

**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE  
SEMI-CONDUCTOR LABORATORY (SCL)  
CHANDIGARH**

**Tender for SITC of Air Conditioning System for upcoming Chemical  
Store**

**Bids to be submitted online**

**Tender No.: SCL/PurUnit-4/SC202200017501 dated 21-10-2022**

## A. Tender Details

Tender No :	<b>SCL/PurUnit-4/SC202200017501</b>
Tender Date :	<b>21-10-2022</b>
Tender Classification:	<b>GOODS</b>
Purchase Entity :	<b>PurUnit-4</b>
Centre :	<b>SEMI-CONDUCTOR LABORATORY (SCL)</b>

## Procurement of SITC of Air Conditioning System for upcoming Chemical Store

SITC of Air Conditioning System for upcoming Chemical Store at SCL

This tender is proposed as a DOMESTIC PUBLIC TENDER. This tender is restricted only to Class-I and Class-II Local Suppliers as defined under DPIIT Order dated 04/06/2020- Preference to Make in India Order-2017 Revision. Non-Local Suppliers need not quote.

Foreign OEMs/Agents quoting on behalf of Foreign OEMs are not permitted to quote. High Sea Sales Quotes not permitted. The bids shall be in INR only.

Purchase preference to eligible vendors are applicable as per extant notifications issued by the Government of India.

The Class-I/Class-II Local suppliers, at the time of submitting their offer, shall also indicate percentage of local content and provide self-certification that the item (s) offered meets the local content requirement for Class-I/Class-II Local Suppliers as the case may be. They shall also give details of location (s) at which the local value addition is made.

In cases if the item(s) offered exceed Rs. 10 Crores, the Class-I/Class-II Local Suppliers shall provide a Certificate from the statutory auditor or cost auditor of the company (in case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.

False Declarations will be in breach of the 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 up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.

Technical Bids will be opened at the scheduled due date & time. No further intimation will be sent in this regard. The schedule for price bid opening shown is only indicative. Price bids will only be opened in the case of parties who have been techno-commercially accepted, the details of which will be communicated at a later stage.

Parties interested to participate in this e-Tender are required to register themselves as vendors, if not already registered, in our e-procurement portal <https://eproc.vssc.gov.in> by downloading plugins and help demos listed on the home page of the e-procurement link mentioned above to complete the vendor registration process. Parties can seek help from help desk +91471 2565 454/2527 (Email: [eproc@vssc.gov.in](mailto:eproc@vssc.gov.in)) also the home page of e-procurement portal may be accessed for any technical help for registration and subsequent process. Parties may please note that without registering in our E-procurement portal they will not be able to quote for this tender.

## **A.1 Tender Schedule**

Bid Submission Start Date :	<b>21-10-2022 15:00</b>
Bid Clarification Due Date :	<b>10-11-2022 17:00</b>
Bid Submission Due Date :	<b>22-11-2022 14:47</b>
Bid Opening Date :	<b>22-11-2022 15:30</b>
Price Bid Opening Date :	<b>12-12-2022 17:00</b>

## **B. Tender Attachments**

### **Technical Write-up/Drawings**

**Document : Detailed Specification**

**Document : Tender Drawing - Store Layout**

**Document : Tender Drawing - Store Layout 2**

**Document : Tender Drawing- LAYOUT plan**

**Document : Tender Drawing- Piping Instrumentation**

### **Instructions To Vendors**

## **6. INSTRUCTIONS TO TENDERERS AND TERMS CONDITIONS OF TENDER**

1. a) All available technical literature, catalogues and other data in support of the specifications and details of the items should be furnished along with the offer.
- b) Samples, if called for, should be submitted free of all charges by the tenderer and the Purchaser shall not be responsible for any loss or damage thereof due to any reason whatsoever. In the event of non acceptance of tender, the tenderer will have to remove the samples at his own expense.
- c) Approximate net and gross weight of the items offered shall be indicated in your offer if available. If dimensional details are available the same should also be indicated in your offer.
- (d) Specifications: Stores offered should strictly confirm to our specifications. Deviations, if any, should be clearly indicated by the tenderer in his quotation. The tenderer should also indicate the Make/Type number of the stores offered and provide catalogues, technical literature and samples, wherever necessary, along with the quotations. Test Certificates, wherever necessary, should be forwarded along with supplies. Wherever options have been called for in our specifications, the tenderer should address all such options. Wherever specifically mentioned by us, the tenderer could suggest changes to specifications with appropriate response for the same.

### **2. ACCEPTANCE OF STORES:**

- a. The stores shall be tendered by the Contractor for inspection at such places as may be specified by the purchaser at the Contractor's own risk, expense and cost.
- b. It is expressly agreed that the acceptance of the stores Contracted for, is subject to final approval by the purchaser, whose decision shall be final.
- c. If, in the opinion of the purchaser, all or any of the stores do not meet the performance or quality requirements specified in the Purchase Order, they shall be rejected may be either rejected or

accepted at a price to be fixed by the purchaser and his decision as to rejection and the prices to be fixed shall be final and binding on the Contractor.

d.If the whole or any part of the stores supplied are rejected in accordance with Clause No. 6 (c) above, the purchaser shall be at liberty, with or without notice to the Contractor, to purchase in the open market at the expense of the Contractor stores meeting the necessary performance and quality Contracted for in place of those rejected, provided that either the purchase, or the agreement to purchase, from another supplier is made within six months from the date of rejection of the stores as aforesaid.

3. Bid shall be submitted on-line only complying specified schedule.

#### 4. COUNTER TERMS AND CONDITION OF SUPPLIERS:

Where counter terms and conditions printed or cyclostyled conditions have been offered by the supplier, the same shall not be deemed to have been accepted by the Purchaser, unless specific written acceptance thereof is obtained.

#### 5. DEFINITIONS:

a.The term PURCHASER shall mean Semi-Conductor Laboratory, Sector-72, Mohali, Punjab-160071, under the administrative control of DOS, Government of India.

b.The term CONTRACTOR shall mean, the person, firm or company with whom or with which the order for the supply of stores is placed and shall be deemed to include the Contractor's successors, representative, heirs, executors and administrators unless excluded by the Contract.

c.The term STORES shall mean what the Contractor agrees to supply under the Contract as specified in the Purchase Order including erection of plants machinery and subsequent testing, should such a condition is included in the Purchase Order. The term PURCHASE ORDER shall mean the communication signed on behalf of the Purchaser by an Officer duly authorised intimating the acceptance on behalf of the Purchaser on the terms and conditions mentioned or referred to in the said communication accepting the tender or offer of the Contractor for supply of stores or plant, machinery or equipment or part thereof.

#### 6. DELIVERY:

a.The time for and the date of delivery of the stores stipulated in the Purchase Order shall be deemed to be the essence of the Contract and delivery must be completed on or before the specified dates.

b.Should the Contractor fail to deliver the stores or any consignment thereof within the period prescribed for such delivery, the purchaser shall be entitled at his option either.

(i) to recover from the Contractor as agreed liquidated damages and not by way of penalty, a sum of 0.5% per week of the price of any stores which the Contractor has failed to deliver as aforesaid or during which the delivery of such store may be in arrears subject to a minimum of 10%, or

(ii) to purchase from elsewhere, without notice to the Contractor on the account and at the risk of the Contractor, the stores not delivered or others of a similar description (where others exactly complying

with the particulars, are not, in the opinion of the purchaser, readily procurable, such opinion being final) without cancelling the Contract in respect of the consignment (s) not yet due for delivery, or

(iii) to cancel the Contract or a portion thereof and if so desired to purchase or authorise the purchase of stores not so delivered or others of a similar description (where others exactly if complying with the particulars are not, in the opinion of the purchaser, readily procurable, such opinion final) at the risk and cost of the Contractor.

In the event of action being taken under sub-clause (ii) (iii) of clause above, the Contractor shall be liable for any loss which the purchaser may sustain on that account, provided that the re-purchase or if there is an agreement to repurchase then such agreement is made within six months from the date of such failure. But the Contractor shall not be entitled to any gain on such re-purchase made against default. The manner and method of such re purchase shall be at the discretion of the purchaser, whose decision shall be final. It shall not be necessary for the purchaser to serve a notice of such re purchase on the defaulting Contractor. This right shall be without prejudice to the right of the purchaser to recover damages for breach of Contract by the Contractor.

#### 7. DESPATCH:

The Contractor is responsible for obtaining a clear receipt from the Transport Authorities specifying the goods dispatched. The consignment should be dispatched with clear Railway Receipt/Lorry Receipt. If sent in any other mode, it shall be at the risk of the Contractor. Purchaser will take no responsibility for short deliveries or wrong supply of goods when the same are booked on said to contain basis. Purchaser shall pay for only such stores as are actually received by them in accordance with the Contract.

#### 8. ERECTION OF PLANT MACHINERY:

Wherever erection of a plant or machinery is the responsibility of the Contractor as per the terms of the Contract and in case the Contractor fails to carry out the erection as and when called upon to do so within the period specified by the purchaser, the purchaser shall have the right to get the erection done through any source of his choice. In such an event, the Contractor shall be liable to bear any additional expenditure that the purchaser is liable to incur towards erection. The Contractor shall, however, not be entitled to any gain due to such an action by the purchaser.

#### 9.

##### EXTENSION OF TIME:

As soon as it is apparent that the Contract dates cannot be adhered to, an application shall be sent by the Contractor to the purchaser. If failure, on the part of the Contractor, to deliver the stores in proper time shall have arisen from any cause which the purchaser may admit as reasonable ground for an extension of the time (and his decision shall be final) he may allow such additional time as he considers it to be justified by circumstances, of the case without prejudice to the purchaser's right to

recover liquidated damages under clause 8 thereof.

10. GST and/or other duties/levies legally leviable and intended to be claimed should be distinctly shown separately in the tender.

11. In case of any difference between General Terms & Conditions enclosed and Terms & Conditions specific to this tender i.e. technical specifications & Vendor Specified Terms, Terms and Conditions specific to this tender will prevail.

**12. INDEMNITY:**

The Contractor shall warrant and be deemed to have warranted that all stores supplied against this Contract are free and clean of infringement of any Patent, Copyright or Trademark, and shall at all times indemnify the purchaser against all claims which may be made in respect of the stores for infringement of any right protected by Patent Registration of design or Trade mark and shall take all risk of accidents or damage which may cause a failure of the supply from whatever cause arising and the entire responsibility for sufficiency of all means used by him for the fulfillment of the contract.

13. Late tenders and delayed tenders will not be considered.

**14. MODE OF PAYMENT:**

Normally payment will be made for the accepted stores within 30 days from the date of receipt of the materials.

**15. PACKING FORWARDING INSURANCE:**

The Contractor will be held responsible for the stores being sufficiently and properly packed for transport by rail, road, sea or air to withstand transit hazards and ensure safe arrival at the destination. The packing and marking of packages shall be done by and at the expense of the Contractor. The purchaser will not pay separately for transit insurance, all risks in transit being exclusively of the Contractor and the Purchaser shall pay only for such stores as are actually received in good condition in accordance with the Contract.

**16. PAYMENT:**

Contractor's bill will be passed for payment only after the stores have been received, inspected and accepted by the Purchaser.

**17. PRICES:**

Tender offering firm prices will be preferred. Where a price variation clause is insisted upon by a tenderer, quotation with a reasonable ceiling should be submitted. Such offers should invariably be supported by the base price taken into account at the time of tendering and also the formula for any such variation/s.

#### 18. RECOVERY OF SUM DUE:

Whenever any claim for the payment of, whether liquidated or not, money arising out of or under this Contract against the Contractor, the purchaser shall be entitled to recover such sum by appropriating in part or whole, the security deposited by the Contractor, if a security is taken against the Contract. In the event of the security being insufficient or if no security has been taken from the Contractor, then the balance or the total sum recoverable as the case may be, shall be deducted from any sum then due or which at any time thereafter may become due to the Contractor under this or any other Contract with the purchaser. Should this sum be not sufficient to cover the full amount recoverable, the contractor shall pay to the purchaser on demand the remaining balance due. Similarly, if the purchaser has or makes any claim, whether liquidated or not, against the Contractor under any other Contract with the purchaser, the payment of all moneys payable under the Contract to the Contractor including the security deposit shall be withheld till such claims of the purchaser are finally adjudicated upon and paid by the Contractor.

#### 19. REJECTED STORES:

Rejected stores will remain at destination at the Contractor's risk and responsibility. If instructions for their disposal are not received from the Contractor within a period of 14 days from the date of receipt of the advice of rejection, the purchaser or his representative has, at his discretion, the right to scrap or sell or consign the rejected stores to Contractor's address at the Contractor's entire risk and expense, freight being payable by the Contractor at actuals.

#### 20. SECURITY FOR PURCHASE OF MATERIALS:

Successful tenderer will have to furnish in the form of a bank guarantee or any other form as called for by the purchaser towards adequate security for the materials and properties provided by the Purchaser for the due execution of the Contract.

#### 21. TERMS CONDITIONS OF TENDER

#### 22. TEST CERTIFICATE:

Wherever required, test certificates should be sent along with the dispatch documents.

23. The authority of the person signing the tender, if called for, should be produced.

24. The purchaser shall be under no obligation to accept the lowest or any tender and reserves the right of acceptance of the whole or any part of the tender or portions of the quantity offered and the tenderers shall supply the same at the rates quoted.

25. The tenderer should supply along with his tender, the name of his bankers as well as the latest Income-Tax clearance certificate duly countersigned by the Income-Tax Officer of the Circle concerned under the seal of his office, if required by the Purchaser.



## C. Bid Templates

### C.1 Technical Bid - SITC of Air Conditioning System for upcoming Chemical Store

**1. Pressure gauge, 4" dial size, bourdan movement, all SS internals, complete with all the fittings and isolating ball valve etc.**

**Item specifications for Pressure gauge, 4" dial size, bourdan movement, all SS internals, complete with all the fittings and isolating ball valve etc.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Pressure gauge, 4" dial size, bourdan movement, all SS internals, complete with all the fittings and isolating ball valve etc.		-		

**2. Temperature sensor cum transmitter complete with SS Thermowell, all the fittings etc.**

**Item specifications for Temperature sensor cum transmitter complete with SS Thermowell, all the fittings etc.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Temperature sensor cum transmitter complete with SS Thermowell, all the fittings etc.		-		

**3. 4" size, MS, C-Class, chilled water line**

**Item specifications for 4" size, MS, C-Class, chilled water line**

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	4" size, MS, C-Class, chilled water line complete with all the fittings like bends, reducers, flanges, pumps connections, chiller connections, nuts, bolts, supports, gaskets etc.		-		
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#### 4. Screw Chillers, Minimum Capacity 70 TR at 43 Deg C ambient

##### Item specifications for Screw Chillers, Minimum Capacity 70 TR at 43 Deg C ambient

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Screw Chillers, Minimum Capacity 70 TR at 43 Deg C ambient, with Single/Multiple screw compressor, air cooled condenser, shell and tube type heat exchanger, micro processor controlled, IP55 enclosure, complete with all the accessories, safeties, regrigerant, oil etc.		-		

#### 5. Chilled water pumps, Horizontal end suction, top discharge

##### Item specifications for Chilled water pumps, Horizontal end suction, top discharge

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Chilled water pumps, Horizontal end suction, top discharge, minimum capacity: 175 gpm @ 3 KG/CM2, complete with TEFC squirrel cage induction motor, heavy duty, IE3 Class motor, base frame, coupling, nuts, bolts, gaskets etc.		-		

#### 6. 4" Size, NRVs, PN-16/Class 150 rated, dual plate, with CI body and SS internals.

**Item specifications for 4" Size, NRVs, PN-16/Class 150 rated, dual plate, with CI body and SS internals.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	4" Size, NRVs, PN-16/Class 150 rated, dual plate, with CI body and SS internals.		-		

**7. 4" Size, Butterfly valves, PN 16/Class 150 rated, wafer design, lever operated, CI/SG iron body, SG iron disc coated with Nylon, SS shaft.**

**Item specifications for 4" Size, Butterfly valves, PN 16/Class 150 rated, wafer design, lever operated, CI/SG iron body, SG iron disc coated with Nylon, SS shaft.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	4" Size, Butterfly valves, PN 16/Class 150 rated, wafer design, lever operated, CI/SG iron body, SG iron disc coated with Nylon, SS shaft.		-		

**8. 4"size, Motorised butterfly valves (On-Off type)**

**Item specifications for 4"size, Motorised butterfly valves (On-Off type)**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	4"size, Motorised butterfly valves (On-Off type)		-		

**9. I/T/C of 4" size, Three way flow control valve**

**Item specifications for I/T/C of 4" size, Three way flow control valve**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	4" size, Three way flow control valve		-		

**10. I/T/C of Temperature gauge, 4"Dial type, complete with capillary, SS Thermowell, all the fittings etc.**

**Item specifications for I/T/C of Temperature gauge, 4"Dial type, complete with capillary, SS Thermowell, all the fittings etc.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Temperature gauge, 4"Dial type, complete with capillary, SS Thermowell, all the fittings etc.		-		

**11. I/T/C of Pressure gauge, 4" dial size, bourdan movement, all SS internals, complete with all the fittings and isolating ball valve etc.**

**Item specifications for I/T/C of Pressure gauge, 4" dial size, bourdan movement, all SS internals, complete with all the fittings and isolating ball valve etc.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Pressure gauge, 4" dial size, bourdan movement, all SS internals, complete with all the fittings and isolating ball valve etc.		-		

**12. 4" size, Y-strainer, CI/MS body with brass wire/ SS wire-mesh, PN16/Class 150 rated**

**Item specifications for 4" size, Y-strainer, CI/MS body with brass wire/ SS wire-mesh, PN16/Class 150 rated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	4" size, Y-strainer, CI/MS body with brass wire/ SS wire-mesh, PN16/Class 150 rated		-		

**13. 4" size, Three way flow control valve**

**Item specifications for 4" size, Three way flow control valve**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	4" size, Three way flow control valve		-		

#### 14. Supply of Extra item(s) if any

##### Item specifications for Supply of Extra item(s) if any

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Supply of Extra item(s) if any		-		

#### 15. Ball valve, 1" Size

##### Item specifications for Ball valve, 1" Size

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Ball valve, 1" Size		-		
2	Size	12 mm	Yes / No / Explain		
3	Maximum Allowable Working Pressure	414 bar	Yes / No / Explain		
4	Seat material	PCTFE	Yes / No / Explain		
5	Material of Construction	SS316	Yes / No / Explain		
6	End connection	12 mm OD	Yes / No / Explain		
7	Actuator type	Required. Spring Return Aluminum Pneumatic Actuator	Yes / No / Explain		
8	Valve open type	Normally closed	Yes / No / Explain		
9	Solenoid valve	Required. 24V DC.	Yes / No / Explain		
10	Type	Manual	Yes / No / Explain		
11	1" ball valve	manual type	Yes / No / Explain		

## 16. I/T/C OF Ball valve, 1" Size

### Item specifications for I/T/C OF Ball valve, 1" Size

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Ball valve, 1" Size		-		

## 17. Temperature gauge, 4"Dial type, complete with capillary, SS Thermowell, all the fittings etc.

### Item specifications for Temperature gauge, 4"Dial type, complete with capillary, SS Thermowell, all the fittings etc.

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Temperature gauge, 4"Dial type, complete with capillary, SS Thermowell, all the fittings etc.		-		

## 18. Differential Pressure (DP) switch complete with fittings

### Item specifications for Differential Pressure (DP) switch complete with fittings

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Differential Pressure (DP) switch complete with fittings suitable for outdoor application. Medium: Exhaust Air, Pressure range: 20 to 300 Pa, Make: Danfoss / Siemens/honeywell.		-		

## 19. 50 mm thick, TF quality Thermocole insulation for 4" MS chilled water line

### Item specifications for 50 mm thick, TF quality Thermocole insulation for 4" MS chilled water line

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	50 mm thick, TF quality Thermocole insulation for 4" MS chilled water line complete with all the fittings like bends, reducers, flanges, pumps connections, chiller connections etc.		-		
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**20. Expansion tank, Capacity: 1000 Ltrs., MOC: MS, insulated**

**Item specifications for Expansion tank, Capacity: 1000 Ltrs., MOC: MS, insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Expansion tank, Capacity: 1000 Ltrs., MOC: MS, insulated, complete with float valve & quick fill make-up connections, drain, over flow connection, MS stand etc.		-		

**21. Make-up line from expansion tank to highest point in the retrain air line, 2" size, MS - C Class**

**Item specifications for Make-up line from expansion tank to highest point in the retrain air line, 2" size, MS - C Class**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Make-up line from expansion tank to highest point in the retrain air line, 2" size, MS - C Class, complete with all the fittings, nuts, bolts, gasket and insulation		-		

**22. Expansion tank inlet line complete with all the fittings, supports, 1" size, GI - Class B**

**Item specifications for Expansion tank inlet line complete with all the fittings, supports, 1" size, GI - Class B**

SI No	Specification	Value	Compliance	Offered Specification	Remark

1	Expansion tank inlet line complete with all the fittings, supports, 1" size, GI - Class B		-		
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### 23. Level switch for expansion tank

#### Item specifications for Level switch for expansion tank

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Level switch for expansion tank		-		

### 24. Butterfly valve, 2" Size

#### Item specifications for Butterfly valve, 2" Size

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Butterfly valve, 2" Size		-		

### 25. Drain points, 1" size, complete with all fittings and isolating ball valve.

#### Item specifications for Drain points, 1" size, complete with all fittings and isolating ball valve.

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Drain points, 1" size, complete with all fittings and isolating ball valve.		-		

### 26. Purge points, 1" size, complete with all fittings and isolating ball valve.

#### Item specifications for Purge points, 1" size, complete with all fittings and isolating ball valve.

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Purge points, 1" size, complete with all fittings and isolating ball valve.		-		

### 27. Air handling unit, minimum capacity: 8000 CFM



### Item specifications for Air handling unit, minimum capacity: 8000 CFM

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Air handling unit, minimum capacity: 8000 CFM, complete with Louvers at inlet, pre and fine filter section, tubular/strip heaters section, 8 row chilled water coil section, SS 304 condensate tray, fans - 02 numbers, :minimum 8000 CFM each @ 65 mm static, with TEFC, IE3 efficiency, VFD compatible, spark/flame proof motors suitable for 415V +/- 10%, 3 phase, 50 Hz+ 5% AC , motorised isolation dampers at fan outlets, motorised fire and smoke damper at AHU outlet etc.		-		

### 28. Differential pressure sensor

#### Item specifications for Differential pressure sensor

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Differential pressure sensor for DP across the filters		-		
2	Type	Differential pressure sensor	Yes / No / Explain		
3	Full Scale Measurement Range	0 to $\geq 1000$ Pa	Yes / No / Explain		
4	Medium	Air and non-aggressive gases	Yes / No / Explain		
5	Accuracy at ambient temperature	$\leq \pm 2\%$ Full Scale	Yes / No / Explain		
6	User selectable- Full scale Range	200, 500, 750 Pa & Max range	Yes / No / Explain		

7	User selectable-Direction	Unidirectional & Bidirectional	Yes / No / Explain		
8	User selectable- Unit	In w.c., mm w.c., Pa & kPa	Yes / No / Explain		
9	User selectable-Output	0 to 5 V & 0 to 10 V	Yes / No / Explain		
10	User selectable-Output action	Direct & reverse	Yes / No / Explain		
11	Overpressure limit	≥ 5 kPa	Yes / No / Explain		
12	Burst pressure	≥ 50 kPa	Yes / No / Explain		
13	Sensing element	Piezo resistive	Yes / No / Explain		
14	Output signal	0 to10 VDC with minimum load resistance of 1000 Ω	Yes / No / Explain		
15	Supply voltage	10 to 30 VDC	Yes / No / Explain		
16	Supply Current Consumption	≤ 40 mA	Yes / No / Explain		
17	Operating temperature	0 to 50 °C	Yes / No / Explain		
18	Electrical connection	Screw terminals for Cable lead	Yes / No / Explain		
19	Process connections	Tube with ID: 5mm and OD : 9mm	Yes / No / Explain		
20	Zero point adjustment	Push button	Yes / No / Explain		
21	Protection class	IP 66 or better	Yes / No / Explain		
22	Mounting orientation	Any orientation	Yes / No / Explain		
23	Mounting type	Wall Mounting	Yes / No / Explain		
24	Weight	≤ 250 gm	Yes / No / Explain		

## 29. Thermostat for safety of heaters

## 30. Anodised Aluminium ducting, 22 gauge (Standard), as per SMACNA complete with supporting arrangements

**Item specifications for Anodised Aluminium ducting, 22 gauge (Standard), as per SMACNA complete with supporting arrangements**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Anodised Aluminium ducting, 22 gauge (Standard), as per SMACNA complete with supporting arrangements, vanes, anchor fasteners, supports, access doors, nuts, bolts, neoprene rubber gaskets etc. .		-		

**31. Volume control dampers in Al construction within ducts to be provided with suitable ducts lever and quadrants.**

**Item specifications for Volume control dampers in Al construction within ducts to be provided with suitable ducts lever and quadrants.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Volume control dampers in Al construction within ducts to be provided with suitable ducts lever and quadrants.		-		

**32. Supply air grilles/ diffusers in Al construction with volume control dampers with necessary frame work etc. and complete as required.**

**Item specifications for Supply air grilles/ diffusers in Al construction with volume control dampers with necessary frame work etc. and complete as required.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Supply air grilles/ diffusers in Al construction with volume control dampers with necessary frame work etc. and complete as required.		-		

**33. Thermal insulation for supply air duct: Aluminium faced Closed Cell Nitrile rubber, Class 'O' fire rating, 38 mm thick**

**Item specifications for Thermal insulation for supply air duct: Aluminium faced Closed Cell Nitrile rubber, Class 'O' fire rating, 38 mm thick**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Thermal insulation for supply air duct: Aluminium faced Closed Cell Nitrile rubber, Class 'O' fire rating, 38 mm thick with a density not less than 50 Kg/m <sup>3</sup> . All the joints shall be sealed with 50mm thick Al tape.		-		

**34. Temperature sensors inside the Chemical store**

**Item specifications for Temperature sensors inside the Chemical store**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Temperature sensors inside the Chemical store, accuracy +/- 0.5 Deg C.		-		

**35. Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 1800 CFM at 15 mm WG**

**Item specifications for Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 1800 CFM at 15 mm WG**

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 1800 CFM at 15 mm WG, Cast Al impeller, suitable for 415V+10%, 50 Hz, 3 phase, TEFC squirrel cage induction motor, S1, F-Class, IP55, explosion proof type suitable for Hazardous Zone -II, Gas group-II C (FLP), Temperature Class - T3, complete with bird protection guard wire mesh both sides.		-		
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**36. Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 900 CFM at 15 mm WG**

**Item specifications for Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 900 CFM at 15 mm WG**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 900 CFM at 15 mm WG, cast Al impeller, suitable for 415V+10%, 50 Hz, 3 phase, TEFC squirrel cage induction motor, S1, F-Class, IP55, explosion proof type suitable for Hazardous Zone -II, Gas group-II C (FLP), Temperature Class - T3, complete with bird protection guard wire mesh both sides.		-		

**37. Installation, Testing and Commissioning of Screw Chillers, Minimum Capacity 70 TR at 43 Deg C ambient**

**Item specifications for Installation, Testing and Commissioning of Screw Chillers, Minimum**

### Capacity 70 TR at 43 Deg C ambient

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Screw Chillers, Minimum Capacity 70 TR at 43 Deg C ambient, with Single/Multiple screw compressor, air cooled condenser, shell and tube type heat exchanger, micro processor controlled, IP55 enclosure, complete with all the accessories, safeties, refrigerant, oil etc.		-		

### 38. Installation, Testing and Commissioning of Chilled water pumps, Horizontal end suction, top discharge

#### Item specifications for Installation, Testing and Commissioning of Chilled water pumps, Horizontal end suction, top discharge

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Chilled water pumps, Horizontal end suction, top discharge, minimum capacity: 175 gpm @ 3 KG/CM2, complete with TEFC squirrel cage induction motor, heavy duty, IE3 Class motor, base frame, coupling, nuts, bolts, gaskets etc.		-		

### 39. Installation, Testing and Commissioning of 4" Size, NRVs, PN-16/Class 150 rated, dual plate, with CI body and SS internals.

#### Item specifications for Installation, Testing and Commissioning of 4" Size, NRVs, PN-16/Class 150 rated, dual plate, with CI body and SS internals.

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	4" Size, NRVs, PN-16/Class 150 rated, dual plate, with CI body and SS internals.		-		
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**40. I/T/C of 4" Size, Butterfly valves, PN 16/Class 150 rated, wafer design, lever operated, CI/SG iron body, SG iron disc coated with Nylon, SS shaft.**

**Item specifications for I/T/C of 4" Size, Butterfly valves, PN 16/Class 150 rated, wafer design, lever operated, CI/SG iron body, SG iron disc coated with Nylon, SS shaft.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	4" Size, Butterfly valves, PN 16/Class 150 rated, wafer design, lever operated, CI/SG iron body, SG iron disc coated with Nylon, SS shaft.		-		

**41. I/T/C of 4" size, Y-strainer,CI/MS body with brass wire/ SS wire-mesh, PN16/Class 150 rated**

**Item specifications for I/T/C of 4" size, Y-strainer,CI/MS body with brass wire/ SS wire-mesh, PN16/Class 150 rated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	4" size, Y-strainer,CI/MS body with brass wire/ SS wire-mesh, PN16/Class 150 rated		-		

**42. I/T/C of 4"size, Motorised butterfly valves (On-Off type)**

**Item specifications for I/T/C of 4"size, Motorised butterfly valves (On-Off type)**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	4"size, Motorised butterfly valves (On-Off type)		-		

**43. I/T/C of Temperature sensor cum transmitter complete with SS Thermowell, all the fittings etc.**

**Item specifications for I/T/C of Temperature sensor cum transmitter complete with SS Thermowell, all the fittings etc.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Temperature sensor cum transmitter complete with SS Thermowell, all the fittings etc.		-		

**44. I/T/C of Differential pressure sensor across chillers, complete with all the fittings, piping etc.**

**Item specifications for I/T/C of Differential pressure sensor across chillers, complete with all the fittings, piping etc.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Differential pressure across chillers, complete with all the fittings, piping etc.		-		

**45. I/T/C OF 4" size, MS, C-Class, chilled water line complete with all the fittings**

**Item specifications for I/T/C OF 4" size, MS, C-Class, chilled water line complete with all the fittings**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	4" size, MS, C-Class, chilled water line complete with all the fittings like bends, reducers, flanges, pumps connections, chiller connections, nuts, bolts, supports, gaskets etc.		-		

**46. I/T/C OF 50 mm thick, TF quality Thermocole insulation for 4" MS chilled water line complete with all the fittings**

**Item specifications for I/T/C OF 50 mm thick, TF quality Thermocole insulation for 4" MS chilled water line complete with all the fittings**

SI No	Specification	Value	Compliance	Offered Specification	Remark



1	50 mm thick, TF quality Thermocole insulation for 4" MS chilled water line complete with all the fittings like bends, reducers, flanges, pumps connections, chiller connections etc.		-		
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**47. I/T/C OF Expansion tank, Capacity: 1000 Ltrs., MOC: MS, insulated**

**Item specifications for I/T/C OF Expansion tank, Capacity: 1000 Ltrs., MOC: MS, insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Expansion tank, Capacity: 1000 Ltrs., MOC: MS, insulated, complete with float valve & quick fill make-up connections, drain, over flow connection, MS stand etc.		-		

**48. I/T/C OF Make-up line from expansion tank to highest point in the retrain air line, 2" size, MS - C Class**

**Item specifications for I/T/C OF Make-up line from expansion tank to highest point in the retrain air line, 2" size, MS - C Class**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Make-up line from expansion tank to highest point in the retrain air line, 2" size, MS - C Class, complete with all the fittings, nuts, bolts, gasket and insulation		-		

**49. I/T/C OF Expansion tank inlet line complete with all the fittings, supports, 1" size, GI - Class B**

**Item specifications for I/T/C OF Expansion tank inlet line complete with all the fittings, supports, 1" size, GI - Class B**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Expansion tank inlet line complete with all the fittings, supports, 1" size, GI - Class B		-		

#### 50. I/T/C/ OF Level switch for expansion tank

##### Item specifications for I/T/C/ OF Level switch for expansion tank

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Level switch for expansion tank		-		

#### 51. I/T/C OF Butterfly valve, 2" Size

##### Item specifications for I/T/C OF Butterfly valve, 2" Size

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Butterfly valve, 2" Size		-		

#### 52. I/T/C OF Drain points, 1" size, complete with all fittings and isolating ball valve.

##### Item specifications for I/T/C OF Drain points, 1" size, complete with all fittings and isolating ball valve.

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Drain points, 1" size, complete with all fittings and isolating ball valve.		-		

#### 53. I/T/C OF Purge points, 1" size, complete with all fittings and isolating ball valve.

##### Item specifications for I/T/C OF Purge points, 1" size, complete with all fittings and isolating ball valve.

SI No	Specification	Value	Compliance	Offered Specification	Remark

1	Purge points, 1" size, complete with all fittings and isolating ball valve.		-		
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**54. I/T/C OF Air handling unit,minimum capacity: 8000 CFM**

**Item specifications for I/T/C OF Air handling unit,minimum capacity: 8000 CFM**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Air handling unit,minimum capacity: 8000 CFM, complete with Louvers at inlet, pre and fine filter section, tubular/strip heaters section, 8 row chilled water coil section, SS 304 condensate tray, fans - 02 numbers, :minimum 8000 CFM each @ 65 mm static, with TEFC, IE3 efficiency, VFD compatible, spark/flame proof motors suitable for 415V +/- 10%, 3 phase, 50 Hz+ 5% AC , motorised isolation dampers at fan outlets, motorised fire and smoke damper at AHU outlet etc.		-		

**55. I/T/C OF Differential pressure sensor across the filters**

**Item specifications for I/T/C OF Differential pressure sensor across the filters**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Differential pressure across the filters		-		

**56. I/T/C of Thermostats for the heaters**

**Item specifications for I/T/C of Thermostats for the heaters**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	I/T/C of Thermostats for the heaters		-		

**57. I/T/C of Anodised Aluminium ducting, 22 gauge (Standard), as per SMACNA complete with supporting arrangements**

**Item specifications for I/T/C of Anodised Aluminium ducting, 22 gauge (Standard), as per SMACNA complete with supporting arrangements**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	I/T/C of Anodised Aluminium ducting, 22 gauge (Standard), as per SMACNA complete with supporting arrangements, vanes, anchor fasteners, supports, access doors, nuts, bolts, neoprene rubber gaskets etc. .		-		

**58. I/T/C of Volume control dampers in Al construction within ducts to be provided with suitable ducts lever and quadrants.**

**Item specifications for I/T/C of Volume control dampers in Al construction within ducts to be provided with suitable ducts lever and quadrants.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	I/T/C of Volume control dampers in Al construction within ducts to be provided with suitable ducts lever and quadrants.		-		

**59. I/T/C of Supply air grilles/ diffusers in Al construction with volume control dampers with necessary frame work etc. and complete as required.**

**Item specifications for I/T/C of Supply air grilles/ diffusers in Al construction with volume control dampers with necessary frame work etc. and complete as required.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	I/T/C of Supply air grilles/ diffusers in Al construction with volume control dampers with necessary frame work etc. and complete as required.		-		

**60. I/T/C of Thermal insulation for supply air duct: Aluminium faced Closed Cell Nitrile rubber, Class 'O' fire rating, 38 mm thick**

**Item specifications for I/T/C of Thermal insulation for supply air duct: Aluminium faced Closed Cell Nitrile rubber, Class 'O' fire rating, 38 mm thick**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	I/T/C of Thermal insulation for supply air duct: Aluminium faced Closed Cell Nitrile rubber, Class 'O' fire rating, 38 mm thick with a density not less than 50 Kg/m <sup>3</sup> . All the joints shall be sealed with 50mm thick Al tape.		-		

**61. I/T/C of Temperature sensors inside the Chemical store**

**Item specifications for I/T/C of Temperature sensors inside the Chemical store**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Temperature sensors inside the Chemical store, accuracy +/- 0.5 Deg C.		-		

**62. I/T/C OF Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 1800 CFM at 15 mm WG**

**Item specifications for I/T/C OF Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 1800 CFM at 15 mm WG**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 1800 CFM at 15 mm WG, Cast Al impeller, suitable for 415V+10%, 50 Hz, 3 phase, TEFC squirrel cage induction motor, S1, F-Class, IP55, explosion proof type suitable for Hazardous Zone -II, Gas group-II C (FLP), Temperature Class - T3, complete with bird protection guard wire mesh both sides.		-		

**63. I/T/C OF Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 900 CFM at 15 mm WG**

**Item specifications for I/T/C OF Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 900 CFM at 15 mm WG**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 900 CFM at 15 mm WG, cast Al impeller, suitable for 415V+10%, 50 Hz, 3 phase, TEFC squirrel cage induction motor, S1, F-Class, IP55, explosion proof type suitable for Hazardous Zone -II, Gas group-II C (FLP), Temperature Class - T3, complete with bird protection guard wire mesh both sides.		-		

**64. Supply of 3.5Cx150 Sq. mm size Aluminium conductor, XLPE insulated**

**Item specifications for Supply of 3.5Cx150 Sq. mm size Aluminium conductor, XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	3.5Cx150 Sq. mm size Aluminium conductor, XLPE insulated, extruded PVC inner sheath, armoured and overall FRLS PVC outer sheathed 1.1 KV grade, as per IS 7098 ( Part I) on existing wall/surface/Cable		-		

**65. Supply of 4Cx35 sq mm size Aluminium conductor, XLPE insulated****Item specifications for Supply of 4Cx35 sq mm size Aluminium conductor, XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	4Cx35 sq mm size Aluminium conductor, XLPE insulated, extruded PVC inner sheath, armoured and overall FRLS PVC outer sheathed 1.1 KV grade, as per IS 7098 ( Part I) on existing wall/surface/Cable Tray/underground as required. Make: Finolex/Havells/KEI/Polycab/RPG/CCI		-		

**66. Supply of 3Cx 6 Sq. mm size Aluminium conductor, XLPE insulated****Item specifications for Supply of 3Cx 6 Sq. mm size Aluminium conductor, XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	3Cx 6 Sq. mm size Aluminium conductor, XLPE insulated, extruded PVC inner sheath, armoured and overall FRLS PVC outer sheathed 1.1 KV grade, as per IS 7098 ( Part I) on existing wall/surface/Cable		-		
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### 67. Supply of 3Cx 10 Sq. mm size Aluminium conductor, XLPE insulated

#### Item specifications for Supply of 3Cx 10 Sq. mm size Aluminium conductor, XLPE insulated

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	3Cx 10 Sq. mm size Aluminium conductor, XLPE insulated, extruded PVC inner sheath, armoured and overall FRLS PVC outer sheathed 1.1 KV grade, as per IS 7098 ( Part I) on existing wall/surface/Cable Tray/underground		-		

### 68. 2 Pair Instrumentation cable, XLPE insulated

#### Item specifications for 2 Pair Instrumentation cable, XLPE insulated

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	2 Pair Instrumentation cable, XLPE insulated, extruded PVC inner sheath, armoured and overall FRLS PVC outer sheathed 1.1 KV grade, as per IS 7098 ( Part I) on existing wall/surface/Cable Tray/underground		-		

### 69. 6 Pair Instrumentation cable, XLPE insulated



**Item specifications for 6 Pair Instrumentation cable, XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	6 Pair Instrumentation cable, XLPE insulated, extruded PVC inner sheath, armoured and overall FRLS PVC outer sheathed 1.1 KV grade, as per IS 7098 ( Part I) on existing wall/surface/Cable Tray/underground		-		

**70. Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 3.5C x 150 sq mm Aluminium (50 mm) size XLPE insulated****Item specifications for Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 3.5C x 150 sq mm Aluminium (50 mm) size XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	End termination with brass double compression gland and Aluminium/Cu lugs for 3.5C x 150 sq mm Aluminium (50 mm) size XLPE insulated, extruded PVC inner sheath, Steel wire armoured and PVC outer sheathed 1.1 KV grade cable. Make: Dowells, 3M, Hex, Comet		-		

**71. Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 4 C x 35 sq mm Aluminium (32 mm) size XLPE insulated K****Item specifications for Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 4 C x 35 sq mm Aluminium (32 mm) size XLPE insulated K**

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 4 C x 35 sq mm Aluminium (32 mm) size XLPE insulated, extruded PVC inner sheath, Steel wire armoured and PVC outer sheathed 1.1 KV grade cable. Make: Dowells, 3M, Hex, Comet				
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**72. Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 3 C x 6 sq mm Aluminium size XLPE insulated**

**Item specifications for Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 3 C x 6 sq mm Aluminium size XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	End termination with brass double compression gland and Aluminium/Cu lugs for 3 C x 6 sq mm Aluminium size XLPE insulated, extruded PVC inner sheath, Steel wire armoured and PVC outer sheathed 1.1 KV grade cable. Make: Dowells, 3M, Hex, Comet		-		

**73. Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 3 C x 10 sq mm Aluminium (22 mm) size XLPE insulated**

**Item specifications for Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 3 C x 10 sq mm Aluminium (22 mm) size XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark

1	End termination with brass double compression gland and Aluminium/Cu lugs for 3 C x 10 sq mm Aluminium (22 mm) size XLPE insulated, extruded PVC inner sheath, Steel wire armoured and PVC outer sheathed 1.1 KV grade cable. Make: Dowells, 3M, Hex, Comet		-		
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**74. Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 2 Pair instrumentation cable XLPE insulated**

**Item specifications for Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 2 Pair instrumentation cable XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	End termination with brass double compression gland and Aluminium/Cu lugs for 2 Pair instrumentation cable XLPE insulated, extruded PVC inner sheath, Steel wire armoured and PVC outer sheathed 1.1 KV grade cable. Make: Dowells, 3M, Hex, Comet		-		

**75. Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 6 Pair instrumentation cable XLPE insulated**

**Item specifications for Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 6 Pair instrumentation cable XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	End termination with brass double compression gland and Aluminium/Cu lugs for 6 Pair instrumentation cable XLPE insulated, extruded PVC inner sheath, Steel wire armoured and PVC outer sheathed 1.1 KV grade cable. Make: Dowells, 3M, Hex, Comet		-		
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**76. Supply of 50 mm width x 50 mm depth x 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray**

**Item specifications for Supply of 50 mm width x 50 mm depth x 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	50 mm width x 50 mm depth x 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray (Galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders or on surface including G.I. bolts & nuts, etc. as required. Make: L&T, Profab, Legrand, SIntex, OBO Bettermann		-		

**77. Supply of 100 mm width x 50 mm depth x 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray**

**Item specifications for Supply of 100 mm width x 50 mm depth x 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Supply of 100 mm width x 50 mm depth x 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray (Galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders or on surface including G.I. bolts & nuts, etc. as required. Make: L&T, Profab, Legrand, Sintex, OBO Bettermann		-		

**78. Supply of 300 mm width x 50 mm depth x 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray**

**Item specifications for Supply of 300 mm width x 50 mm depth x 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray**

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	Supply of 300 mm width x 50 mm depth x 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray (Galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders or on surface including G.I. bolts & nuts, etc. as required. Make: L&T, Profab, Legrand, Sintex, OBO Bettermann				
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**79. Earthing with maintenance free copper coated Earth rod of 3 Mtr length 20 mm dia earth rod**

**Item specifications for Earthing with maintenance free copper coated Earth rod of 3 Mtr length 20 mm dia earth rod**

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	Earthing with maintenance free copper coated Earth rod of 3 Mtr length 20 mm dia earth rod with necessary coupler and connector, universal clamps, inspection chamber, earth conductivity enhancing mineral compound of required quantity around the electrode in the excavated pit and providing earth chamber including necessary civil works also necessary holes, material to interconnect with earth strips complete as required as per IS 60364 and IS 3043 with latest amendments. Make: OBO Bettermann/ Terec/ Erico/ Loress/ Ashlok/JMV Ips		-		
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**80. Providing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required.**

**Item specifications for Providing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required.**

Sl No	Specification	Value	Compliance	Offered Specification	Remark
1	Providing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required. (Jointing shall be done by overlapping and with 2 sets of G.I. nut bolt & spring washer spaced at 50mm).		-		

**81. Providing 10 mm dia copper wire (Green yellow colour) on surface or in recess for loop earthing of motor, cable tray etc.**

**Item specifications for Providing 10 mm dia copper wire (Green yellow colour) on surface or in recess for loop earthing of motor, cable tray etc.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Providing 10 mm dia copper wire (Green yellow colour) on surface or in recess for loop earthing of motor, cable tray etc. with termination at both end as required. Make: Finolex/Havells/KEI/ Polycab/RPG/CCI.		-		

**82. Providing 6 SWG dia G.I. wire on surface or in recess for loop earthing as required.**

**Item specifications for Providing 6 SWG dia G.I. wire on surface or in recess for loop earthing as required.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Providing 6 SWG dia G.I. wire on surface or in recess for loop earthing as required.		-		

**83. I/T/C of 3.5C x 150 Sq mm size Aluminium conductor, XLPE insulated**

**Item specifications for I/T/C of 3.5C x 150 Sq mm size Aluminium conductor, XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	I/T/C of 3.5C x 150 Sq mm size Aluminium conductor, XLPE insulated, extruded PVC inner sheath, armoured and overall FRLS PVC outer sheathed 1.1 KV grade, as per IS 7098 ( Part I) on existing wall/surface/Cable Tray/underground as required.		-		

**84. I/T/C of 4C x 35 Sq mm size Aluminium conductor, XLPE insulated**

**Item specifications for I/T/C of 4C x 35 Sq mm size Aluminium conductor, XLPE insulated**



SI No	Specification	Value	Compliance	Offered Specification	Remark
1	I/T/C of 4C x 35 Sq mm size Aluminium conductor, XLPE insulated, extruded PVC inner sheath, armoured and overall FRLS PVC outer sheathed 1.1 KV grade, as per IS 7098 ( Part I) on existing wall/surface/Cable Tray/underground as required.		-		

**85. I/T/I/T/C of 3C x 6 Sq mm size Aluminium conductor, XLPE insulated**

**Item specifications for I/T/I/T/C of 3C x 6 Sq mm size Aluminium conductor, XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	I/T/C of 3C x 6 Sq mm size Aluminium conductor, XLPE insulated, extruded PVC inner sheath, armoured and overall FRLS PVC outer sheathed 1.1 KV grade, as per IS 7098 ( Part I) on existing wall/surface/Cable Tray/underground as required.		-		

**86. I/T/C of 3C x 10 Sq mm size Aluminium conductor, XLPE insulated**

**Item specifications for I/T/C of 3C x 10 Sq mm size Aluminium conductor, XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	I/T/C of 3C x 10 Sq mm size Aluminium conductor, XLPE insulated, extruded PVC inner sheath, armoured and overall FRLS PVC outer sheathed 1.1 KV grade, as per IS 7098 ( Part I) on existing wall/surface/Cable Tray/underground as required.		-		
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**87. I/T/C of 2 Pair instrumentation cable, XLPE insulated**

**Item specifications for I/T/C of 2 Pair instrumentation cable, XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	I/T/C of 2 Pair instrumentation cable, XLPE insulated, extruded PVC inner sheath, armoured and overall FRLS PVC outer sheathed 1.1 KV grade, as per IS 7098 ( Part I) on existing wall/surface/Cable Tray/underground as required.		-		

**88. I/T/C of 6 Pair instrumentation cable, XLPE insulated**

**Item specifications for I/T/C of 6 Pair instrumentation cable, XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	I/T/C of 6 Pair instrumentation cable, XLPE insulated, extruded PVC inner sheath, armoured and overall FRLS PVC outer sheathed 1.1 KV grade, as per IS 7098 ( Part I) on existing wall/surface/Cable Tray/underground as required.		-		
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**89. Making of end termination with brass double compression gland and Aluminium/Cu lugs for 3.5Cx150 Sq. mm Aluminium (50mm) size XLPE insulated**

**Item specifications for Making of end termination with brass double compression gland and Aluminium/Cu lugs for 3.5Cx150 Sq. mm Aluminium (50mm) size XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Making of end termination with brass double compression gland and Aluminium/Cu lugs for 3.5Cx150 Sq. mm Aluminium (50mm) size XLPE insulated, extruded PVC inner sheath, Steel wire armoured and PVC outer sheathed 1.1 KV grade cable.		-		

**90. Making of end termination with brass double compression gland and Aluminium/Cu lugs for 4Cx35 Sq. mm Aluminium (32mm) size XLPE insulated**

**Item specifications for Making of end termination with brass double compression gland and Aluminium/Cu lugs for 4Cx35 Sq. mm Aluminium (32mm) size XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark

1	Making of end termination with brass double compression gland and Aluminium/Cu lugs for 4Cx35 Sq. mm Aluminium (32mm) size XLPE insulated, extruded PVC inner sheath, Steel wire armoured and PVC outer sheathed 1.1 KV grade cable.		-		
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**91. Making of end termination with brass double compression gland and Copper lugs for 3Cx6 Sq. mm copper cable**

**92. Making of end termination with brass double compression gland and Aluminium/Cu lugs for 3Cx10 Sq. mm Aluminium (22mm) size XLPE insulated**

**Item specifications for Making of end termination with brass double compression gland and Aluminium/Cu lugs for 3Cx10 Sq. mm Aluminium (22mm) size XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Making of end termination with brass double compression gland and Aluminium/Cu lugs for 3Cx10 Sq. mm Aluminium (22mm) size XLPE insulated, extruded PVC inner sheath, Steel wire armoured and PVC outer sheathed 1.1 KV grade cable		-		

**93. Making of end termination with brass double compression gland and Aluminium/Cu lugs for 2 Pair instrumentation cable XLPE insulated**

**Item specifications for Making of end termination with brass double compression gland and Aluminium/Cu lugs for 2 Pair instrumentation cable XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark

1	Making of end termination with brass double compression gland and Aluminium/Cu lugs for 2 Pair instrumentation cable XLPE insulated, extruded PVC inner sheath, Steel wire armoured and PVC outer sheathed 1.1 KV grade cable.		-		
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**94. Making of end termination with brass double compression gland and Aluminium/Cu lugs for 6 Pair instrumentation cable XLPE insulated**

**Item specifications for Making of end termination with brass double compression gland and Aluminium/Cu lugs for 6 Pair instrumentation cable XLPE insulated**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Making of end termination with brass double compression gland and Aluminium/Cu lugs for 6 Pair instrumentation cable XLPE insulated, extruded PVC inner sheath, Steel wire armoured and PVC outer sheathed 1.1 KV grade cable.		-		

**95. Installing of 50 mm width X 50 mm depth X 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray**

**Item specifications for Installing of 50 mm width X 50 mm depth X 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray**

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	Installing of 50 mm width X 50 mm depth X 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray (Galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders or on surface including G.I. bolts & nuts, etc. as required.		-		
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**96. Installing of 100 mm width X 50 mm depth X 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray**

**Item specifications for Installing of 100 mm width X 50 mm depth X 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray**

Sl No	Specification	Value	Compliance	Offered Specification	Remark
1	Installing of 100 mm width X 50 mm depth X 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray (Galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders or on surface including G.I. bolts & nuts, etc. as required.		-		

**97. Installing of 300 mm width X 50 mm depth X 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray**

**Item specifications for Installing of 300 mm width X 50 mm depth X 1.6 mm thickness size of**

**perforated Hot, Dipped Galvanised Iron cable tray**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Installing of 300 mm width X 50 mm depth X 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray (Galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders or on surface including G.I. bolts & nuts, etc. as required.		-		

**98. I/T/C of Earthing with maintenance free copper coated Earth rod of 3 Mtr length 20 mm dia earth rod**

**Item specifications for I/T/C of Earthing with maintenance free copper coated Earth rod of 3 Mtr length 20 mm dia earth rod**

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	I/T/C of Earthing with maintenance free copper coated Earth rod of 3 Mtr length 20 mm dia earth rod with necessary coupler and connector, universal clamps, inspection chamber, earth conductivity enhancing mineral compound of required quantity around the electrode in the excavated pit and providing earth chamber including necessary civil works also necessary holes, material to interconnect with earth strips complete as required as per IS 60364 and IS 3043 with latest amendments.		-		
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**99. Fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required.**

**Item specifications for Fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required.**

Sl No	Specification	Value	Compliance	Offered Specification	Remark
1	Fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required. (Jointing shall be done by overlapping and with 2 sets of G.I. nut bolt & spring washer spaced at 50mm).		-		

**100. Fixing 10 mm dia copper wire (Green yellow colour) on surface or in recess for loop earthing of motor**

**Item specifications for Fixing 10 mm dia copper wire (Green yellow colour) on surface or in recess for loop earthing of motor**

Sl No	Specification	Value	Compliance	Offered Specification	Remark
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1	Fixing 10 mm dia copper wire (Green yellow colour) on surface or in recess for loop earthing of motor, cable tray etc. with termination at both end as required. Make: Finolex/Havells/KEI/ Polycab/RPG/CCI.		-		
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**101. Fixing 6 SWG dia G.I. wire on surface or in recess for loop earthing as required.**

**Item specifications for Fixing 6 SWG dia G.I. wire on surface or in recess for loop earthing as required.**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Fixing of	6 SWG dia G.I. wire on surface or in recess for loop earthing as required.	Yes / No / Explain		

**102. I/T/C of extra Items if any**

**Item specifications for I/T/C of extra Items if any**

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	I/T/C of extra Items if any		-		

**Common Specifications (Applicable for all items)**

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	Intent of Tender	<p>For storage of high purity chemicals, a building is being constructed in the Semi-Conductor Laboratory (SCL) premises in sector 71, S A S Nagar, (Mohali), and is nearing completion. The upcoming Building space has four bays for storing different families of chemicals. The layout of the said Building is as per the attached Drawing no. 01. The store is to have environmentally controlled condition. Accordingly, SCL intends to engage an experienced and competent HVAC contractor for implementation of the HVAC system and associated electrical &amp; Instrumentation system required for the said Building. The scope of work covers Design, Detailed engineering, Supply, Installation, testing, commissioning of HVAC system and associated Electrical &amp; Instrumentation system as per the technical specification as spelt out in this document. The scope of work also includes shop testing, inspection, packing, dispatching, loading, unloading and storage at site, transit, storage and construction insurance, assembly, erection, testing &amp; commissioning at site and handing over of the entire systems covered under the scope of work. The work shall be executed as per the Approved for Construction (AFC) Drawings. The</p>	Yes / No / Explain		
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		<p>selected vendor (referred also as 'Contractor' in this document) will prepare design document complying with the technical specifications, tender drawings as well as the Bill of quantities and submit the detailed engineering drawings including design details to SCL for its approval. SCL shall review the detailed engineering drawings and comments, if any, shall be incorporated in the same by the selected vendor. The approved drawings (to be called as the Approved for construction or AFC drawings) shall be the drawings for implementation by the Contractor.</p>			
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2	ELIGIBILITY CRITERIA	<p>Only those Bidders who meet the below mentioned eligibility criteria are eligible to participate in the tender.</p> <p>1. Bidder should have successfully completed at-least one (01) similar project involving supply, installation, testing and commissioning of Chilled water plant of installed capacity not less than 110 TR comprising of Chiller(s), Pumps, Piping, Ducting, associated Electrical works, Controls/Instrumentation etc. during the last seven (07) years.</p> <p>OR</p> <p>Bidder should have successfully completed at-least two (02) similar projects each involving supply, installation and commissioning of Chilled water plants of installed capacity not less than 85 TR comprising of Chiller(s), Pumps, Piping, Ducting and associated Electrical works, Controls/Instrumentation etc. during last seven (07) years.</p> <p>2. All the major equipment/items such as Chillers, AHU, Pumps, Heaters, Exhaust fans, ducting, Piping, electrical cables etc. covered under the scope of supply shall be of Indian manufacturer(s) only .</p> <p>To assess eligibility for the work, the bidder shall furnish copy(ies) of the Purchase Order(s) / work order(s) of their earlier completed</p>	Yes / No / Explain		
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		works/Projects and their completion certificate(s), evidencing satisfactory completion of similar works (as mentioned above) issued by the respective clients/organizations. Bidder shall submit compliance to Pt.no.2 above duly supported by the makes offered from among the recommended makes mentioned in the tender document.			
3	TECHNICAL SPECIFICATIONS SECTION A – HVAC	<p>The Scope of work covers Design, Detailed engineering and Supply, Installation, Testing &amp; Commissioning (SITC) of HVAC system and Instrumentation/controls for environment control inside the Chemical store. The HVAC system includes chillers, pumps, air handling unit, chilled water piping, heaters, ducting, instrumentation and control etc.</p> <p>The Air management inside the chemical store is based on “Once through concept”, i.e. AHU shall be supplying the total fresh air inside the chemical store. No air re-circulation is allowed inside the chemical store. The temperature inside the chemical store is to be maintained between 21 Deg. C to 24 Deg. C round the year.</p> <p>Tentative layout of the chillers, AHU, pumps, piping and ducting layout is as shown in the Tender Drawing no. 02.</p>	Yes / No / Explain		

4	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC 1.Chillers</p>	<p>a)Design, Detailed engineering, Supply, Installation, Testing and Commissioning (SITC) of factory assembled, microprocessor controlled air-cooled, screw chiller package of minimum capacity of 70 TR at 43 Deg C Ambient condition at SAS Nagar, Punjab. The chiller shall be capable to operate upto 46 Deg C ambient temperature without tripping. b)Quantity: Two (02) numbers – N+1 configuration c)Type: Air cooled, Single/Multiple screw compressor chillers. d)Leaving water temperature from the chiller shall not exceed 7 Deg. C when the entering water temperature is 12 Deg. C at peak load. e)The IPLV for the chiller shall not be less than 4.3 (KW/KW) considering the total power input for the chiller (i.e. including the fan power). f)The chiller shall be AHRI/Eurovent certified chiller. The factory testing of the Chiller may be witnessed by SCL representative as per AHRI/Eurovent standard. All the expenses related to testing shall be borne by the Contractor. g)Compressor shall be Semi hermetic/hermetic type, Direct Driven, operating on eco-friendly refrigerants such as R134a/410a complete with electrical and instrumentation controls, microprocessor based</p>	Yes / No / Explain		
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controller, accessories, automatic modulating capacity control, lubrication system, high efficiency, liquid refrigerant cooled electric motor/s suitable for 415 +/- 10% Volts, 50 Hz, AC power supply etc.

h)Evaporator side fouling factor: 0.000018 m<sup>2</sup>K/W.

i)Air-cooled condenser made of copper tubes mechanically expanded into aluminium fins with Corrosion resistance coating – Blygold/Nano coating, statically and dynamically balanced low noise condenser fans and motors. The condenser shall be complete with relief valve, purge valve, receiver of adequate storage capacity, shut-off valves etc.

j)Shell and tube, DX/Flooded type chiller with steel shell and copper tube and complete with drain points. Chiller shall be insulated with Nitrile rubber/cross linked polyethylene or equivalent faced with aluminium foil. Chiller shall be with suitable baffles and adequate tube surface area and complete with cooling and antifreeze thermostats. Factory set Antifreeze thermostat shall be provided in the chiller.

k)Microprocessor based centralised control unit in fully enclosed steel cabinet (IP 55 Protection) with power and safety operating controls and complete with monitoring facilities for suction/Discharge

pressure, oil pressure, suction line super heat etc.

l) Power supply panel (IP 55 protection) housing all main power connections, Star Delta starters for compressors and condenser, factory wiring for compressors, condensers, all internal electrical connections, incoming suitable electrical isolator complete with accessories and safeties as required. Single point power shall be provided to the chiller.

m) MS Supporting framework for items mentioned above with suitable vibration isolators.

n) Refrigerant piping made of copper with necessary controls such as TEV/Electronic expansion valve, Pilot operated solenoid valves to interconnect compressors, condensers and chiller. Liquid cum moisture indicators and strainer shall be provided.

o) Lubrication device consisting of automatic electric oil pump, oil cooler, tank, oil strainer, pressure regulating valve, oil heater, oil heater thermal switch etc all complete for chillers operation.

p) The entire package is proposed to be located on the ground in outside location adjoining the Chemical store building. Necessary vibration isolators shall be provided for the Units as a whole.

q) Initial charge of



		<p>refrigerant and oil shall be provided with the chiller.</p> <p>r)The chillers shall be operated on Local and Remote mode. The operation on remote mode will be controlled from the existing centralized Facility Control and Monitoring System (FCMS) located in the sub-fab of the VLSI facility in the SCL premises about 200 m from the chemical stores Building. Thus the chillers should have all the necessary interface hardware/provision/software inbuilt to:</p> <ul style="list-style-type: none"><li>i.Start/Stop the chiller from FCMS</li><li>ii.Transmit all the important parameters to FCMS enabling the chiller monitoring/control from remote location (FCMS).</li></ul>		
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5	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC</p> <p>2.Chilled water pumps:</p>	<p>a)Design, Detailed engineering and SITC of chilled water pumps.  b)Quantity: 02 nos.: - N+1 arrangement  c)Type of pumps: Horizontal end suction, top discharge, single stage, with factory fitted Mechanical seal and flushing arrangement.  d)Capacity: Minimum 175 GPM @ 3 kg/cm<sup>2</sup> (30 m Head). Pump flow shall be suiting the chiller flow requirement.  e)Heavy duty for continuous operation.  f)MOC: Casing: Cast iron, Impeller: Stainless steel/Bronze.  g)Motor: Adequately sized, TEFC, squirrel cage induction motor having high efficiency rating IE3 Class and suitable for 415V +/- 10%, 3 Phase, 50 Hz +/- 5%.  h)Accessories: Pressure gauges at suction and discharge, isolating butterfly valves at suction and discharge, check valve, strainer, base frame, foundation bolts, nuts, vibration isolator/rubber pads etc.  i)Pump shall be insulated with 30 mm thick Nitrile rubber/cross linked polyethylene or equivalent insulation faced with aluminium cladding minimum 24 SWG thick.</p>	Yes / No / Explain		
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6	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC</p> <p>3.Chilled water piping:</p>	<p>a)Interconnecting Chilled water piping between the pumps, chillers, AHU.</p> <p>b)Size and MOC: Minimum 4”, MS Heavy duty, C-Class, with thermal insulation.</p> <p>c)The line shall be complete with all fittings like flanges, isolation valves, bends, reducers, pumps connections, chillers connections etc.</p> <p>d)The flanges shall be MS heavy duty (rating 300 psi).</p> <p>e)The gaskets shall be good quality neoprene of appropriate thickness.</p> <p>f)All the valves of size 2” and above shall be butterfly type and those of smaller size shall be ball valves. All butterfly valve shall be PN 16/Class 150 rated, wafer design, lever operated, CI/SG iron body, SG iron disc coated with Nylon, SS shaft. All the ball valves shall be 300 PSI rates, cast steel body, SS ball, screwed ends.</p> <p>g)The check valves shall be, heavy duty (rating PN-16/Class 150), dual plate, with CI body and SS internals.</p> <p>h)The strainers shall be of CI/MS body with brass wire/ SS wire-mesh and PN16 rated.</p> <p>i)Pressure gauges having suitable range and 1/2” connection size shall be of 4” dial type, with Bourdon movement. All internal parts shall be of SS 316. The over range protection shall be 125% of maximum range. The gauges shall have external micrometre screw for</p>	Yes / No / Explain		
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zero adjustment. The pressure gauge connection shall be complete with all the fittings and isolating valves.

j)The temperature gauges of suitable range shall be 4 inches dial type. The sensor, capillary and thermo-well shall be SS316.

k)The line shall have the drain points and purge points complete with all the fittings and isolating ball valves.

l)The piping shall be pressure tested at 10 Kg/sq.cm for a minimum period of 24 hrs.

m)Spring washers of required thickness shall be used with pumps, motors and other moving machinery while plain washers of required thickness shall be used at all other places. Nuts and bolts shall be of high tensile strength.

n)Insulation on chilled water piping, valves, fittings, pumps etc. shall be carried out using TF quality thermocole of not less than 50 mm thickness and having density of not less than 18 Kg/cubic meter pipe sections/slabs. The pipes and the other surfaces where insulation is to be applied shall be cleaned so that surface is free from rust, dust and other foreign materials.

o)Two coats of 85/25 bitumen/CPRX shall be applied on the entire pipe surface and the inside surface of the pipe section/slabs (as required) of insulating material so

		<p>that the insulating mass sticks with the pipe properly. Thereafter white transparent polyethylene sheet of thickness not less than 500 gauge shall be wrapped all along sealing the insulation mass, overlapping the joints by not less than 50 mm and sealing them properly using bitumen/CPRX/ good quality adhesive tape. Over the polyethylene sheet, 0.5 mm thick aluminium sheet shall be used as cladding to cover the insulation in a quality manner.</p> <p>p) For the areas exposed to atmosphere, over polyethylene sheet, GI 24 gauge, Hexagonal GI wire netting shall be wrapped which shall be covered by two coats of sand cement plaster mixed with water proof compound of 6-8 mm thickness each and then on the entire surface 0.5 mm thick aluminium sheet shall be used as cladding to cover the insulation in a quality manner.</p>		
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7	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC 4. Air Handling Unit</p>	<p>a) Quantity – One (01) number.  b) Capacity: Minimum 8000 CFM with a total fan static of 65 mm of WC.  c) AHU shall be of modular construction and of draw/push through type comprising of pre filter section, fine filter section, cooling coil section, heater section and fan section. The frame work shall be of extruded Al sections joined by moulded high tensile reinforced plastic and shall be assembled to provide a sturdy, strong and self-supporting frame work for various sections. Each section shall be complete with its own independent base and mounted on 14G galvanised sheet steel and aluminium die cast channels. Zinc deposition on the GI sheets shall be minimum 120 GSM.  d) AHU shall be of double skin, with 43+2 mm thick PUF insulation sandwiched panel, 1 mm GI outer skin pre coated and 0.8 mm thick Aluminium/SS sheet inside. The density of PUF insulation shall be minimum 40 Kg/m<sup>3</sup>.  e) The frame work for each section shall be joined together with soft rubber gasket in between to make joints air tight.  f) Suitable air tight access doors with Aluminium die cast heavy duty hinges and locks shall be provided for various sections.  g) The casing shall incorporate thermal break profile and all other necessary</p>	Yes / No / Explain		
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		<p>design features to ensure that condensate does not occur during all seasons.</p> <p>h)The AHU shall have louvers at air inlet for separating the heavier dust particles.</p> <p>i)Automatic smoke damper, complete with smoke and temperature sensor, frame, supports, and other standard accessories, shall be provided at the outlet of the AHU. The damper will get closed and AHU will be switched off automatically with the sense of smoke/heat.</p> <p>j)The detailed specifications of the AHU systems are as under:</p>			
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8	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC 4. Air Handling Unit 4.1 Circulation fans:</p>	<p>a) Fan Quantity: 02 (Two) nos. – {N+1 configuration}.  b) Fan Type: Direct driven, Plug type centrifugal fan.  c) Capacity: Minimum 8000 CFM (each)  d) Total static pressure: Minimum 65 mm WC.  e) Fans shall have backward curved blades.  f) Motor and fan assembly shall be floor mounted and placed on Extruded aluminium sections and on vibration isolators.  g) Each fan shall have motorised isolation damper.  h) Motor: Adequately sized, TEFC, Squirrel cage induction motor, compatible for VFD drive and suitable for 415V + 10%, 3 phase, 50 Hz + 5% AC power supply.  i) The motor shall be of high Efficiency IE3 class as per IS 12615 – 2011.  j) Motor shall be compatible for VFD operation.  k) The fan motors shall be spark/flame proof.  l) Flexible connection fabricated of neoprene coated flame proof fabric shall be provided.  m) Fan impeller in Steel construction and housing shall be treated suitably for the rust protection for long life of the same.</p>	Yes / No / Explain		
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9	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC 4. Air Handling Unit 4.2 Cooling Coil:</p>	<p>a. Suitable for cooling water at a temperature of 7.5 +/- 0.5 Deg C.  b. Air handling quantity: Minimum 8000 CFM  c. Total cooling area shall be sufficient so that the velocity across coil shall not exceed 2.25 m/s.  d. Coils shall be of seamless copper tubes with Al fins, 8 rows deep, with 12-13 fins/inch, with copper header, flange connection and SS 304 enclosure/tube sheet.  e. Copper tubes shall be 24 Gauge (0.51 mm minimum) and hydrostatically tested for 21 kg per sq. cm. Test certificate for the same be submitted by the vendor.  f. Cooling coil condensate tray shall be of 20 SWG SS 304 material.  g. Vertically stacked Cooling coils shall have SS 304 drip trays between them and SS pipe drain connection left at the drain tray and finally connected to drain point with suitable trap to check ingress of outside air.  h. Fouling factor: 0.0002 hr. m<sup>2</sup> °C/K cal.  i. Accessories: Frame, support, inlet and outlet header, vent connection and drain connection with valves, insulated drain line, pressure gauges complete with all the fittings and isolating valve, Temperature gauge complete all the fittings and SS thermowell in chilled water supply and return line.</p>	Yes / No / Explain		
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10	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC</p> <p>4.Air Handling Unit</p> <p>4.3 Filters:</p>	<p>a. There will be two stages of filtration.</p> <p>b. Air handling capacity of each stage will be Minimum 8000 CFM.</p> <p>c. The pre-filters shall be of G4 grade as per EN 779, flange type, non-woven synthetic material, sandwiched between HDPE mesh on both sides and suitable for maximum 2000 CFM with an initial pressure drop of 5 mm WG or less, in Aluminium frame with a modular size of 610x610x100mm, suitable for cleaning with dry air or water jet.</p> <p>d. Fine filters shall be of M6 grade as per EN779, flange type, non-woven synthetic material sandwiched between HDPE mesh on both sides and suitable for maximum 2000 CFM with an initial pressure drop of 6-8 mm WG or less, in Aluminium frame with a modular size of 610x610x300mm, suitable for cleaning with dry air or water jet.</p> <p>e. Filters face velocity shall not exceed 2.5 m/sec.</p> <p>f. Filter mounting frame shall be made out of extruded aluminium material.</p> <p>g. Filters shall be having a quick release mechanism and sealing gasket.</p>	Yes / No / Explain		
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11	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC 4.Air Handling Unit 4.4 Tubular/Strip heaters:</p>	<p>a.Tubular /Strip heaters section, minimum Capacity: 85 KW to be provided in AHU room (located on the first floor of the building) to maintain the temperature inside the Chemical store within the permissible limits in the winter season. b.Heaters shall be in flame proof construction. c.Heaters shall be complete with mounting frame, Thermostat in the hot redundant arrangement to be provided for the safety of the heaters. d.The heaters output shall be controlled by a thyristor to be provided in the MCC by SCL.</p>	Yes / No / Explain		
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12	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC</p> <p>5. Instrumentation:</p>	<p>The list of sensors/instruments to be installed in the system are given as under. The scope includes supply and installation of all the sensors/instruments in the field, and terminating all the sensors/instruments in a Junction box located in the Electrical room (on the first floor of the Building) for further transmission/control to the centralised Facility Control and Monitoring System (FCMS). Cabling from JB to IO panel/FCMS and control through FCMS is not covered under this scope and will be arranged by SCL separately. However, the HVAC vendor must coordinate for the control work with instrumentation contractor for seamless integration and control of the system.</p> <p>a) Motorised flow control valve in the chilled water return line of both the chillers.</p> <p>b) Motorised three-way flow control valves with manual by-pass and isolating valve in the chilled water return line of the AHU.</p> <p>c) Temperature sensors cum transmitters in the chilled water supply and return line.</p> <p>d) Differential pressure sensors across the chillers.</p> <p>e) Level switch for the expansion tank.</p> <p>f) Differential pressure across the pre-filters in the AHU.</p> <p>g) Differential pressure across the fine filters in the AHU.</p> <p>h) Thermostat in the</p>	Yes / No / Explain		
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		<p>hot redundant arrangement after the heaters in the AHU.</p> <p>i)Temperature sensors in each bay of the chemical store, accuracy +/- 0.5 Deg C.</p> <p>j)Temperature gauge at inlet and outlet of chilled water lines of chillers and AHU.</p> <p>k)Pressure gauge at inlet and outlet of chilled water lines of pumps, chillers and AHU.</p>			
13	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC</p> <p>6.Expansion tank:</p>	<p>a)Qty- 01 no.</p> <p>b)Capacity – 1000 Litre</p> <p>c)MOC: MS sheet of thickness not less than 5 mm</p> <p>d)Accessories: The tank shall be complete with make-up connection with heavy duty float valve and isolating ball valve, quick fill connection with isolating ball valve, over flow connection, drain connection with valve, level switch, piping with fittings from tank to the highest point in the return chilled water header, piping and fittings from the water supply line to the expansion tank inlet points, properly supported on base channels, etc. The tank and the piping shall be insulated using TF quality thermocole as specified.</p>	Yes / No / Explain		

14	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC 7.Exhaust fans:</p>	<p>a)Type: Explosion proof, wall mounting, Axial flow, continuous duty, Cast Al impeller b)Capacity -1800 CFM at 15 mm WG – 02 nos. ; 900 CFM at 15 mm WG – 04 no. c)Motor: Suitable for 415V+10%, 50 Hz, 3 phase, TEFC squirrel cage induction motor, S1, F-Class, IP55, explosion proof type suitable for Hazardous Zone -II, Gas group-II C (FLP), Temperature Class - T3. d)The fan shall be complete with bird protection guard wire mesh both sides.</p>	Yes / No / Explain		
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15	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC</p> <p>8.Ducting:</p>	<p>a)The duct work shall be of Anodised Aluminium as per SMACNA and material shall confirm to IS 737.</p> <p>b)Ducts shall be made from Anodised Aluminium sheet of lock forming quality.</p> <p>c)The ducts shall be designed for a static pressure of 65 mm WC with a minimum sheet thickness of 22 SWG.</p> <p>d)Velocity for Supply Air shall not exceed 1500 fpm.</p> <p>e)Ducting shall be complete with dampers, vanes, anchor fasteners, supports, access doors, neoprene rubber gaskets etc.</p> <p>f)All duct reinforcement shall be of Al.</p> <p>g)All the dampers shall be Al anodised.</p> <p>h)The duct sections shall be joined with Al Angle flange joints.</p> <p>i)All the edges with minor leaks should be sealed with silicon sealant.</p> <p>j)All the ducts shall be supported with the building structure with GI threaded rods of 10mm dia.</p> <p>k)Duct inspection window in Aluminium construction to be provided in the main duct. The inspection windows shall be leak proof, easy to open/close.</p> <p>l)The supply air duct exposed to the outside atmosphere condition requires to be insulated using Aluminium faced Closed Cell Nitrile rubber, Class ‘O’ fire rating, 38 mm thick with a density not less than 50 Kg/m<sup>3</sup> and covered with 0.5 mm</p>	Yes / No / Explain		
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		<p>thick Aluminium sheet. All the joints shall be sealed with 50mm thick Al tape.</p> <p>m) Tentative air distribution duct layout and duct design is shown in Drawing no. 2. The drawing provides approximate duct sizes and tentative routing. Vendor shall carry out design, detailed engineering to work out actual duct sizes and duct routing layout, and submit the drawings to SCL for approval before commencement of the duct work fabrication and installation work.</p> <p>n) Supply air grills shall be provided in Al construction with powder coating. The grills shall be completed with volume control dampers, necessary frame work etc. and complete as required.</p>			
16	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC</p> <p>9. Control Philosophy</p>	<p>The chilled water plant and AHU will be controlled automatically from existing Facility Control and Monitoring System (FCMS). The control philosophy for the same is provided as under. The instrumentation drawing for the plant is shown in Tender Drawing no. 3. Control through FCMS is not covered under this scope and will be arranged by SCL separately. However, the HVAC vendor must coordinate for the control work with instrumentation contractor for seamless integration and control of the entire system.</p>	Yes / No / Explain		



17	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC</p> <p>9.Control Philosophy</p> <p>9.1 Chilled Water Plant</p>	<p>a)Chiller On/Off: From Local chiller panel as well as from FCMS.</p> <p>b)Pump On/Off: From Local panel as well as from FCMS.</p> <p>c)Motorised flow control valves: Command from FCMS.</p> <p>d)Chiller running data shall be viewable in the local chiller panel and FCMS as well.</p> <p>e)Readings of Temperature sensors cum transmitters in the chilled water line shall be taken to FCMS and will generate alarm in case the temperature is out of range.</p> <p>f)One chiller – say Chiller-1 to be taken in line. FCMS will issue command as under:</p> <p>i.Motorised flow control valve in the Chiller-1 will open.</p> <p>ii.Any one chilled water pump will start.</p> <p>iii.Start command will be issued to the Chiller-1.</p> <p>iv.Similarly, Chiller-2 should be controlled from chiller.</p> <p>g)If the running chiller trips due to any reason, FCMS will isolate the tripped chiller and will give on command to second Chiller.</p> <p>h)If the running pump trips, chiller will trip due to low flow. FCMS will isolate the Tripped chiller and give command to next pump and chiller to start.</p> <p>i)Level sensor in the expansion tank will generate alarm in case of low water level in the tank.</p>	Yes / No / Explain		
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18	<p>TECHNICAL SPECIFICATIONS SECTION A – HVAC 9.Control Philosophy 9.2 Air Handling Unit</p>	<p>a)Out of two fans, one fan be operational and second will be on standby. b)One fan – say fan-1 to be taken in line. FCMS will issue command as under: i.Motorised fire and smoke damper of the AHU will open. ii.Isolation damper of fan -1 will open. iii.Start command will be issued to fan -1. iv.Similarly, fan-2 will be controlled from FCMS. c)If the running fan trips due to any reason, FCMS will isolate the tripped fan and give command to next fan to start. d)Temperature in the Chemical store will be controlled by using a motorised three-way flow control valve in the chilled water line based on the average reading of the Temperature sensors in the Chemical store. e)The power input to heaters will be controlled by thyristor based on the average reading of the temperature sensors in the Chemical store. f)If any one of the Differential Pressure (DP) sensor is out of the range, the heaters will be switched off. g)Heaters will be interlocked with the thermostats in the AHU. If reading of any one of the thermostat is out of the range, the heaters will be switched off. h)Heaters will be interlocked with the AHU fans. If both the fans are off, heater will not switch on. i)If the chiller/heater trips due to any reason, AHU should</p>	Yes / No / Explain		
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		be turned off by FCMS.			
19	TECHNICAL SPECIFICATIONS SECTION A – HVAC 9.Control Philosophy 9.3 Chemical Store	a)Exhaust fan/s in each bay will be operational all the times. b)If any fan trips, alarm will be generated in the FCMS. c)Centralised fire and Smoke detection system will be installed in the chemical store through a separate agency. In case of any fire/smoke alarm in the panel, the controller will switch off the AHU and will close the fire & smoke damper.	Yes / No / Explain		
20	TECHNICAL SPECIFICATIONS Section B – Electrical 1.General Design Consideration:	a.System configuration: 1) Voltage Supply: 415V± 10% 2) Frequency : 50Hz± 5% 3) No of Phase and grounding: 3 Phase & Solidly ground earth 4) Power Distribution: A.C., 3 Phase 4 wire for 3 Phase system, 1 Phase 3 wire system for 1 Phase system. b.Code & Standards: All electrical equipment and accessories to be furnished, installed and commissioned under scope of these specifications shall be designed, manufactured, tested and installed in accordance with relevant Indian Standard Specifications (ISS), Indian electricity rules and any other applicable regulations.	Yes / No / Explain		

21	<p>TECHNICAL SPECIFICATIONS</p> <p>Section B – Electrical</p> <p>2.Drawing, Data and Manuals</p>	<p>Following drawings /documents shall be submitted by the selected contractor for approval of SCL for execution of the work.</p> <p>a.Make, type and catalogue of electrical switchgears, Power Cables and related accessories along with technical leaflets, data sheets, etc. to be provided by the contractor from among the recommended makes mentioned in this document.</p> <p>b.Equipment data sheets furnishing guaranteed performance figure for each type of equipment.</p> <p>c.Test certificates, test results for each type of equipment.</p>	Yes / No / Explain		
22	<p>TECHNICAL SPECIFICATIONS</p> <p>Section B – Electrical</p> <p>3.Scope of the Works</p> <p>a)Power Cables:</p>	<p>The scope includes the Supply and installation of XLPE insulated, overall FRLS PVC outer sheathed, Al/Cu armoured Power cable on wall/surface/existing cable tray as required from existing MCC Panel to chillers, chiller pumps, AHUs, Heater etc. as per the detailed specification and quantity in this document.</p>	Yes / No / Explain		

23	<p>TECHNICAL SPECIFICATIONS Section B – Electrical 3.Scope of the Works b)Instrumentation Cables:</p>	<p>The scope includes the Supply and installation of Instrumentation cables conforming to BS 5308, type II, 300/500 V grade with stranded 0.75sq mm copper conductor, PVC insulated, colour coded, twisted to form a pair/pairs, twisted to form a unit, units laid up, myler taped binding, overall screened with aluminium myler tap with tinned copper drain wire, extruded inner sheathed, galvanised steel round wire /strip armoured, overall FRLS PVC sheathed from field instruments to Junction box. All instrument cables from field shall be terminated at existing junction box to be provided and installed by SCL in electrical room of chemical store. LPBS (Local Push Button Station) and their cable from MCC Panel shall be supplied and installed by the SCL by engaging another electrical contractor. All necessary hardware for installation of cable like cable tie, clamps, tags etc. is in the scope of Contractor. Contractor to ensure that cable laid on the cable tray is properly clamped with GI clamps and cable is properly secured on cable tray. The cable shall be tagged at both ends with Aluminium tagging plate in black letters on white background indicating the: - (i) Cable size (ii) Supply end panel and</p>	Yes / No / Explain		
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		feeder (iii) Load end panel/equipment.			
24	TECHNICAL SPECIFICATIONS Section B – Electrical 3.Scope of the Works c)Earthing:	Supply and laying of 25mmx5mm GI Strip, 6 SWG wire and 10Sq.mm earth (Green-Yellow) wire on wall/floor/recess including connection, termination with GI nuts, bolts, spring washers as required for Cable trays, chillers, chiller pumps, AHUs, heater etc. earthing to the maintenance free earth pit. (Jointing of GI strip shall be done by overlapping with 2 sets of brass nut bolt and spring washer spaced at 50mm).	Yes / No / Explain		
25	TECHNICAL SPECIFICATIONS Section B – Electrical 3.Scope of the Works d)Cable tray:	The scope includes the supply and installation of perforated Hot, Dipped Galvanised Iron cable tray (Galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders or on surface including G.I. bolts & nuts, etc. as required and as per quantity specified in BOQ.	Yes / No / Explain		
26	TECHNICAL SPECIFICATIONS Section B – Electrical 3.Scope of the Works e)Termination:	Double/single compression brass cable glands, cable lugs (Al & Cu as required), cable ties, cable/wire identification tags required for the installation and maintenance of trouble free operation of the downstream system and accessories covered under the work.	Yes / No / Explain		

27	<p>TECHNICAL SPECIFICATIONS</p> <p>Section B – Electrical</p> <p>4. Interfacing (Chillers) with existing FCMS:</p>	<p>The existing Facility Control and Monitoring System (FCMS) system comprises of ControlNet network for field IOs and Ethernet/IP for SCADA.</p> <p>The salient features of the FCMS are listed below:</p> <p>a) FCMS is using Rockwell hot standby ControlLogix L64 system and FT view SCADA for utilities monitoring, control, alarm management, trend and history management, reporting and has redundant SCADA servers for FCMS and LSS.</p> <p>b) The Control logix supports Ethernet IP, controlNet, device net, DH+, remote IO, foundation field bus, serial, DH 485 networks.</p> <p>c) SCADA: Factory Talk SE (site edition) - supervisory HMI</p> <p>d) HMI displays Graphic Screens, PID loops, Face plates, Alarms, trends, Logs, report.</p> <p>Vendor to facilitate integration of chillers by using either ControlNet network or Ethernet/IP to display the chiller running data in existing SCL FCMS. The required protocol convertor/ gateway shall be provided by the vendor to facilitate communication between vendor's supplied chiller system with FCMS.</p> <p>Control system of chillers shall be equipped with AC/DC potential free relays (230V AC/24V DC), contactors etc. for seamless interface of</p>	Yes / No / Explain		
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		<p>the operation of Drives from FCMS.</p> <p>For Chillers, vendor shall provide auto/manual selector switch and its drive modules shall be wired up to the terminal block for local/auto selection, ON, OFF, trip, feedback to SCL's control station and ON/OFF command room FCMS/PLC as well.</p> <p>The control cable from chiller to the IO panel is covered under this scope of the work. The approximate distance between IO Panel and site of chillers is 100 meter. From IO panel to FCMS, integration will carried out by SCL, and is, therefore, not covered under scope of this work.</p>			
28	Recommended Makes-1	<p>1. Chillers: Trane/Mitsubishi/Dunham Bush/ Carrier/ York/Daikin Mc Quay/Climaveneta/ Hitachi/ Blue Star/ Voltas</p> <p>2. Air Handling units: Edgetech/Zeco/Citizen /Carrier/Voltas/Daikins /Flakt Woods/Ventus.</p> <p>3. AHU fans: Woods/Ziehlabegg/Gr eenheck/Kruger/Nikotra / Comfrei.</p> <p>4. Motors: Siemens/ABB/Crompton/Bharat Bijlee/GE</p> <p>5. Pumps: Johnson/ Grundfos /Armstrong/ Bell and Gossette/ Tour &amp; Anderson/WILO</p>	Yes / No / Explain		



29	Recommended Makes-2	<p>6. Heaters: Daspass/KEPL/Rapid Cool</p> <p>7. Air Filters: Camfil/AAF/Klenzaid/FMI/Thermadyne/Trijama/Aerosol</p> <p>8. Isolation valves: L&amp;T/Microfinish/Avcon</p> <p>9. Check Valve: Advance/Intervolve/L&amp;T</p> <p>10. MS Pipe: Tata/SAIL/Jindal</p> <p>11. Y – Strainer: Sant/Leader</p> <p>12. Pressure and Temperature gauges: Waree/Ashcroft/Bells</p>	Yes / No / Explain		
30	Recommended Makes-3	<p>13. Temperature: Vaisala/Siemens/Johnson/Honeywell</p> <p>14. Three way motorised valve: Siemens/Johnson control/Honeywell/Sauter</p> <p>15. Temperature sensor cum transmitter: Siemens/Johnson control/Honeywell/Sauter</p> <p>16. Differential pressure sensor across pumps and filters: Siemens/Johnson control/Honeywell/Sauter</p> <p>17. Fasteners: Unbrako/Bossard/TVS</p> <p>18. Insulation: Beardsell / styrene Packing/Aeroflex/Armaflex / Trocellen / Paramount-XPE/Llyod</p> <p>19. Thermostat for MAU duct: Siemens/Honeywell/Toshniwall</p> <p>20. Exhaust Fans: Sarla/Suburban/Baltiboy/Flakt/Aerotech India/Hruger/Nikotra</p> <p>21. Diffusers/grills: Caryaire/Dynecraft/Ravistar/Air-master</p>	Yes / No / Explain		

31	Recommended Makes-4	<p>22. Damper: Caryaire/Ravistar/Air Master/Moosatty/Tristar</p> <p>23. Smoke Damper: Caryaire/Ravistar/Air Master/Tristar</p> <p>24. Actuator for smoke damper: Joventa/Belimo/Anergy</p> <p>25. Cable: Finolex/Havells/KEI/Polycab/RPG/CCI/Lapp</p> <p>26. Gland, lugs: Dowells, 3M, Hex, Comet</p> <p>27. Cable tray: L&amp;T, Profab, Legrand, OBO Bettermann or equivalent</p> <p>28. Maintenance free Earth Pit: OBO Bettermann/ Terec/ Erico/ Loress/ Ashlok/JMV Ips</p>	Yes / No / Explain		
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32	<p>GENERAL TERMS AND CONDITIONS: A)VARIATION OF QUANTITY</p>	<p>The quantities indicated against each item in the bill of quantities (BOQ) are indicative and are for the purpose of bidding only and payment for the work shall be made on the basis of actual work done and the accepted rates for various items in the Bill of Quantities. Variation in quantities up-to + 25% shall be carried out by the contractor on the same conditions in all respects including the rates as per PO/Contract. In case of Contract/PO items which exceed the said limit of +25%, the contractor may claim revision of rates supported by proof of analysis and if the rate claimed is in excess of the rate specified in the bill of quantities, SCL's authorized officials in-charge shall after giving consideration to the analysis of rates submitted by the contractor, determine the rates on the basis of market rates and the contractor shall be paid in accordance with the rates so determined. The contractor's profit and OH (Over Head) shall be factored in the rate analysis @15%. In case of extra items (that are completely new and are in addition to the items contained in the contract), the contractor may claim rates supported by proper analysis, and SCL's authorized officials in-charge of the works under the aforementioned work packages, shall after</p>	Yes / No / Explain		
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		giving consideration to the analysis of the rates submitted by the contractor, determine the rates on the basis of market rates and the contractor shall be paid in accordance with the rates so determined. The contractor's profit and OH (Over Head) shall be factored in the rate analysis @15%.			
33	B)ACCEPTANCE PROCEDURE	The Performance & Quality parameters of the entire installation shall be monitored for at least 10 days after commissioning for satisfactory performance upon which SCL shall give its Acceptance. Deviation in any of the specified parameters will not be acceptable and it shall be the responsibility of the Vendor to take corrective action/improvements/modifications, as required, in the installed system to meet the specified parameters.	Yes / No / Explain		

34	C)WARRANTY	Warranty period will commence from the date of acceptance of the entire installation covered under the scope of work by SCL. The warranty period shall be 24 months to be reckoned from date of acceptance of the work as defined above. During the warranty period, the contractor shall provide four (04) numbers of quarterly preventive maintenance visits per year for each of the tendered system and breakdown visits as required. All the consumables, spares, parts, tools, tackles, required manpower etc. shall be covered under scope of the vendor during the warranty period.	Yes / No / Explain		
35	D)COMPLETION PERIOD	The entire work is to be completed within 6 months reckoned from the 7th day of award of the contract.	Yes / No / Explain		

36	E) OTHER TERMS AND CONDITIONS	<p>1.Factory Test certificates of the material / equipment/systems/machines supplied shall be furnished by the vendor.</p> <p>2.Vendor to engage the electrical contractor possessing valid 'Class A' electrical contractor license issued by state/central authority for execution of the electrical works.</p> <p>3.The machines/equipment/s systems etc. shall be adequately isolated against transmission of vibrations to the building structure as per manufacturer recommendation.</p> <p>4.All the sensors, gauges and energy meters etc. shall be calibrated and shall be traceable to accredited test house standards.</p> <p>5.Necessary foundation bolts, nuts, leveling-screws vibration pads etc. wherever required, for mounting the machines, shall be provided by the vendor as per manufacturer's drawings/recommendations.</p>	Yes / No / Explain		
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37	E)OTHER TERMS AND CONDITIONS-2	<p>6. Technical leaflets and General layout of the equipments showing their overall dimensions shall be provided in duplicate along with the technical bid.</p> <p>7. The Vendor shall impart on-site hands-on training to SCL personnel free of cost, on operations, troubleshooting and preventive maintenance of the equipment / systems supplied and installed under the Contract, during installation and commissioning.</p> <p>8. Vendor to provide certificate showing the date of manufacture of the machine and certifying that the machine being supplied is new and not a used/old/second hand/ refurbished /reconditioned machine.</p> <p>9. The vendor should satisfy himself for the adequacy/completeness of the system and shall include any other item/s required for safe and satisfactory functioning.</p> <p>10. Detailed manuals incorporating all technical details, spare part lists, troubleshooting, mechanical &amp; electrical drawings, wiring-diagrams etc. shall be provided by the vendor.</p>	Yes / No / Explain		
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38	E)OTHER TERMS AND CONDITIONS-3	<p>11.Payment for the work shall be made on the basis of actual work done and the accepted rates for various items in the Bill of Quantities.</p> <p>12.For measurement of piping &amp; insulation, installed straight length including fittings (bends, flanges, Tee, reducers) etc. shall be considered for payment and the payment shall be made as per unit rates based upon the measurements of actual work done. Valves shall be counted separately and paid at the agreed unit rates.</p> <p>13.All the required tools, tackles, scaffoldings, man power etc. is in scope of the vendor.</p> <p>14.Vendor shall ensure adherence to safe construction practices which shall inter-alia include use of Personnel Protection Equipment (PPE) by their workmen, supervisors etc. deployed on the work. PPE viz., safety helmets, safety shoes, harnesses, safety glasses, gloves etc. shall be provided by the vendor for the safety of all the personnel at the site of work. Work shall be executed as per the ISRO contractor safety Manual available at ISRO site <a href="http://www.isro.gov.in">www.isro.gov.in</a>.</p> <p>15.Vendor shall take adequate measures to ensure that no damage or loss is caused to SCL's buildings, equipment and personnel due to any activity carried out by the vendor relating</p>	Yes / No / Explain		
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		to the performance of the Contract. Vendor shall be liable to make good the loss/damage including any consequential damage caused by them and in case of failure to do so, SCL shall affect financial recovery for the same from the vendor.			
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39	E)OTHER TERMS AND CONDITIONS-4	<p>16.All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design. Makes shall be strictly in conformity with the Recommended Makes/Manufacturers' listed in the Tender Document.</p> <p>17.Electricity required for installation shall be provided by SCL at no charge basis to the vendor. For this, electricity connection will be provided at single point and further distribution shall be the vendor's responsibility. Vendor shall provide wattage of all the electrical loads required for installation and install all safety and protection devices viz., MCB/MCCB/ELCB/RC CB etc. as per the applicable electricity rules.</p> <p>18.Civil works are excluded from the vendor's scope of work but necessary drawings and other details shall be provided by the vendor. However, making cut-outs/ penetrations etc. for routing utility piping lines, ducts etc. in the building and making good the same is in the vendor's scope of work.</p> <p>19.Vendor shall be required to follow the security procedures in vogue at SCL for the movement of vendor's personnel, materials etc. into/from SCL premises.</p> <p>20.On successful completion of the entire work, the Contractor shall</p>	Yes / No / Explain		
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		provide 'As Built' drawings for all the Systems executed under the Contract. Three (03) sets of hard copies and one (01) set in soft copy (Pen Drive/CD/DVD) in Auto-CAD and PDF format shall be provided to SCL for its record and reference. Contractor shall also provide instruction / Operation manual(s), maintenance manuals, drawings, data, catalogues etc. for the all equipment/systems installed under this project.			
40	Note 1	In case, any extra item(s) over and above the BOQ items is(are) required to meet the specifications, description of such item(s) shall be mentioned here. Supply rates of such item(s) shall be mentioned in the row 'Supply of Extra item(s) if any' of BOQ. Installation/Testing/Commissioning rates of such item(s) shall be mentioned in the row 'I/T/C of Extra item(s) if any' row of BOQ.	Yes / No / Explain		
41	Note 2	Various materials / systems etc. procured by the selected Contractor for incorporation in the work shall be only of RFP specified Makes/Manufacturers of various materials / systems. Submittals of the same shall be submitted by the contractor for SCL review and approval.	Yes / No / Explain		

42	Note 3	Vendor to Download the " Technical Specification document" , take print of the complete document, sign all the Clauses/Pages of the document as token of Acceptance/ Compliance to the Technical Specifications, Scan the signed document and shall upload the same in the un-priced technical part of the bid/Supporting document from vendor.	Yes / No / Explain		
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### Supporting Documents required from Vendor

**1. Signed and stamped Specification document**

**2. Brochure of the Chillers of makes offered from among the recommended makes and showing the Chillers manufactured in India.**

**3. Chiller selection sheet indicating the chiller operation parameters on AHRI standard conditions to calculate the IPLV (including fan power).**

**4. Documents/Brochure of the Equipments/Items of makes offered from among the recommended makes and showing the equipment/items are manufactured in India.**

**5. Copies of Purchase Orders/Work orders and their Completion certificates in support of the Eligibility Criteria**

5 additional documents can be uploaded by the vendor

## C.2 Commercial Terms / Bid

Sl. No.	Description	Compliance	Vendor Terms
1	This being two part Tender Technical and Commercial parts separate, the bidder should not attach any document(s) containing pricing information alongwith Technical Part. The tenders containing price information in Technical Part will be summarily rejected. Prices should be indicated in the Price Bid format only	Yes / No / Explain	
2	DELIVERY TERMS : For supply Store/s: Stores shall be despatched on F.O.R destination basis i.e. SCL, S.A.S. Nagar, Mohali, Punjab exclusive of GST as may be applicable	Yes / No / Explain	
3	GST : Please mention percentage of applicable GST.	Yes / No / Explain	
4	Completion Period The entire work shall be completed within 6 months reckoned from 7 <sup>th</sup> day of award of the contract	Yes / No / Explain	
5	VALIDITY: The tender must be valid for a minimum period of 120 days from the date of opening of Technical bid and 90 days after opening of Price bid.	Yes / No / Explain	

6	<p><b>SECURITY DEPOSIT:</b> On acceptance of the purchase order, the Contractor shall submit security deposit for three percent (03 percent) value of the Purchase Order (PO) within 15 days from the date of receipt of PO towards successful execution of the PO. Security Deposit shall be submitted through Demand Draft / Bankers Cheque/ Fixed Deposit Receipt or Bank Guarantee(BG) from any of the Scheduled Banks executed on non judicial stamp paper of appropriate value, and shall be valid for a period of sixty (60) days beyond the date for completion of the Purchase Order. This will be returned by SCL immediately on execution of the PO satisfactorily as per order terms. If not, the amount will be forfeited. Note: In case of BG, Vendor to ensure that their Banker gives Bank Guarantee(BG) confirmation over email from Bank Domain immediately after issuance of the same at the following email ids: njain@scl.gov.in CC: sunilchauhan@scl.gov.in jarnail@scl.gov.in In addition the banker may send a scanned copy of the BG as an attachment</p>	Yes / No / Explain	
7	<p><b>Warranty:</b> Warranty period will commence from the date of acceptance of the entire installation covered under the scope of work by SCL. The warranty period shall be 24 months to be reckoned from date of acceptance of the work as defined above. During the warranty period, the contractor shall provide four (04) numbers of quarterly preventive maintenance visits per year for each of the tendered system and breakdown visits as required. All the consumables, spares, parts, tools, tackles, required manpower etc. shall be covered under scope of the vendor during the warranty period.</p>	Yes / No / Explain	
8	<p><b>WARRANTY REPLACEMENTS:</b> The replacement parts during warranty period, if any, shall be supplied by the Contractor, free of cost on F.O.R. Purchaser site at SAS Nagar, Punjab basis. Rejected items if required back by vendor, shall be collected by vendor from SCL premises.</p>	Yes / No / Explain	

9	<p><b>TERMS OF PAYMENT:</b> 90% value of the supply parts shall be paid within 30 days of receipt of material at Purchaser site and the balance 10% amount and 100% of installation charges shall be payable on acceptance of the entire project against a Performance Bank Guarantee. Payment towards services (installations etc.) shall be released after deduction of TDS, if any.</p>	Yes / No / Explain	
10	<p><b>PERFORMANCE BANK GUARANTEE (PBG):</b> The Contractor shall furnish a Bank Guarantee (as per format given by purchaser) from any nationalized/ scheduled bank for an amount equivalent to 3% of the value of the Contract and shall be valid for a period of 60 days beyond the expiry date of warranty period. On the performance and completion of the Contract in all respects, the Bank Guarantee will be returned to the Contractor without any interest. Note: Vendor to ensure that their Banker gives Bank Guarantee(BG) confirmation over email from Bank Domain immediately after issuance of the same at the following email Ids: njain@scl.gov.in CC:sunilchauhan@scl.gov.in jarnail@scl.gov.in In addition the banker may send a scanned copy of the BG as an attachment.</p>	Yes / No / Explain	
11	<p><b>Liquidated Damages (LD):</b> If the Vendor fails to deliver the stores within the time specified in the contract or any extension thereof, the purchaser shall recover from the Vendor as liquidated damages a sum of one-half of one percent (0.5 percent) of the Contract price for each calendar week of delay. The total liquidated damages shall not exceed ten percent (10 percent) of the Contract price. Delivery of stores means supply, Installation, commissioning and acceptance as applicable.</p>	Yes / No / Explain	

12	<p>Variation of quantities: The quantities indicated against each item in the bill of quantities (BOQ) are indicative and are for the purpose of bidding only and payment for the work shall be made on the basis of actual work done and the accepted rates for various items in the Bill of Quantities.</p> <p>Variation in quantities up-to plus 25 percent. shall be carried out by the contractor on the same conditions in all respects including the rates as per PO/Contract. In case of Contract PO items which exceed the said limit of plus 25 percent. , the contractor may claim revision of rates supported by proof of analysis and if the rate claimed is in excess of the rate specified in the bill of quantities, SCL s authorized officials in-charge shall after giving consideration to the analysis of rates submitted by the contractor, determine the rates on the basis of market rates and the contractor shall be paid in accordance with the rates so determined. The contractor s profit and OH (Over Head) shall be factored in the rate analysis at 15 percent.</p> <p>In case of extra items (that are completely new and are in addition to the items contained in the contract), the contractor may claim rates supported by proper analysis, and SCL s authorized officials in-charge of the works under the aforementioned work packages, shall after giving consideration to the analysis of the rates submitted by the contractor, determine the rates on the basis of market rates and the contractor shall be paid in accordance with the rates so determined. The contractor s profit and OH (Over Head) shall be factored in the rate analysis at 15 percent.</p>	Yes / No / Explain	
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13	<p><b>EXTENSION OF TIME :</b>          If the completion of supply of stores is delayed due to reason of force majeure such as acts of god, acts of public enemy, acts of Government fires floods epidemics quarantine restriction strikes freight embargoes etc., the Contractor shall give notice within 15 days to the purchaser in writing of his claim for an extension of time. The purchaser on receipt of such notice after verification, if necessary may agree to extend the Contract delivery date as may be reasonable but without prejudice to other terms and conditions of the Contract.</p>	Yes / No / Explain	
14	<p><b>Labour Law:</b> Contractor shall abide by all labour laws, rules and regulations in India, which are prevailing, and as enforced from time to time and SCL shall not be responsible for any accident or mishap during the course of the contract to any of engineer/ labour employee by the Contractor. The contractor shall also ensure that the statutory obligations with regards to the employment of labour under law are complied properly and timely.</p>	Yes / No / Explain	

15	<p><b>ARBITRATION:</b> In the event of any dispute/s, difference/s or claim/s arising out of or relating to the interpretation and application of the Contract, such dispute/s or difference/s or claim/s shall be settled amicably by mutual consultations of the good Offices of the respective Parties and recognizing their mutual interests attempt to reach a solution satisfactory to both the parties. If such a resolution is not possible, within 30 days from the date of receipt of written notice of the existence of such dispute/s, then the unresolved dispute/s or difference/s or claim/s shall be referred to the Sole Arbitrator appointed by the Parties by mutual consent in accordance with the rules and procedures of Arbitration and Conciliation Act 1996 as amended from time to time. The arbitration shall be conducted in New Delhi in the Arbitration and Conciliation Centre New Delhi (Domestic and International) as per its rules and regulations. The expenses for the Arbitration shall be shared equally or as may be determined by the Arbitrator. The considered and written decision of the Arbitrator shall be final and binding between the Parties. The applicable language for Arbitration shall be English only. Work under the Contract shall be continued by the CONTRACTOR during the pendency of arbitration proceedings, without prejudice to a final adjustment in accordance with the decision of the Arbitrator unless otherwise directed in writing by the DEPARTMENT or unless the matter is such that the works cannot be possibly continued until the decision (whether final or interim) of the Arbitrator is obtained.</p>	Yes / No / Explain	
16	<p><b>APPLICABLE LAWS:</b> The contract shall be interpreted, construed and governed by laws of India. The contract shall be subject to exclusive Jurisdiction of the Court of SAS Nagar (Mohali), Punjab, India irrespective of anything mentioned in any correspondences or otherwise.</p>	Yes / No / Explain	

17	<p>The Participating Vendor / Suppliers /Service Provider shall indicate specifically whether they fall in the category of Class-I local Supplier or Class-II Local Supplier or Non - Local Supplier for evaluation as per Ministry of Commerce and Industry Office Order No. P-45021/2/2017-PP (B-II dt. 16th September 2020. The Provisions of the office order shall apply for this tender. The Vendor/Supplier/Service provider shall submit documentary proof in this regard along with their quotation.</p> <p>Definitions: A supplier or service provider, whose goods, services or works offered for procurement, has local content:</p> <p>a)Equal to or more than 50% : Class-I local supplier.  b) More than 20% but less than 50%: Class-II local supplier.  c)Less than or equal to 20% : Non local supplier.</p> <p>Mention your category.  The provision of office order shall apply to this tender.</p>	Yes / No / Explain	
18	<p>The Class-I/Class-II Local suppliers, at the time of submitting their offer, shall also indicate percentage of local content and provide self-certification that the item (s) offered meets the local content requirement for Class-I/Class-II Local Suppliers as the case may be. Vendor shall also give details of location (s) at which the local value addition is made.</p>	Yes / No / Explain	

19	<p><b>REJECTION:</b> In the event that any of the stores supplied by the Vendor is found defective in material or workmanship or otherwise not in conformity with the requirements of the Contract specifications, the purchaser shall either reject the stores or request the Contractor, in writing, to rectify the same. The Contractor, on receipt of such notification, shall either rectify or replace the defective stores free of cost to the purchaser. If the Vendor fails to do so, the purchaser may at his option either: a)replace or rectify such defective stores and recover the extra cost so involved from the Contractor, or b)terminate the Contract for default or c)acquire the defective stores at a reduced price considered equitable under the circumstances. The provision of this article shall not prejudice the Purchasers rights under LD clause.</p>	Yes / No / Explain	
20	<p><b>Cancellation of Contract:</b> In the event of the vendors failure to execute the contract as per terms and conditions mentioned therein, Purchaser reserves the rights to cancel the contract without any obligations.</p>	Yes / No / Explain	
21	<p>Vendors are requested to mention the address of vendor for placement of PO and also provide e-mail ID, Phone no. of the focal point for seeking clarification in case of need.</p>	Yes / No / Explain	
22	Any other terms	Yes / No / Explain	

### C.3 Price Bid

Sl. No.	Item	Quantity	Unit Price	Currency	Total Price	Remark
1	Pressure gauge, 4" dial size, bourdan movement, all SS internals, complete with all the fittings and isolating ball valve etc.	10.00 Nos.		-		

2	Temperature sensor cum transmitter complete with SS Thermowell, all the fittings etc.	2.00 Nos.					
3	4" size, MS, C-Class, chilled water line	114.00 m					
4	Screw Chillers, Minimum Capacity 70 TR at 43 Deg C ambient	2.00 Nos.					
5	Chilled water pumps, Horizontal end suction, top discharge	2.00 Nos.					
6	4" Size, NRVs, PN-16/Class 150 rated, dual plate, with CI body and SS internals.	2.00 Nos.					
7	4" Size, Butterfly valves, PN 16/Class 150 rated, wafer design, lever operated, CI/SG iron body, SG iron disc coated with Nylon, SS shaft.	12.00 Nos.					
8	4"size, Motorised butterfly valves (On-Off type)	2.00 Nos.					
9	I/T/C of 4" size, Three way flow control valve	1.00 Nos.					
10	I/T/C of Temperature gauge, 4"Dial type, complete with capillary, SS Thermowell, all the fittings etc.	6.00 Nos.					

11	I/T/C of Pressure gauge, 4" dial size, bourdan movement, all SS internals, complete with all the fittings and isolating ball valve etc.	10.00 Nos.		-		
12	4" size, Y-strainer, CI/M S body with brass wire/ SS wire-mesh, PN16/Class 150 rated	2.00 Nos.		-		
13	4" size, Three way flow control valve	1.00 Nos.		-		
14	Supply of Extra item(s) if any	1.00 Lot		-		
15	Ball valve, 1" Size	2.00 Nos.		-		
16	I/T/C OF Ball valve, 1" Size	2.00 Nos.		-		
17	Temperature gauge, 4"Dial type, complete with capillary, SS Thermowell, all the fittings etc.	6.00 Nos.		-		
18	Differential Pressure (DP) switch complete with fittings	2.00 Nos.		-		
19	50 mm thick, TF quality Thermocole insulation for 4" MS chilled water line	114.00 m		-		
20	Expansion tank, Capacity: 1000 Ltrs., MOC: MS, insulated	1.00 Nos.		-		

21	Make-up line from expansion tank to highest point in the return air line, 2" size, MS - C Class	12.00 m		-		
22	Expansion tank inlet line complete with all the fittings, supports, 1" size, GI - Class B	50.00 m		-		
23	Level switch for expansion tank	1.00 Nos.		-		
24	Butterfly valve, 2" Size	1.00 Nos.		-		
25	Drain points, 1" size, complete with all fittings and isolating ball valve.	6.00 Nos.		-		
26	Purge points, 1" size, complete with all fittings and isolating ball valve.	4.00 Nos.		-		
27	Air handling unit, minimum capacity: 8000 CFM	1.00 Sets		-		
28	Differential pressure sensor	2.00 Nos.		-		
29	Thermostat for safety of heaters	2.00 Nos.		-		
30	Anodised Aluminium ducting, 22 gauge (Standard), as per SMACNA complete with supporting arrangements	220.00 Square Metre		-		

31	Volume control dampers in Al construction within ducts to be provided with suitable ducts lever and quadrants.	1.00 Square Metre					
32	Supply air grilles/ diffusers in Al construction with volume control dampers with necessary frame work etc. and complete as required.	3.50 Square Metre					
33	Thermal insulation for supply air duct: Aluminium faced Closed Cell Nitrile rubber, Class 'O' fire rating, 38 mm thick	4.00 Square Metre					
34	Temperature sensors inside the Chemical store	4.00 Nos.					
35	Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 1800 CFM at 15 mm WG	2.00 Nos.					
36	Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 900 CFM at 15 mm WG	4.00 Nos.					



37	Installation, Testing and Commissioning of Screw Chillers, Minimum Capacity 70 TR at 43 Deg C ambient	2.00 Nos.					
38	Installation, Testing and Commissioning of Chilled water pumps, Horizontal end suction, top discharge	2.00 Nos.					
39	Installation, Testing and Commissioning of 4" Size, NRVs, PN-16/Class 150 rated, dual plate, with CI body and SS internals.	2.00 Nos.					
40	I/T/C of 4" Size, Butterfly valves, PN 16/Class 150 rated, wafer design, lever operated, CI/SG iron body, SG iron disc coated with Nylon, SS shaft.	12.00 Nos.					
41	I/T/C of 4" size, Y-strainer, CI/MS body with brass wire/ SS wire-mesh, PN16/Class 150 rated	2.00 Nos.					
42	I/T/C of 4" size, Motorised butterfly valves (On-Off type)	2.00 Nos.					

43	I/T/C of Temperature sensor cum transmitter complete with SS Thermowell, all the fittings etc.	2.00 Nos.					
44	I/T/C of Differential pressure sensor across chillers, complete with all the fittings, piping etc.	2.00 Nos.					
45	I/T/C OF 4" size, MS, C-Class, chilled water line complete with all the fittings	114.00 m					
46	I/T/C OF 50 mm thick, TF quality Thermocole insulation for 4" MS chilled water line complete with all the fittings	114.00 m					
47	I/T/C OF Expansion tank, Capacity: 1000 Ltrs., MOC: MS, insulated	1.00 Nos.					
48	I/T/C OF Make-up line from expansion tank to highest point in the return air line, 2" size, MS - C Class	12.00 m					
49	I/T/C OF Expansion tank inlet line complete with all the fittings, supports, 1" size, GI - Class B	50.00 m					
50	I/T/C/ OF Level switch for expansion tank	1.00 Nos.					

51	I/T/C OF Butterfly valve, 2" Size	1.00 Nos.		-		
52	I/T/C OF Drain points, 1" size, complete with all fittings and isolating ball valve.	6.00 Nos.		-		
53	I/T/C OF Purge points, 1" size, complete with all fittings and isolating ball valve.	4.00 Nos.		-		
54	I/T/C OF Air handling unit, minimum capacity: 8000 CFM	1.00 Sets		-		
55	I/T/C OF Differential pressure sensor across the filters	2.00 Nos.		-		
56	I/T/C of Thermostats for the heaters	2.00 Nos.		-		
57	I/T/C of Anodised Aluminium ducting, 22 gauge (Standard), as per SMACNA complete with supporting arrangements	220.00 Square Metre		-		
58	I/T/C of Volume control dampers in Al construction within ducts to be provided with suitable ducts lever and quadrants.	1.00 Square Metre		-		

59	I/T/C of Supply air grilles/ diffusers in Al construction with volume control dampers with necessary frame work etc. and complete as required.	3.50 Square Metre					
60	I/T/C of Thermal insulation for supply air duct: Aluminium faced Closed Cell Nitrile rubber, Class 'O' fire rating, 38 mm thick	4.00 Square Metre					
61	I/T/C of Temperature sensors inside the Chemical store	4.00 Nos.					
62	I/T/C OF Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 1800 CFM at 15 mm WG	2.00 Nos.					
63	I/T/C OF Explosion proof, wall mounting, Exhaust fans, Axial flow, continuous duty, capacity - 900 CFM at 15 mm WG	4.00 Nos.					
64	Supply of 3.5Cx150 Sq. mm size Aluminium conductor, XLPE insulated	200.00 m					

65	Supply of 4Cx35 sq mm size Aluminium conductor, XLPE insulated	100.00 m		-		
66	Supply of 3Cx 6 Sq. mm size Aluminium conductor, XLPE insulated	100.00 m		-		
67	Supply of 3Cx 10 Sq. mm size Aluminium conductor, XLPE insulated	200.00 m		-		
68	2 Pair Instrumentation cable, XLPE insulated	800.00 m		-		
69	6 Pair Instrumentation cable, XLPE insulated	200.00 m		-		
70	Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 3.5C x 150 sq mm Aluminium (50 mm) size XLPE insulated	6.00 Nos.		-		
71	Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 4 C x 35 sq mm Aluminium (32 mm) size XLPE insulated K	6.00 Nos.		-		

72	Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 3 C x 6 sq mm Aluminium size XLPE insulated	4.00 Nos.					
73	Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 3 C x 10 sq mm Aluminium (22 mm) size XLPE insulated	4.00 Nos.					
74	Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 2 Pair instrumentation cable XLPE insulated	70.00 Nos.					
75	Supply of end termination with brass double compression gland and Aluminium/Cu lugs for 6 Pair instrumentation cable XLPE insulated	10.00 Nos.					

76	Supply of 50 mm width x 50 mm depth x 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray	100.00 m					
77	Supply of 100 mm width x 50 mm depth x 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray	50.00 m					
78	Supply of 300 mm width x 50 mm depth x 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray	50.00 m					
79	Earthing with maintenance free copper coated Earth rod of 3 Mtr length 20 mm dia earth rod	2.00 Nos.					
80	Providing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required.	100.00 m					
81	Providing 10 mm dia copper wire (Green yellow colour) on surface or in recess for loop earthing of motor, cable tray etc.	50.00 m					

82	Providing 6 SWG dia G.I. wire on surface or in recess for loop earthing as required.	50.00 m		-		
83	I/T/C of 3.5C x 150 Sq mm size Aluminium conductor, XLPE insulated	200.00 m		-		
84	I/T/C of 4C x 35 Sq mm size Aluminium conductor, XLPE insulated	100.00 m		-		
85	I/T/I/T/C of 3C x 6 Sq mm size Aluminium conductor, XLPE insulated	100.00 m		-		
86	I/T/C of 3C x 10 Sq mm size Aluminium conductor, XLPE insulated	200.00 m		-		
87	I/T/C of 2 Pair instrumentation cable, XLPE insulated	800.00 m		-		
88	I/T/C of 6 Pair instrumentation cable, XLPE insulated	200.00 m		-		
89	Making of end termination with brass double compression gland and Aluminium/Cu lugs for 3.5Cx150 Sq. mm Aluminium (50mm) size XLPE insulated	6.00 Nos.		-		



90	Making of end termination with brass double compression gland and Aluminium/Cu lugs for 4Cx35 Sq. mm Aluminium (32mm) size XLPE insulated	6.00 Nos.					
91	Making of end termination with brass double compression gland and Copper lugs for 3Cx6 Sq. mm copper cable	4.00 Nos.					
92	Making of end termination with brass double compression gland and Aluminium/Cu lugs for 3Cx10 Sq. mm Aluminium (22mm) size XLPE insulated	4.00 Nos.					
93	Making of end termination with brass double compression gland and Aluminium/Cu lugs for 2 Pair instrumentation cable XLPE insulated	70.00 Nos.					

94	Making of end termination with brass double compression gland and Aluminium/Cu lugs for 6 Pair instrumentation cable XLPE insulated	10.00 Nos.					
95	Installing of 50 mm width X 50 mm depth X 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray	100.00 m					
96	Installing of 100 mm width X 50 mm depth X 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray	50.00 m					
97	Installing of 300 mm width X 50 mm depth X 1.6 mm thickness size of perforated Hot, Dipped Galvanised Iron cable tray	50.00 m					
98	I/T/C of Earthing with maintenance free copper coated Earth rod of 3 Mtr length 20 mm dia earth rod	2.00 Nos.					

99	Fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required.	100.00 m		-		
100	Fixing 10 mm dia copper wire (Green yellow colour) on surface or in recess for loop earthing of motor	50.00 m		-		
101	Fixing 6 SWG dia G.I. wire on surface or in recess for loop earthing as required.	50.00 m		-		
102	I/T/C of extra Items if any	1.00 Lot		-		