provide a comprehensive plant overview. Standard plants from medium to higher complexity (as in this project) require a simultaneous display of up to 10 trend curves on the current page view to assess the plants. Multiple trend curves must thus be recorded at the same time.

8.3 Freely assign Trend Data

For the greatest possible flexibility, operators must be able to assign and thus record max. 4 additional data points individually for each plant.

The assignment must be carried out from the management station.

8.4 Decentralized Data Storage

None of the trend data may be lost during communications failure to achieve gap-free trend documentation. For this reason, all trend data must be created and saved to the automation station. After communications are restored, all values saved on the management station must be updated automatically.

8.5 Record History Data, Trend

Vital data points and setpoints must be saved for each building services plant. The polling time is oriented to the signal type, i.e. analog values are recorded cyclically while digital or multistate values are recorded by event.

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8.6 Intermediate Storage of History Data

Trend data are collected in the automation station and transferred to the management level after a specific time has expired or a specific amount of data has been recorded. Trend data may not be lost if the management station is unavailable temporarily.

8.7 Trend Comparison

The system must offer a time adjusted trend view to run analysis of changed conditions at various times.

8.8 Trend Calculations

The system must allow simple calculations between trend data. A special trend calculation workspace must be used to configure the necessary elements for the calculations. The calculation workspace must at least offer:

- User defined descriptions for the trend calculation objects
- Fixed names for each individual trend object
- Mathematical operations, such as + , - , / , * , (), sqrt(), ^
- Align the trend data in a common timestamp with interpolation

The calculations must be presented in the form of reports or can be extracted in XLS for further analysis with external tools.

9   Communication

9.1 Interfaces

The building automation and control system must be extendible to ensure long-term operation and provide all standard interfaces commonly available on today's market.

9.2 Fire Detection System, BACnet-based

BACnet-based fire detection systems supporting BACnet BIBB AE-LS-B as well as objects Life Safety Point and Life safety Zone as per the PICS (Protocol Implementation Conformance Statement) document must be able to be integrated for best deployment of a building automation and control system. The following functions must be supported:

- Alarms and events from the fire detection system must be identified clearly and unambiguously.
- Signaling device states must be displayed as per the BACnet standard.
- Instruction texts must be able to be added to detectors and zones.
- Situational and floor plans as well as dynamic symbols must be used for visualization.
- A technical hierarchy, e.g. building, building part, zone, detector, must be provided to the operator for ease of operation.

9.3 OPC

The building management system must be able to integrate and edit OPC data, and yet supply real time OPC data as an OPC server. System processing must include alarming, trend, scheduler, reporting, and be able to communicate with other devices.

The OPC interface must be tested and certified by the OPC Foundation certification program.

The system must support the OPC specification:

- OPC Data Access (DA)
- OPC Unified Architecture (OPC UA)

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9.4 IEC 61850

A native integration with an electrical power network via IEC 61850 protocol must be supported.

9.5 Modbus

The management station must support communication to Modbus TCP/IP devices and sub systems directly from the management station.

9.6 KNX

The management station must support native communication to KNX devices, via KNX/IP protocol through KNX IP Routers, or KNX IP interfaces and gateways.

9.7 Standard BACnet / AMEV

9.7.1 DIN EN ISO 16484-5 / AMEV

AMEV (Management station) AMEV Profile MBE-A and MBE-B

The management station must meet AMEV profiles MBE-A and MBE-B as per AMEV guideline "BACnet 2011" V1.1.

9.7.2 BACnet Standardized Device Profiles

The building management system must be BTL certified for the following BACnet standardized device profiles:

- BACnet Advanced Operator Workstation (B-AWS)
- BACnet Advanced Life Safety Workstation (B-ALSWS)
- BACnet Advanced Access Control Workstation (B-AACWS)
- BACnet Router (B-RTR)
- BACnet Broadcast Management Device (B-BBMD)

They must also support BACnet data points and BACnet personal safety security zone functionality. The BACnet protocol revision must be at least 1.18.

The building management station must support seamless integration of alarming with BACnet devices, full support for commanding, writing and COVs to provide control and command functionality.

Finally, the system must support discovery and display of BACnet devices and all object types in revision 1.18

9.7.3 BACnet Secure Connect (BACnet/SC)

The building management station must support the BACnet/SC standard and allow:

- Support for any type of BACnet vendor using BACnet Secure Connect
- Support for dual network deployment (e.g., both SC networks and BACnet standard networks can be deployed)
- Handling of certificates for BACnet/SC
- Support for certificate notifications (e.g., Certificate expiry)

9.7.4 BACnet Engineering Data Exchange (EDE)

The building management station must support the import of engineering data, such as data point types, data point addresses and special data point presentation information from an EDE file that complies with the format described in the document "Description of the EDE Data Fields ", Version of Layout: 2.3, from the BACnet Interest Group Europe (BIG).

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9.7.5 Video Status and Commands

The building management station shall be able to provide video controls with:

- Remote Control of Video Monitors
- VMS triggers for controlling logic in the VMS and triggering reactions in the building management system.
- Video Events and Video Event Treatment including video tagging with alarm information.
- Diagnostic information of Video Devices
- Video as Operating Procedure step

9.8 Northbound Interfaces

9.8.1 Expose Information via OPC

The system must be able to supply real time data from the management layer, as an OPC server, and to integrate with third-party applications when necessary.

The system must support the OPC specification:

- OPC data access (DA)

9.8.2 Expose Information via BACnet/IP

The system must be able to supply real time data from the management layer, as a BACnet/IP server, enabling communication and integration with third-party applications and systems, when necessary.

The following specifications must be met:

- The system must expose a system object as Analog, Binary and Multistate BACnet object.
- The system must support of read, write, and change of value (COV)
- The system must be able to expose management station trends as BACnet trend log objects.
- The system must be able to expose BACnet alarms.
- The system must be able to expose at least 20'000 objects per running server.

  A BACnet Protocol Implementation Conformance Statement (PICS) must also be available.

9.8.3 Expose Information via SNMP

The system must be able to supply real time data from the management layer, as SNMP agent, allowing Network Management Systems (NMS) to monitor all Building Automation, Danger Management, Energy and Control System devices connected to the management platform.

The system must support:

- SNMP V2 protocol
- SNMP V3 protocol
- SNMP traps
- SNMP get

9.8.4 Expose Information via Cloud

The system must be able to connect to a cloud-based BMS platform, that allows cloud-based SaaS applications to access data of the on-premise system and execute the following tasks:

- View the high-level status of a single or multiple sites
- View the current value of datapoints
- Command/override on-site datapoints

C … Nil   I ….. Nil   O …… Nil

- Visualize events/alarms coming from one or multiple sites in a unified and consolidated view
- Visualize aggregated information at different levels based on datapoints values or event information
- Visualize energy consumption information based on meter data
- Access the BMS user interface with single sign-on and simplified security deployments
- Onboard BMS sites as an application to get an understanding of what is installed on-premise

  The systems cloud connectivity must include the following features:

- **Site onboarding process and configuration**
  The system must provide a simple engineering workflow to onboard the server hosting the system as a device and register the application represented by the systems project.
- **Selection of data to expose to the cloud-based SaaS application**
  As not all data of the system are relevant for a cloud overview, the system must provide a mechanism to do a selection of data to be uploaded and gives visibility from the cloud-based SaaS application only to the required data.
- **Data points and events from the cloud-based SaaS application**
  Datapoints and equipment that are uploaded to the cloud for a given site can be monitored, and for some of them, depending on the datapoint's nature, commanding / override is also possible. Datapoint values previously uploaded can be consulted using a Trend View. Events associated with the uploaded datapoints are reflected in the cloud-based SaaS application as well and aggregated to the level of equipment and site.
- **Remote tunnel access to the systems**
  If the overview given in the cloud-based SaaS application is not enough and the user needs to drill down into more details for a specific site, it must be possible to establish a tunnel to the system and use the local Client UI for more advanced operations.

9.8.5 Expose Information via Web Services

The system must allow external applications to read and write real-time data as well as access events or historical values, by using the provided REST (Representational State Transfer) web service interfaces.

Web Services can be used for applications such as Enterprise Software, Energy Management services, Facility Management systems or Mobile Apps.

9.9 Automation level

9.9.1 Requirements on the automation level

General

Building automation station standard

Building automation stations must be intelligent. They must be autonomous. They must allow to build large systems with highly decentralized small units (DDC).
Building automation stations must be freely programmable and feature graphical programming optimized for building automation and control. The following functions must be possible with it: Control, measure, signal at various priorities and by event, monitor, alarm, count, calculate, schedule, save trend values, and log as per DIN EN ISO 16484-5. BACnet server (building automation stations) certificates must be added to the bid.

Building automation stations must have:

- an embedded WLAN interface conforming to IEEE 802.11b/g/n, operating in the frequency band 2.4…2.462 GHz, protected by WPA2,
- a 2-port Ethernet switch 10Base-T / 100Base-TX, IEEE 802.3 compatible

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- a processor speed of at least 300MHz
- configurable RS485 interfaces either for integration of Modbus RTU or BACnet MS/TP
- KNX PL-Link bus connection for sensors, actuators, and control units (including power supply of the devices) with "Plug and Play" connection to field devices with KNX PL-Link

Building automation station I/O

Building automation station must have the ability to expand via I/O modules. Expanded I/O must support the following signal types:

- Passive sensors LG-Ni 1000, 2x LG-Ni1000, Pt 1000 (*75, 385)
- NTC 10k, NTC 100k
- Resistance sensors 1000 Ohm, 2500 Ohm, 2650 Ohm, 1000...1175 Ohm (for setpoint shift)
- Active sensors DC 0 ... 10 V
- Current measurement analog DC 0...20 mA or 4...20 mA
- Binary potential-free contacts for signaling functions.
- Counter to 25 Hz (electronic switch to 100 Hz)
- Analog outputs DC 0…10 V
- Relay outputs for binary controls, changeover contact (NO, NC, pulse)

System design

Manufacturer must prove that they have various scalable building automation stations to ensure optimal building automation station design. Associated system documentation must be added to the bid and included in system evaluation. Documentation must show that the hardware (DDC and I/O modules) is designed optimally for the number of the required data points.

Delineation, primary and system automation to management level

All management level functions must be fully engineered in the building automation station to increase plant availability. Delineation is defined to ensure that no additional engineering is required at the management level (BACnet client).

Delineation, room automation to management level

All management level functions must be fully engineered in the room automation station to increase plant availability. Delineation is defined to ensure that no additional engineering is required at the management level (BACnet client).

9.9.2 Operation concept at automation level

Local operation

General

Local operation with access for the corresponding building automation station, or network operation via BACnet to all or selected building automation stations, or simple room operation must be available.

Operator and monitoring units

Requirements planned on operator and monitoring units

Networkable operator and monitoring unit

Plant operation must be possible both locally and via management level.

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Operation must allow for access to all values (current values, setpoints, parameters, maintenance and fault messages) without special engineering as well as plant-specific composition of vital values.

Operation must allow for graphic display of weekday and exception programs, heating curves and trends set up individually.

Graphical plant operation via network-capable touch panel

The building management system is operated via a networked touch panel. They must inform the operator without log on using plant graphics on the present state of the plant. Multiple plants must be able to be operate via touch panel. Is must be capable of displaying and acknowledging alarms. The operator should be informed about faults directly by a common alarm display via faults even when the display is switched off. At the same time, functions to control the plant must be supported, so that plants must be able to be graphically operated and displayed using select data points, schedulers as well as trend views. A capacitive display is used to operate. The touch panel as be added as an integral component of the overall system via a scalable web interface as well as a pleasant form of polished aluminum frames. User name and password is required to run functions that can change to plant settings in order to protect the plant. Authentication must be able to be disabled as an option.

Web operation independent of hardware

Operation must allow for graphic display of weekday and exception programs, heating curves and trends set up individually.

Operation via web browser or mobile clients

Vital functions must be viewable regardless of plant location. To this end, access is required via mobile clients (mobile phone, pocket PC, PDA, etc.) to all actual values and setpoints, plants and operating states.

Operator intervention via operator units

Plant operators must be able to switch via operator units the plant and individual aggregates and components and deactivate Auto mode via operator units. Read/write access rights must be considered in this regard.

Manual intervention signal

An alarm message must be generated following manual operator intervention as the plants are designed and controlled for highest possible energy efficiency.

Monitoring

Manual intervention (override), switching frequency.

Monitoring, evaluation, and display of switching frequency is required for manual interventions over a defined timeframe. The determined value is monitored to a minimum and maximum and displayed as quality state for breach and/or exceeding thereof. The determined value from the current timeframe is displayed; the value from the previous timeframe is also displayed and made available to the trend data.

Manual intervention (override), runtime

Monitoring, evaluation, and display of runtime is required for manual interventions over a defined timeframe. The determined value is monitored to a minimum and maximum and displayed as

C … Nil   I ….. Nil   O …… Nil

quality state for breach and/or exceeding thereof. The determined value from the current timeframe is displayed; the value from the previous timeframe is also displayed and made available to the trend data.

9.9.3 I/O modules

General

Construction

As highly flexible I/O modules are needed for complex and large technical equipment in buildings, they must be composed individually for each plant. To this end, modules must be configurable for various signal types, grouped, labeled per channel with clear text, two-sided readable, and distributed or set across several control cabinets/panels. Building automation stations must allow for flexible expansion of I/O via these modules.

The entire module electronics must be protected by a stable plastic housing against touch and soiling.

Diagnostic function

A status diagnosis for each channel is required to quickly locate installation or plant errors. The status is displayed by LED or on the module.

LED display

The color of the status LED must be configurable to correspond with message type to provide and easy overview in the control cabinet. Feedback: green, maintenance: yellow, warning: red.

Remote I/O modules.

Remote I/O modules must be able to be used for small plants or parts thereof to keep the size and number of control cabinets/panels as low as possible. The modules must be able to be as far as 200 m from the building automation station. The maximum number of data points edited this way may only be limited by the maximum capacity of the building automation station.

Isolating terminal functionality

The electronic modules must have isolating terminals to simplify hardware tests and commissioning. As a result, connected field devices can be measured at the test plug sockets without module electronics influence. At the same time, the connection terminals must act as cabinet/panel terminal strips. If the bidder cannot provide proof for this function, all inputs and outputs must be run via separate isolating terminals. The resulting costs must be included in the unit prices.

Local priority control

Level for manual local priority control

The module must have an optical status message facility to avoid faulty positions.

Monitoring local priority control

The building automation and control system must be able to indicate any intervention via the local priority control. This indication must be well displayed at the management level.

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Connection

Short-circuit proof

Field devices and motors must be connected directly without requiring coupling relays or other proprietary hardware. All terminals are protected against short circuit and incorrect wiring using AC/DC 24 V. Field device errors must be recognized and displayed reliably to retain high plant availability.

Broken wire interlock

Interlocks (hardware) and fault messages must be designed for possible wire breaks or loose terminals under closed-loop rules, i.e. the building automation station then has status "1" OK (closed monitoring loop) or no fault, and status "0" (interrupted monitoring loop) or fault.

Connect field devices.

Field device standards

The building automation stations, and I/O modules must support all common sensors (e.g. temperature, humidity) and actuators (valves, damper actuators) without requiring additional conversion hardware. The bidder must provide proof that the field devices used for the project were tested under the entire system and documented accordingly.

Use of I/O modules on the automation level

Functionality for the I/O system must be implemented on the automation level.

9.9.4 Updates and adaptions

Updates

Changes during operation

Customer-specific plant programs must allow for minor adjustments without having to switch off unrelated plants and without changing set parameters and setpoints.

Changes to applications during operation

Minor program changes must be able to be introduced without operational interruptions.

Adaptations

Access to system network

Operators must be able to enter adapted parameters, setpoints, times etc. in each building automation station via the system network under their password.

9.10 Communication

9.10.1 Standard BACnet / AMEV

DIN EN ISO 16484-5 / AMEV

BACnet conformance and BTL logo

The BACnet servers (building automation stations) used must support at least BACnet in a recent BACnet revision version (that qualifies as a "minimum protocol revision" according to the official BTL test policies at the time of the bidding).

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B-BC (building automation station)

Building automation stations must match the BACnet Profile B-BC (Building Controller) as per the BTL Listing.

AMEV AS-A and AS-B (Building automation station)

The building automation stations must meet AMEV profiles for at least AS-A as per AMEV guideline "BACnet 2017".

Conformance declaration

Protocol implementation, and conformance statement (PICS)

Manufacturer self-declaration PICS is required prior to executing work to gain information on the type of communication for the building automation and control system.

Communication via BACnet / IP

BACnet/IP(v4) to BACnet/MS/TP

The building automation station must be able to integrate, using a BACnet router manufactured by the same vendor, the MS/TP protocol via BACnet/IP.

Communication via BACnet / SC

Responsibility of certificates

The end customer shall define the responsibility to generate and maintain required TLS certificates.

BACnet/IP to BACnet/SC

Automation Stations and Management Stations shall support BACnet/SC datalink to ensure secure communication. If not all devices of the BACnet system can support BACnet/SC, the alternative solution shall consist of a mix with a recommendation to migrate all devices to BACnet/SC (future upgrade via firmware must be possible).
The building automation stations supporting BACnet/IP must also support BACnet/SC or at least allow for a software upgrade to BACnet/SC (without exchanging the hardware).

Building automation stations that support BACnet/SC must support both self-signed certificates as well as the use of digital certificates that are generated by an arbitrary 3rd party certification authority ("CA"). The engineering tool shall also be capable of handling TLS certificates generated by an external CA.

Building automation stations that work as a BACnet/SC "hub" must also simultaneously work as BACnet/IP router to support an easy parallel use of both BACnet datalinks and a step-wise migration towards a secure system-wide BACnet communication and to support a mixed system.

Building automation stations that work as BACnet/SC "hub" must support at least 100 simultaneous BACnet/SC "node" connections. It shall be possible to build systems larger than a single BACnet/SC hub supports.

BACnet/SC devices shall be tested and certified by the BACnet Testing Laboratory.

The automation equipment manufacturer must ensure cyber secure product development process

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and demonstrate compliance with IEC62443 4-2 (Security Level 2*).

9.10.2 Physical structure

Network structure

Structure

The offered network must be flexible and allow for all types of networks (line, star, ring, tree, etc.) to satisfy all owner/operator needs

9.10.3 System Integration controller

Building automation and control system - Building automation stations

Openness

Integration of third-party systems

If possible, the same communication protocol must be used as for the existing technical equipment in the building to integrate third-party systems (refrigeration machines, lighting and building automation and control systems, etc.). Building automation and control systems not offering this integration as specified must include and clearly declare any additional conversion hardware (gateways) in their price.

Open and neutral communication via BACnet

Building automation stations are connected to the management level via communication bus. System structure must allow open, neutral and manufacturer-independent communication. Communications must take place in principle via BACnet even if proprietary communications would be possible based on the building automation stations used. Intermediate OPC servers are not allowed.

Building system automation stations must have:

- System functions (alarming, scheduling, trending, access protection)
- Freely programmable (close resemblance to CEN standard 11312). All function blocks, available in libraries, can
  be graphically connected.
- BACnet/IP communication (BTL certified).
- Integration of BACnet MS/TP, Modbus data points via RTU and / or TCP devices, KNX PL-Link, M-bus energy
  meters directly (integrated mini power supply) or via RS485 level-converter.
- Operating voltage AC or DC 24 V.
- BACnet Secure Connect communication.
- 32bit processor 512 MByte SDRAM (DDR3) and 512 MByte NAND Flash
- Energy reserve (Supercap) to support real-time clock (7 days)
- Energy reserve can be extended using optional battery CR2032: Typically, up to 10 years (depending on the life
  of the battery).
- Engineering and commissioning with the user-friendly tool ABT Site using graphical function charts.
- BTL tested BACnet communication on MS/TP (BACnet/IP and BACnet/SC) or BACnet MS/TP, in compliance with
  the BACnet standard including B-BC profile (Rev. 1.16).
- WLAN interface for engineering and commissioning.

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- IT security including HTTPS, IEC-62443 4-2 (Security Level 2*), and BACnet Secure Connect.
- Building X Integration.

9.10.4 Building automation station - Building automation station

Standard protocol

Uniform protocol

Communication must also be standardized even between individual modules and building automation stations. All devices must communicate on the same protocol on the entire primary and room system levels

9.10.5 Building automation station - Field level

Field device connection

Connect field devices

The building automation stations and I/O modules must support all common sensors (e.g. temperature, humidity) and actuators (valves, damper actuators, lighting control, blinds drives) without requiring additional conversion hardware. The bidder must provide proof that the field devices used for the project were tested under the entire system and documented accordingly.

Connect communicating field devices

Common manufacturers must be integrable to connect third-party devices and subsystems. (e.g. communicating pumps, Modbus subsystems etc.).

(i)   General Requirements

All controls shall be capable of operating in ambient conditions varying between 0-55 deg. C and 90% R.H. non-condensing.

All Control devices shall have a 20 mm conduit knockout. Alternatively, they shall be supplied with adaptors for 20 mm conduit.

(ii)

(iii)   Ancillary Items

When items of equipment are installed in the situations listed below, the BAS contractor shall include the   following ancillary items:

(i)   Weather Protection

All devices required to be weatherproofed are detailed in the Schedule of Quantities. IP ratings for the equipment are mentioned in the respective section.

(ii)   Pipework Immersion

Corrosion resisting pockets of a length suitable for the complete active length of the device, screwed ½" (13   mm) or ¾" (20 mm) NPT suitable for the temperature, pressure and medium.

(iii)   Duct Mounting (Metal or Builders Work)

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Mounting flanges, clamping bushes, couplings, locknuts, gaskets, brackets, sealing glands and any special fittings necessitated by the device.

(iv)   TEMPERATURE SENSOR

Temperature sensors for space, pipes and ducts, shall be of the Resistance Temperature detector (RTD) type or thermistor. These shall be two wire type and shall conform to the following specifications :

1) Immersion sensors shall be high accuracy type with a high resistance versus temperature change. The accuracy shall be at least   At -30...130 °C: ±1.3 K.

2) Immersion sensors shall be provided with separate Brass thermo well. These shall be manufactured from bar stock with hydrostatic pressure rating of at least 10 kgf/cm^2.

3) The connection to the pipe shall be screwed type. An aluminium sleeve shall be provided to ensure proper heat transfer from the well to the sensor. Terminations to be provided on the head. Flying leads shall not be acceptable.

4) The sensor housing shall plug into the base so that the same can be easily removed without disturbing the wiring connections.

5) Duct temperature sensors shall be with rigid stem and of averaging   type. These shall be suitable for duct installation.

6) Outdoor air temperature sensor shall be provided with a sun shield.

7) The sensors shall not be mounted near any heat source such as windows, electrical appliances etc.

   The temperature sensors may be of any of the following types :

   1)   PT 100, PT 1000, PT 3000
   2)   Thermistor

(v)   HUMIDITY SENSOR

Space and duct humidity sensors shall be of capacitance type with an effective sensing range of 10% to 90% RH. Accuracy shall be + 3% or better. Duct mounted humidity sensors shall be provided with a sampling chamber. Wall mounted sensors shall be provided with a housing. The sensor housing shall plug into the base so that the same can be easily removed without disturbing the wiring connections. The sensors shall not be mounted near any heat source such as windows, electrical appliances etc.

(vi)   FLOW METER

Water flow meters shall be either Electro magnetic or ultra sonic type. For electromagnetic flow meter, teflon lining with 316 SS electrodes must be provided. The housing shall have IP 55 protection. Vendors shall have to get their design/ selection approved by the Consultant, prior to the supply.

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The exact ranges to be set shall be determined by the contractor at the time of commissioning. It should be possible to 'zero' the flow meter without any external instruments, with the overall accuracy of at least ± 2% full scale.

(vii)   PRESSURE TRANSMITTER FOR WATER

Pressure transmitters shall be piezo-electric type or diaphragm type. (Bourdon Tube type shall not be acceptable). Output shall be 4-20mA or 0-10V DC and the range as specified in the data sheet depending on the line pressure. Power supply shall be either 24 V AC, 24 V DC or 230 V AC. Connection shall be as per manufacturer's standards. The pressure detector shall be capable of withstanding a hydraulic test pressure of twice the working pressure. The set point shall fall within 40%-70% of the sensing range and detector shall have sensitivity such that change of 1.5% from the stabilized condition shall cause modulation of the corrective element. The sensor must be pressure compensated for a medium temperature of -10 o C to 60o C with ambient ranging between 0 o C to 55 o C.

DIFFERENTIAL PRESSURE SWITCH FOR PIPE WORK

These shall be used to measure pressure differential across suction and discharge of pumps. The range shall be as specified in the data sheet. Switch shall be ON with increase in differential. Housing for these shall be weather proof with IP 55 protection. The pressure switch shall be capable of withstanding a hydraulic test pressure of 1.5 times the working pressure. The set point shall fall in 40-70% of the scale range and shall have differentials adjustable over 10%-30% of the scale range. The switches shall be provided with site adjustable scale and with 1 NO/NC contacts.

(viii)   DIFFERENTIAL PRESSURE SWITCH FOR AIR SYSTEMS

These shall be diaphragm operated. Switches shall be supplied with air connections permitting their use as static or differential pressure switches.

The switch shall be of differential pressure type complete with connecting tube and metal bends for connections to the duct. The housing shall be IP 54 rated. The pressure switches shall be available in minimum of 3 ranges suitable for applications like Air flow proving, dirty filter, etc. The set point shall be concealed type. The contact shall be SPDT type with 230 VAC, 1A rating.

The switch shall be supplied suitable for wall mounting on ducts. It should be mounted in such a way that the condensation flow out of the sensing tips. Proper adaptor shall be provided for the cables.

The set point shall fall within 40%-70% of the scale range and l has differentials adjustable over 10%-30% of the scale range.The switches shall be provided with site adjustable scale and with 1 NO/NC contacts.

(ix)   AIR FLOW SWITCHES

Air flow switches shall be selected for the correct air velocity, duct size and mounting attitude. If any special atmospheric conditions are detailed in the Schedule of Quantity the parts of the switches shall be suitably coated or made to withstand such conditions. These shall be suitable for mounting in any plane. Output shall be 1 NO/NC potential free. Site adjustable scale shall also be provided.

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(x)   AIR PRESSURE SENSOR

The pressure sensor shall be differential type. The construction shall be spring loaded diaphragm type. The movement of the membrane in relation to the pressure should be converted by an inductive electromagnet coupling which would give an output suitable for the controller. The pressure sensor shall be in a housing having IP 54 ratings in accordance with IEC 529. Suitable mounting arrangement shall be available on the sensor. The sensor shall come complete with the PVC tubes & probes.

(xi)   WATER FLOW SWITCH

These shall be paddle type and suitable for the type of liquid flowing in the line. Output shall be 1NO/1NC potential free.

(xii)   CO SENSOR

CO Sensor shall be integrated Surface mounted type on the field. These shall work on 24V AC/DC supply with the output being standard type i.e. 4-20 mA / 0- 10 Volts etc. Response time of the detector shall be <10 minutes

(xiii)   AIR VELOCITY SENSOR

Air Velocity Sensor shall be integrated Surface / Duct mounted type on the field. These shall work on 24V AC/DC supply with +/- 10% variation the output being standard type i.e. 4-20 mA / 0- 10 Volts etc with an accuracy of +/- 3%. It shall be possible to select the different ranges by changing the jumpers on the sensor. At least 3 selection ranges on the sensors are required.

(xiv)   CO2 SENSOR – Duct Type

CO2 Sensor shall be wall / Surface mounted type on the field. These shall work on 24V AC/DC supply with the output being standard type i.e. 4-20 mA / 0- 10 Volts etc. The sensing range required shall be 0-2000 PPM with good resolution.
The preferred type of sensing element / method is NDIR type with accuracy of +/-50PPM or +/-2 % of measured value. Time constant of sensor shall be <5 minutes.

(xv)   LEVEL SWITCH

The level switches shall have to meet the following requirement:

Type	:	Float Type/Capacitance type/Conductivity type
Mounting	:	To suit application.
Connection	:	Flanged ANSI 150 lbs RF Carbon steel
Float material	:	316 SS
Stem Material	:	316 SS
Output	:	1 NO, 1 NC potential free
Switch Enclosure	:	IP 55

a.   ENCLOSURES FOR CONTROLLERS AND ELECTRICAL PANELS

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All the controllers shall be housed in Lockable Vandal proof boxes which shall either be floor mounted or wall mounted. These shall be free standing, totally enclosed, dust and vermin proof and suitable for tropical climatic conditions.

The panel shall be metal enclosed 18 SWG CRCA sheet steel cubicle with gaskets between all adjacent units and beneath all covers to render the joints dust proof. All doors and covers shall be hinged and latched and shall be folded and braced as necessary to provide a rigid support. Joints of any kind in sheet metal shall be seam welded with welding slag grounded off and welding pits wiped smooth with plumber metal.

All panels and covers shall be properly fitted and secured with the frame and holes in the panels correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with nuts. Self-threading screws shall not be used in the construction of control panels. Knockout holes of approved size and number shall be provided in the panels in conformity with the location of incoming and outgoing conduits/cables. Lamps shall be provided to support the weight of the cables. The dimension of the boxes shall depend on the requirement with the colour decided in consultation with the Architect/Consultant.

Note: All panel enclosures used in plant room spaces and external to building shall be suitable for outdoor application (IP 54 protection).

b.   CONDUITS AND WIRING

Prior to laying and fixing of conduits, the contractor shall carefully examine the drawings indicating the layout, satisfy himself about the sufficiency of number and sizes of conduits, sizes and location of conduits and other relevant details. Any discrepancy found in the drawings shall be brought to the notice of Architect/Engineers any modifications suggested by the Contractor shall be got approved by the Architect /Engineers before the actual laying of conduits is commenced.

c.   CONDUITS/TRUNKER

Conduits and accessories shall conform to relevant Indian Standards. PVC conduits of required dia shall be used as called for in the schedule of quantities. Joints between conduits and accessories shall be securely made, with help of adhesive.

The conduits shall be delivered to the site of construction in original bundles and each length of conduit shall bear the label of the manufacturer.

d.   CONNECTIONS

All jointing methods shall be subject to the approval of the Architect/Engineer. Separate conduits shall run for all power wiring.

The threads and sockets shall be free from grease and oil. Connections between conduit and controller metal boxes shall be by means of brass hexagon smooth bore bush, fixed inside the box and connected through a coupler to the conduit. The joints in conduits shall be smooth to avoid damage to insulation of conductors while pulling them through the conduits.

e. BENDS IN CONDUIT

Where necessary, bends or diversions may be achieved by means of bends and/or circular inspection boxes with adequate and suitable inlet and outlet screwed joints. In case of recessed system each junction box shall be provided with a cover properly secured and flush

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with a finished wall surface. No bends shall have radius less than 2-1/2 times the outside diameter of the conduit.

f. FIXING CONDUITS

The conduits, junction boxes, outlet boxes and controller boxes once installed in position, shall have their outlets properly plugged or covered so that water, mortar, insects or any other foreign matter does not enter into the conduit system. Surface conduits shall be fixed by means of spacer bar saddles at intervals not more than 500 mm.

The saddles shall be 2 mm x 19 mm galvanized steel flat, properly treated, primer coated & painted, securely fixed to supports by means of nuts and bolts/rawl bolts and brass machines screws.

g. DRAWING OF CONDUCTORS

While drawing insulated wires/cable into the conduits, care shall be taken to avoid scratches and kinks which may cause breakage of conductors. No joint shall be allowed in case of breakage of any conductor. No joint shall be shaved off like length of the conductors. Insulation shall be shaved off like sharpening of a pencil and it shall not be removed by cutting it square to avoid depression/cutting of conducting material.

Strands of wires shall not be cut to accommodate & connect to the terminals. Terminals shall have sufficient cross-sectional area to take all the strands.

No wire shall be drawn into any conduit until all work of any nature that may cause injury to wire is completed. Before the wires are drawn into the conduit, the conduits shall be thoroughly cleaned of moisture, dust, dirt or any other obstruction. Where wires are connected to detectors, or panel, sufficient extra length of wires shall be provided to facilitate easy connections and maintenance.

Only licensed supervisors/wiremen shall be employed for cabling and other connected work. Only approved make of cables shall be used. The cables shall be brought to the site in original packing.

h. MODE OF MEASUREMENT

LAN Cable

The cable connecting various system integration units to the control station shall be termed as LAN cable. These cable along with conduits shall be measurable on unit length basis.

i. SIGNAL CABLING & COMMUNICATION CABLING

The signal cable shall be of the following specifications:

a.   Wire   :   Annealed Tinned Copper

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b.   Size   :   1.0 sq. mm, stranded type

c.   No. of conductors   :   Two (One pair)

d.   Shielding   :   Overall beld foil Aluminium polyester shield.

e.   Jacket   :   Chrome PVC

f.   Nominal DCR   :   17.6 ohm/km for conductor

                                               57.0 ohm/km for shield

g.   Nominal capacitance :   130 pF/m between conductors at 1 KHz

                                               180 pF/m between one conductor and other

                                               Conductors connected to shield.

j. **LOCAL AREA NETWORK CABLE**
Depending on the type of LAN system being used by the contractor, standard, manufacturer's specification shall apply.

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<div align="center">**SECTION B**</div>

1.0 SCOPE :

The scope of all items in LV sub-system is SITC – Supply, Installation, Testing and Commissioning.

The agency that is bidding for the total project shall be called as "LV Integrator".

All and entire responsibility towards the successful execution of the LV sub-systems of the project

shall remain with the LV Integrator.

The entire SITC scope of all items falling under LV sub-systems shall be executed by a single LV

Integrator.

The LV Integrator shall be certified and authorized to supply, commission and provide services at site as may be required, including warranty and post-warranty support, as being the Original Equipment Manufacturer's authorized partner for the project. The LV Integrator shall have to formally submit the Manufacturer's Authorization as per the prescribed format annexed to this specification before commencement of the work.

The OEMs whose products are getting commissioned should have service centers for service and support of their respective products, preferably with toll-free nos. The OEMs whose products are getting commissioned by LV Integrator shall be direct manufacturers having their manufacturing facility.

The passive components of fiber optic cables and fiber optic components, options and accessories shall be from a single manufacturer / make / brand.

The passive cabling system consisting of fiber optic cables and accessories, the active networking components, i.e., networking switches and other such equipment's, the Pbx/communication systems shall be installed by a manufacturer's certified partner.

The fiber optics cabling system shall be duly certified with test reports submitted by the manufacturer or their authorized partners.

The active components of networking and distribution such as networking switches, their options and modules shall be also from a single manufacturer/make/brand, to ensure that software and firmware images and functionality is identical. The upgrades or enhancement of core/operating software images and firmware & management applications for switches, options and modules shall be free (without any extra cost) to the client for the entire life cycle of these switches.

For all LV systems, the core software, operating software, application software and GUI etc. shall be of the latest versions. The upgrades and enhancements of the software images, core software and firmware for all network or networkable devices - such as controllers, interfaces, network camera, ip telephones, pabx, fire alarm panels, PA main units etc. – shall be free (without any extra cost) to the client for the entire life cycle of these products.

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The LV Integrator carrying out the SITC of Works shall provide defects-free supply, commissioning and operation of goods supplied by them for a period of 12 months from the date of hand-over, to be called as Warranty Period. During this period any goods and items supplied by them developing defects or becoming non-operational and downgraded in service shall be replaced free of any cost to the client. Such items shall include goods, software and applications and any other such items becoming a part of total solution.

The LV Integrator carrying out the SITC of Works of Building Management solution as per CPWD Guideline.

At the end of execution or at the time of hand-over, for all equipment's that are covered in SITC, the integrator shall transfer all warranties and guaranties from OEM – original equipment's manufacturer – to the client. The respective OEMs shall be bound to honour any and all warranties, guaranties and support commitments as agreed and committed by the LV Integrator.

The LV Integrator is advised to provide technical datasheets and specification sheets for approval for all items prior to initiating any supply. Any items having deviations, in absence of specific approval from Client / Architect / Consultant shall be returned whether installed or uninstalled at the risk, liability and expense of the LV Integrator.

The LV Integrator is advised to inform the Client / Architect / Consultant of any specific requirements for equipment's such as heat dissipation, earthing, ventilation etc. before supply so as to incorporate the same at site by other agencies.

At the time of project hand-over, the Client shall nominate personnel for O&M of LV systems. The LV Integrator shall depute a qualified and well trained personnel / engineer to impart proper training to client personnel on all aspects of operation, use, programming, administration and management of items under SITC scope.

The LV Integrator shall operate in complete cooperation with other agencies and contractors to achieve harmony of work and maintaining the overall functionality of each systems and aesthetics.

The LV Integrator is advised to specifically use items only from the make list and provide information on compliance of performance specifications.

The LV Integrator shall not use any unknown or local items as a substitute for listed brands and makes that may degrade system performance. Specific approval of E-in-C is required.

Make of components required to be used by LV Integrator to complete the installation, if not mentioned anywhere, shall be required to be GET APPROVED from Client / Architect / Consultant in writing before installation.

Within 4 weeks of work order, the LV Integrator shall submit the sample of each item / component of above mentioned approved make for the approval of the Client / Architect / Consultant.

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MAKE LIST

Sr.No	Equipment/Material	Approved Manufacturer
A	**BMS Hardware and Software**	
1	Building Management Web Based Server Software	EBI by Honeywell/ Desigo by Siemens / Metasys by Johnson/ Beckhoff / Schnider
2	Programmable & Application Specifier Controller (DDC) and Integrator	Siemens (PXC Series) /Comfort Point by Honeywell/Metasys by Johnson Control/ Beckhoff / Schnider
3	Enclosure for DDC Controller	Rittal/ISI / Schnider
B	**Sensor & Field Devices**	
1	Immersion type temperature sensors, Temperature Sensor, Humidity Sensors	Siemens/Honeywell/ Johnson Control/ Kele
2	Differential pressure Switch & Transmitter for (Air & Water) application	Siemens/Honeywell/ Johnson Control/ Kele / Greystone
3	BTU-Meter/ Water Flow Meter	Siemens/Honeywell/ Johnson Control/ Kele / Adept
4	Air Quality Sensor (CO2 Sensor, VOC, PM2.5, PM10, IAQ Monitor)	Siemens/Honeywell/ Johnson Control/ Kele / Greystone
5	Level Switch and Level Transmitter (Flame Proof Type)	Filpro / Veksler / Dwyer
6	DC Voltage, Current Relays	Omron/ Meco/ABB
C	**BMS Server and IT Components**	
1	Central Control BMS Server	IBM/HP/DELL
2	BMS Monitor	Samsung / LG / DELL
3	Printer	HP/Canon/Epson
4	NETWORKING ACTIVE	CISCO / HP / JUNIPER
5	NETWORKING PASSIVE	Tyco / Molex/ Legrand
6	NETWORKING RACKS	Rittal / ISI
7	LAN PASSIVE (CABLE/IO'S/PATCH CORDS/ FACE PLATE/ JACK PANEL)	Tyco / Molex/ Legrand
8	Fiber Optic	Tyco / Molex/ Legrand
9	Lan Cable	Tyco / Molex/ Legrand

C … Nil   I ….. Nil   O …… Nil

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BID SUBMISSION CHECK LIST

ONLINE BID SUBMISSION:

The bid (complete in all respect) must be uploaded online in **two** Envelops as explained below:-

SI. No.	Documents	Content	File Types
	Envelope – 1 (Following documents to be provided as single PDF file)		
1		Annexure - 1	.PDF
2		Annexure - 3	.PDF
3		Annexure - 5	.PDF
4		EMD submission proof	.PDF
5		Certificate of work experience as desired	.PDF
6	**Technical Bid**	TDS of Work done (if Pvt Exp is considered)	.PDF
7		Certificate of GST Registration	.PDF
8		Notarised Affidavit as per provision on stamp paper	.PDF
9		Acceptance to execute INTEGRITY PACT	.PDF
10		IITD 7 / 8 duly signed	.PDF
11		EPFO & ESIC Registration proof with paid challan	.PDF
12		Valid Electrical Licence / Undertaking	.PDF
13		Partnership Deed, if applicable	.PDF
14		OEM Authorisation and certificate	.PDF
15		Any other document as specified in the NIT	.PDF
	Envelope – 2		
SI. No.	TYPES	Content	
1.	**Financial Bid**	Price bid should be submitted in BOQ format.	.EXL

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SCHEDULE OF QUANTITY

Name of work: Providing, Installation, Integration and Commissioning of Building Management System for Central Air Conditioning System of LHC Building, IIT Delhi

Item No.	Description of items	Qty.	Rate (INR) [as per clause 8.1 of Commercial & Additional conditions]	Unit	Amount
	SUB HEAD - 1 (PITC)				
1	**Client workstation**: SITC of BMS Computer System: i7 Processor or Equivalent Server PC, Intel(R) Xeon(R) Processor, 2.93GHz, 4MB Cache with 16 GB RAM, & 1 TB SSD, 10/100 Mbps Ethernet card, USB connection & internal modem, Microsoft(R) Windows(R) 10 OS Professional Enterprise, Web server software, DVD-ROM Drive (with RAM), 100/1000 Mbps NIC for Network connection and anti virus software with 32" colour graphics monitor as per Tender Specifications. Accessories included Optical Mouse, Key Pad, Laserjet colour A4 printer with the above BMS System configuration. Windows Licensed software compatible with the BMS platform etc. complete as required.	1	***	Job	***
2	SCADA Software: SITC of BMS Software. The software shall be open system architecture type which facilitates interoperability with other system. Complete functions as described in specs shall be included. The system should comply with 21 CFR Part II. The following software packages shall have below minimum features and compliances. Software shall have minimum 2000 BACnet Data Points with 600 validated points and shall have future expansion capability at least 20%. Additional 1 Client required. (Make:- Johnson Control-Metasys/ Siemens-Desigo/ Honeywell-EBI/ Beckhoff) a) 3D & HD vector dynamic graphics with AutoCAD import of plan with Zoom In & Zoom Out facility b) Native 64 Bit System, BTL (BACnet Testing Laboratories), UL (Underwriters Laboratories), EN (European Norms) Certified System, BACnet Profile B-AWS (Advanced workstation) as per the				

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	BTL Listing c) Multi-Monitor Support-(Min 4 Nos), Multi-language support, Object tracking on multiple cameras d) Certified OPC DA Server by OPC Foundation e) HTML5 based Web-Server software shall permit use of Standard Web-Browsers such as Microsoft Edge, Google Chrome, Mozilla Firefox, etc f) The Software shall comply to international standards and strive to deliver products that meet security standards such as ISA/IEC 62443, UL2900, ISO/IEC 27001, ISO/IEC62443 and OWASP (Open Web Application Security Project) g) Cybersecurity SL2, Seamless integration of Security certificates within customer IT infrastructure, Microsoft's active directory-based authentication, LDAP (Lightweight Directory Access Protocol) integration, Use of network infrastructure that supports physical network or VLAN segmentation, End-to-end encryption from client to server, End-to-end encryption between servers, Certificate-based data exchange, Encrypted backups h) Audit Trail, 4-Eye Principle, Data Point Validation, Verified tempering evidence for report transmission i) The software shall integrate with BIM data seamlessly j) Ability to provide data to other systems thru OPC DA Server and / Or Rest web services interface k) Reports - Customized reports for Trends and alarm with Graphic screen shots. Report facility should be inbuilt in software. l) Seamless integration of Fire alarm system should be there. m) Alarm Escalation: Assisted treatment of alarms which helps in Predefined & fast intervention steps for faster response n) Energy dashboards having cockpit view of total energy utilized. Energy and Power reports.	1	*****	Job	*****
3	DDC Controllers: SITC of True IP Based BTL & UL Listed for third party integration. The controller shall have 2-port Ethernet switch and WLAN interface. It should have BTL label (BACnet communications passed the BTL test) and consisting of Dual microprocessor with Storage capacity of 1 GB RAM. It should support Real Time clock with backup of upto 7 Days using				

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	super capacitor and also should have option for external battery if required. It should Support the major communication protocols: BACnet,/IP, BACnet MS/TP, Modbus IP and Modbus RTU upto 500 points. Cloud connectivity for remote access. Modbus-RTU communication should have inbuilt short circuit protection. Operating voltage AC/DC 24 V. Cybersecurity protection with BACnet Secure Connect communication as BACnet/SC node protocol. Note: 3rd party make integrator is not acceptable. Controller should be in metal enclosure with all accessories like SMPS, MCB, connectors, etc. (Make:- Johnson Control-Metasys/ Siemens-Desigo/ Honeywell-Comfort Point)				
3.01	DDC for Chillers, motorized valve and sensors (3 chillers in one) (10 -AI , 2-AO,15-DI,12-DO , 300- soft points)	1	******	Each	-
3.02	DDC for Primary Pump (3 pumps in one) (4 -AI , 2-AO, 12-DI, 5-DO)	1	****	Each	-
3.03	DDC for Secondary Pump & sensor (3 pumps in one) (6 -AI, 5-AO, 15-DI, 5-DO)	1	****	Each	-
3.04	DDC for Condenser Pump (3 pumps in one) (4 -AI , 2-AO,12-DI,5-DO)	1	****	Each	-
3.05	DDC for Cooling Tower (5 -AI , 2-AO, 24-DI, 8-DO) (3 Cooling Towers)	1	*****	Each	-
3.06	DDC for AHU's (8 -AI , 4-AO,12-DI, 8-DO)	40	*****	Each	-
4	**Field Devices**				
4.01	SITC of Motorized Butterfly Valves & Actuators - 200 mm for Condenser Line of Chiller Plant	9	***	Each	-
4.02	SITC of Motorized Butterfly Valves & Actuators - 150 mm for Evaporator Line of Chiller Plant	3	***	Each	-
4.03	SITC of AHU 2 Way Modulating valve and actuator - 50 mm	15	***	Each	-
4.04	SITC of AHU 2 Way Modulating valve and actuator - 65 mm	10	***	Each	-
4.05	SITC of AHU 2 Way Modulating valve and actuator - 80 mm	15	***	Each	-
4.06	SITC of Fresh Air Modulation Damper actuator	40	***	Each	-
4.07	SITC of Supply and Return air damper on/off type actuator	120	***	Each	-
4.08	SITC of Balancing Valve - 50 mm	15	***	Each	-
4.09	SITC of Balancing Valve - 65 mm	10	***	Each	-
4.10	SITC of Balancing Valve - 80 mm	15	***	Each	-
5	**Sensors**				
5.01	SITC of Immersion temperature sensor 100 mm	4	***	Each	-

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	Pt1000 with Brass Thermowell				
5.02	SITC of PT 1000 Duct Temperature sensor with thermowell	40	***	Each	-
5.03	SITC of Duct type CO2 sensor	40	***	Each	-
5.04	SITC of Ultra sonic Flow Meter (common Chilled water header)	1	****	Each	-
6	**CABLES & Conduits**				
6.01	SITC of 2 Core, 1 Sq mm Cable, Shielded, Armoured, twisted pair cable (ISI marked)	2000	***	Metre	-
6.02	SITC of 4 Core, 1 Sq mm Cable, Shielded, Armoured , twisted pair cable (ISI marked)	1000	***	Metre	-
6.03	SITC of CAT 6 Cable (ISI marked)	2000	***	Metre	-
6.04	SITC of 100 mm GI Tray	200	***	Metre	-
6.05	SITC of 50 mm GI Tray	200	***	Metre	-
7	**Network Switch**				
7.01	Supply, installation, testing and commissioning of Layer 2 switch with 16 ports (RJ-45) including SFP modules, rack mountable, SMPS power supply & other termination accessories (Like Pigtails/LIUs/ Convertors/Splicing equipment, Patch panel, Patch Cord, etc.) complete as per specifications and as required for BMS DDC Panel Networking. The switch-to-switch distance shall not exceed beyond 80 meters. (Make: - HP / Avaya/ Tyco / Panduit / Molex)	10	***	Job	-
7.02	Commissioning of the entire system and trial run for 7 days with necessary technician / engineer / manpower etc as required.	1	***	Job	-
	Sub Head - 2 (Comprehensive Maintenance & Operation)				
1	**Operation, Control, Monitoring and Comprehensive Maintenance** of the entire system including operation, routine, preventive and breakdown maintenance replacement of spare parts as and when required for proper running of the system by deputing following minimum one qualified and experienced operators / technicians at the site in three shifts of 8 hours each. (a) Contractor shall ensure exclusive presence of at least one operator per shift.				

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	(b) Operator shall be skilled with minimum 2 years ITI course passed in Electrician / Fitter / Refrigeration / Air conditioning / Electronics / Mechanical trade from any Govt recognised Institute or higher qualification. (c) Contractor shall pay the wages to the operators not less than latest minimum wages as prescribed by Central Labour Commissioner for Delhi region for high skilled person. All labour regulations shall be followed. EPF & ESI as applicable shall be complied. (d) Before claiming bill, contractor shall have to submit biometric attendance proof of the operators alongwith wages payment proof (no cash payment is allowed), EPF & ESI payment as applicable. No reimbursement on account of EPF & ESI or wages increment etc. shall be made by IIT Delhi. Paid Challan of EPF & ESI as applicable shall be submitted before claiming bill. (e) Contractor shall be responsible for any accident or eventuality or labour dispute. Training of the operators with proper protection shall be provided by the contractor. (f) Recovery shall be made from the bill payable to the contractor for want of operator in any shift at the rate of actual minimum wages as applicable at that time plus Rs.300 (Three hundred rupees) as penalty. (g) Wages shall be as per **Highly Skilled grade** as notified by CLC time to time. Current Wages is @Rs.1065 per day/shift N.B. During 1st year after commissioning, CAMC shall be free of cost. DLP in force.				
1.01	**1st Year (Defect Liability Period)**				
	Operation, Control and Monitoring	1251	***	Shift	-
2.02	**2nd Year**				
1.021	Operation, Control and Monitoring	1251	***	Shift	-
1.022	CAMC (1 Job means for a period of 12 calendar months)	1	***	Job	-
1.03	**3rd Year**				
1.031	Operation, Control and Monitoring	1251	***	Shift	-
1.032	CAMC (1 Job means for a period of 12 calendar months)	1	***	Job	-
1.04	**4th Year**				
1.041	Operation, Control and Monitoring	1251	**	Shift	-

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1.042	CAMC (1 Job means for a period of 12 calendar months)	1	***	Job	-
1.05	**5th Year**				
1.051	Operation, Control and Monitoring	1251	***	Shift	-
1.052	CAMC (1 Job means for a period of 12 calendar months)	1	***	Job	-
1.06	**6th Year**				
1.061	Operation, Control and Monitoring	1251	***	Shift	-
1.062	CAMC (1 Job means for a period of 12 calendar months)	1	***	Job	-
	GRAND TOTAL (ORIGINAL + AMC)				

Sr. Asstt.   **Junior Engineer (Electrical) AC Divn.**   **AEE-in-charge AC Division**

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