



टाटा मूलभूत अनुसंधान संस्थान  
**TATA INSTITUTE OF FUNDAMENTAL RESEARCH**  
भारत सरकार के परमाणु ऊर्जा विभाग की स्वायत्त संस्था एवं समविश्वविद्यालय  
(An Autonomous Institute of the Department of Atomic Energy,  
Government of India, and a Deemed University)  
सर्वेक्षण संख्या 36 / पी, गोपनपल्ली गांव, सेरिलिंगमपल्ली मंडल, रंगारेड्डी जिला, हैदराबाद - 500 046  
36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy District, Hyderabad - 500 046

Telephone:+91-40-20203009	Date:02.08.2024
Website : <a href="http://www.tifrh.res.in">www.tifrh.res.in</a>	Email: krishnaae@tifrh.res.in

**NOTICE INVITING TENDER**

(TWO PART PUBLIC TENDER) for the following works:

<b>Supply, Installation, Testing and commissioning of HVAC High side and Low side works for Petawatt Laser Facility, TIFR, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.</b>	
निविदा सं. Tender No.	TIFR/PD/CA24-37/240479
निविदा का प्रकार Type of Tender	Two Part Tender (Part-I: Technical Bid and Part- II: Price Bid)
अनुमानित लागत Estimated Cost	Rs.1,59,14,612/-
ईएमडी की लागत Cost of EMD	Rs.3,18,293/- (डिमांड ड्राफ्ट "टीआईएफआर सेंटर फॉर इंटरडिसिप्लिनरी साइंसेस" के पक्ष में तैयार किया जाना है, जो हैदराबाद में देय है (तकनीकी बोली भाग - I के साथ संलग्न किया जाना है)।" Rs.3,18,293/- (Demand Draft to be drawn in favor of "TIFR Center for Interdisciplinary Sciences", Payable at Hyderabad (To be enclosed with the Technical Bid Part – I).
बोली पूर्व बैठक और समय Pre bidding meeting & Time	06.08.2024 at 11:00 Hrs
निविदा प्रस्तुत करने की अंतिम तिथि Last Date for Submission of Tender	12.08.2024 by 13:00 Hrs
बोली खोलने की तिथि (केवल भाग-I: तकनीकी बिड) Date of Opening Bids(Only Part-I: Technical Bid)	12.08.2024 at 15:00 Hrs

- "यदि भाग "I" और भाग "II" बोलियों को अलग-अलग लिफाफों में सील नहीं किया जाता है तो निविदा को अस्वीकार कर दिया जाएगा।"
- In case the Part "I" and Part "II" bids are not sealed in separate envelopes the tender will be rejected.
- तकनीकी बोली में मूल्य का कोई संकेत नहीं होना चाहिए।  
The technical bid should not contain any indication of the price.
- निविदा शुल्क और ईएमडी के भुगतान के बिना प्राप्त तकनीकी बोली को सरसरी तौर पर अस्वीकार कर दिया जाएगा। The Technical Bid received without payment of tender fees and EMD shall be summarily rejected.



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संपर्क: श्री कृष्ण, दूरभाष: 040- 20203009 किसी भी तकनीकी या वाणिज्यिक शर्तों के लिए निविदा में उल्लिखित स्पष्टीकरण Contacts: Mr. Krishna, Tel: 040- 20203009 for any technical or commercial terms clarifications mentioned in the tender.

Sealed tenders are invited for the aforesaid works from contractors having similar work experience in reputed Research Institutions, Universities, Central Government/Public Sector Undertaking, Private Laboratories, Multinational Companies, etc. Interested contractors who are satisfying prequalification criteria stipulated by TIFR-Hyderabad shall only submit their bids. For further details and any clarification on the tender you may please contact Head-Technical Services, Survey No.36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy District, Hyderabad-500046.

**Last date for submission of the tender is 12.08.2024 by 13:00 Hrs.**

**(Rajasekhar. R)**

**Head-Technical Services**



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*36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy District, Hyderabad - 500 046*

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## **TENDER DOCUMENT**

**Supply, Installation, Testing and Commissioning of HVAC High side and Low side works for Petawatt Laser Facility, TIFR, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.**

**NAME OF THE TENDERER:** .....

**Address:** .....

.....

.....

.....

**Last date of submission of the tender: On or before 12.08.2024 by 13:00 Hrs**



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## **TECHNICAL BID**

### **VOLUME-I**

**Supply, Installation, Testing and Commissioning of HVAC High side and Low side works for Petawatt Laser Facility,, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.**



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<b>Tender Notice</b>	:	<b>TIFR/PD/CA24-37/240479</b>
<b>Name of Work</b>	:	<b>Supply, Installation, Testing and Commissioning of HVAC High side and Low side works for Petawatt Laser Facility, TIFR, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.</b>
<b>Location</b>	:	<b>Tata Institute of Fundamental Research Survey No. 36/P, Gopanpally village, Serilingampally Mandal, Ranga Reddy District, Hyderabad – 500046.</b>
<b>Estimated Cost</b>	:	<b>Rs.1,59,14,612/-</b>
<b>EMD</b>	:	<b>Rs.3,18,293/- (Demand Draft to be drawn in favor of “TIFR Center for Interdisciplinary Sciences”, Payable at Hyderabad (To be enclosed with the Technical Bid Part – I).</b>
<b>Delivery Period</b>	:	<b>180 Days (Completion Period)</b>
<b>Validity</b>	:	<b>Seventy Five (75) days after opening of Part-I, Technical Bid</b>



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**SECTION-I**

**IMPORTANT INFORMATION**

**INTRODUCTION**

The Tata Institute of Fundamental Research is a National Centre of the Government of India, under the umbrella of the Department of Atomic Energy, as well as a deemed University awarding degrees for master's and doctoral programs. Tata Institute of Fundamental Research Centre for Interdisciplinary Sciences, Hyderabad invites bids for the following work:

**Supply, Installation, Testing and Commissioning of HVAC High side and Low side works for Petawatt Laser Facility, TIFR, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.**

**1. PARTICULARS**

a)	Location	TIFR, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.
b)	Pre-Bid Meeting Date & Time	06.08.2024 at 11:00 Hrs
c)	Closing date & time of receipt of bids	12.08.2024 by 13:00 Hrs
d)	Date & time of opening of Sealed Cover-I containing Technical Bid	12.08.2024 at 15:00 Hrs
e)	Date of opening of Sealed cover-II containing Financial of eligible bidders	To be intimated to eligible bidders subsequently which is likely to be within 7 days after opening of Technical Bid

**2. GENERAL INSTRUCTIONS**

- 2.1. TIFR shall award the contract for the project through the two Bid systems.
- 2.2. The Contractor is advised to visit and examine the site of work and its surroundings and obtain any information that may be necessary, in addition to those provided in this document. The Contractor shall be deemed to have fully acquainted himself about the site condition, whether he inspects it or not.
- 2.3. The Contractor should adhere to the building bye-laws applicable for the area.
- 2.4. All clarifications shall be sought before the date of pre-bid meeting. The bidders may make suggestions which shall be considered during the Pre Bid Meeting. No further clarifications shall be issued after the issue of noteworthy replies to the pre-bid queries.



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- 2.5. The submission of the bid by Contractor would imply that they have carefully read and agreed to the terms and conditions contained in this bid document.
- 2.6. The bid for the work shall remain open for acceptance for a period of 75(seventy five) days from the date of submission of the bids, which period may be extended by mutual agreement and the Contractor shall not cancel or withdraw the offer during this period.
- 2.7. This bid document shall form a part of the contract agreement.

### 3. SUBMISSION OF BIDS

Bids shall be submitted to Head- Technical Services, **TIFR, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist, Hyderabad-500046** in a sealed Master envelope super scribed "Bid for **Supply, Installation, Testing and Commissioning of HVAC High side and Low side works for Petawatt Laser Facility, TIFR** with our enquiry no. and due date, containing two separate sealed covers clearly super scribed as "**Technical Bid**" and "**Financial Bid**" before the closing date and time of submission in the following manner:

- a) "**Technical Bid**": This will contain Technical part, Eligibility Documents along with testimonials. Earnest Money Deposit (EMD).
- b) "**Financial Bid**": This will contain the complete bidding document with duly filled in Schedule of Financial Quote of Financial Bid & Tender Drawings.

The Bids without signature of the authorized person of bidder and seal, without EMD, with conditions or conditional rebates shall be summarily rejected.

### 4. EVALUATION OF BID

- 4.1. **EVALUATION OF TECHNICAL BID**: The bids received will first be first opened and will be examined for EMD/ Declaration Letter, Eligibility Criteria, Conditions, etc. Conditional Tenders and Tenders without EMD/Declaration Letter shall be summarily rejected.
- 4.2. **EVALUATION OF FINANCIAL BID**: The Financial Bid should contain the complete bid document with duly filled in Schedule of Financial Quote of Financial Bid and signed Tender drawings. Financial Bids of Technically qualified Bidders will only be opened. Work will be awarded to lowest bidder (L1) based on their quotes after making necessary arithmetical checks.

### 5. SCOPE & OBJECTIVE

The Objective of the tender is to **Supply, Installation, Testing and commissioning of HVAC High side and Low side works for Petawatt Laser Facility, TIFR, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046** as per the specifications and Bill of quantities mentioned in the Financial Bid.





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**Period of Completion of Work:** 180 days from the date of issue of work order

**Defect Liability Period:** 12 months from the date of handing over of completed system as per tender.

**6. PAYMENT SCHEDULE:**

The contractor shall submit the bills for payments along with a detailed statement showing the actual works carried out under different heads of items in the format specified by the TIFR. Minimum value of the work for interim payment (**Three Running Bill**) shall be 30% of the work order value. All interim (Maximum Three Running Bill) and final bills will be settled based on the joint measurements of each item of work and certified by TIFR Engineer. TIFR officers may sanction the secured advance up to an amount not exceeding 90% of the value of the materials as assessed by the engineer-in-charge, or an amount not exceeding 90% of the material element cost in the tendered rate of the finished item of work, whichever is lower on production of sufficient documentary evidence i.e., Original invoice, inventory, insurance for the fire and theft etc. All interim bills will be paid within 15 days from the date of the submission and the final bill along with the relevant documents will be settled within 30 days from the date of submission with certification of TIFR engineer.

SECTION-II

ELIGIBILITY CRITERIA FOR TENDER QUALIFICATION



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**Supply, Installation, Testing and Commissioning of HVAC High side and Low side works for Petawatt Laser Facility, TIFR, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.**

● **Eligibility criteria:**

1. The Agencies/Contractors shall hold a valid labor license issued by appropriate authority and must be valid throughout the contractual period.
1. An Authorized dealer/Channel partner of chillers's manufacturers are only eligible.
2. IT Returns for the last three consecutive financial years ended on March 31, 2024 audited by CA.
3. The Agencies/Contractors should have an average annual turnover of **Rs.64** Lakhs during three previous financial years ending March 31, 2024.
4. The Agencies/Contractors should have a latest solvency certificate issued by any nationalized bank of value not less than **Rs.64** Lakhs
5. The Agencies/Contractors should not have incurred any loss in more than two years during the immediate last five consecutive financial years, duly certified by the Chartered Accountant.
6. The Agencies/Contractors should have valid PAN from Income Tax Authority, GST registration No. etc. and any other registration applicable/mandatory for contract.
7. Submission of Technical Data Sheets as per Annexure-IV
8. The Agencies/Contractors should have executed similar installations of High side and low side HVAC works at least.
  - 8.1. One similar work costing **Rs.127** Lakhs or
  - 8.2. Two similar works costing **Rs.95.5** Lakhs or
  - 8.3. Three similar works costing **Rs.64** Lakhs during the last 7 financial years ended on the end date of receiving tender for Research Institutes, Universities, Private Laboratories, R & D institutes, etc. in any Government /PSU/Private organizations of repute.

**The value of executed works shall be brought to the current costing level by enhancing the actual value of work at a simple rate of 7% per annum calculated from the date of completion to the last date of receipt of applications for tender.**

**The Agencies/Contractors should furnish copies of work orders along with BOQ and completion certificates are mandated from the clients in support of the above.**

**Note:**



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- 
- ❖ Agencies/Contractors are advised to inspect the site to understand the scope of work comprehensively before submission of tender.
  - ❖ Agencies/Contractors should arrange the site inspection to TIFR officials for the qualifying works at their own cost if required.
  - ❖ Agencies/Contractors should have a full-fledged in-house project management team to undertake the jobs.
  - ❖ The Agencies/Contractors shall **strictly furnish** aforesaid information in the formats/schedules given. **Non adherence to furnishing of information in the given format/schedules given will lead to disqualification of tender.**
  - ❖ Instructions to Agencies/Contractors for furnishing the information is given as under:
    - Each page of the application shall be signed by a person having necessary authority to do so.
    - If the space in the proforma is insufficient for furnishing full details, such information may be given in separate sheets.
    - Applicants are required to furnish information against each item of the application. In case a certain item is not applicable, please write NA. Application containing incorrect and or inadequate information is liable to be rejected.

**SCHEDULE – A**  
**BASIC INFORMATION**



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- 
1. Name of the firm :
  2. a) Address :
  - b) Telephone / Fax No. :
  - c) Mobile No. Contact Person :
  - d) PAN No. :
  - e) GST Registration No. :
  - f) Labour License Details :
  - Branch Office if any in Hyderabad :
  3. Type of Organization (Proprietorships / Partnership) Ltd. Co. / Co-Operative) (Copy of relevant document to be enclosed) :
  4. Date of Incorporation :
  5. Nature of Business :
  6. Experience as prime Agencies/ Contractors (in Yrs.) :
  7. Name and address of Bankers :
  8. Organization chart of the Company including names and positions of directors / key personnel :

**Signature of the Applicant (s)**



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**SCHEDULE – B**

**Chiller Related Works (Copies of the completion certificate to be enclosed)**

A. Similar work of costing **Rs.127** lakhs or two similar works of costing **Rs.95.5** lakhs or 3 similar works of costing **Rs.64** Lakhs during last 7 financial years ended on end date of receiving tender for Research Institutes, Universities, Private Laboratories, R & D institutes, etc

S r. N o	Name of the project & Address	Descr iption of work in brief	Name of the Engineer	Name of the client also indicate whether Govt or semi Govt or Pvt body with full postal address	Contract Amount in Rs.	Year of commencement	Date of Completion		Whether work was left /uncomplete d or the contract was terminated from either side? Give Details.	Any other relevant information relevant information
							Stipula ted	Actual		
1.										
2.										



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B. List of works in progress above Rs.64 lakhs.

S No.	Name of the project & Address	Description of work in brief	Name of the Engineer with full postal address	Name of the Client. Also indicate whether Govt. or semi Govt. or Pvt. Body with full postal address	Contract Amount in (Rs.)	Date of Completion	Present stage of work with reasons if the work is getting delayed	Any other relevant information
1.								
2.								
3.								

**Signature of the Applicant (s)**



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**SCHEDULE – C**

**TECHNICAL PERSONNEL & SPECIAL EXPERIENCE**

List of technical personnel in your establishment giving details about their technical qualification and experience

Sr No	Name	Age	Qualifications	Project Experience	Nature of works handled	Name of the project Handled	Date from which employed in your organization	Indicate special experience in Air Conditioners installation & Testing projects in which were employed
1								
2								

2. Indicate other points if any to show your technical and managerial competency to indicate any important point in your favour.

**Signature of the Applicant(s)**



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**SCHEDULE – D**

**FINANCIAL POSITION AND WORKING RESULTS**

	2021-22	2022-23	2023-24
1 Annual turnover	:	Rs.	
2. Net Profit	:	Rs.	
3. Credit Facilities from the Bank	:	Rs.	
a) Cash Credit	:	Rs.	
b) Overdraft Limit	:	Rs.	
c) Guarantee	:	Rs.	
d) Others	:	Rs.	
4. Certificate from the Bankers regarding financial soundness of the applicant	:	Enclosed (Yes / No)	
5. Solvency Certificate from the Bankers	:	Enclosed (Yes / No)	

**Signature of the Application (s)**





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**SCHEDULE – E**

**MISCELLANEOUS INFORMATION**

- 1 Whether it would be possible to process Bank :  
Guarantee for various advances  
during execution of the work.
- 2 Details of Civil Suits / Litigations arose during :  
execution of the contracts in the last 5 years.
- 3 Latest Income Tax Clearance Certificate :
- 4 Name of the two senior official of Organizations :  
preferably Govt./Semi Govt/ Autonomous/ Public  
Sector Organization for whom you have  
executed important and major HVAC High side  
and low side works who may be directly  
contracted by TIFR to gather information about  
your ability, competence and capacity of your  
work/organization/etc.
- 5 Number of Supplementary sheets attached. :

**Signature of the Applicant**



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**SECTION-III**

**NOTICE & INSTRUCTIONS**

1. **Sealed item rate tenders** in the prescribed form are invited from Head-Technical Services, Tata Institute of Fundamental Research, Centre for Interdisciplinary Services, Hyderabad, for the following:

<b>Tender Notice No.</b>	<b>TIFR/PD/CA24-37/240479</b>
<b>Name of Work</b>	<b>Supply, Installation, Testing and commissioning of HVAC High side and Low side works for Petawatt Laser Facility, TIFR, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.</b>
<b>Estimated Cost</b>	<b>Rs.1,59,14,612/-</b>
<b>Time Limit</b>	<b>180 days (Completion Period)</b>
<b>Earnest Money Deposit</b>	<b>Rs.3,18,293/- (Demand Draft to be drawn in favor of "TIFR Centre for Interdisciplinary Sciences "Payable at Hyderabad (To be enclosed with the Technical Bid Part –I)).</b>
<b>Last Date &amp; Time of Submission of Tender</b>	<b>12.08.2024 by 13:00 Hrs</b>
<b>Date &amp; Time of Opening of Technical Bid</b>	<b>12.08.2024 at 15:00 Hrs</b>

2. **Submission of Tender & Opening:**

Tenders shall be submitted in a sealed envelope super scribed with Tender enquiry No., Due Date and with heading as "**Supply, Installation, Testing and commissioning of HVAC High side and Low side works for Petawatt Laser Facility, TIFR, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.**" containing two separate sealed covers clearly super scribed as "TECHNICAL BID" and "FINANCIAL BID" on or before the closing date and time of submission in the following manner:

"**TECHNICAL BID**": This will contain the following:

- Proof of Tender Cost paid already
- Earnest Money Deposit as stipulated
- Schedules giving information on Eligibility Criteria with supporting documents specified for tender qualification.



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**“FINANCIAL BID”**: Signed copy of the Financial Bid quoting amount in the stipulated format and signed copies of the tender drawings.

**3.Earnest Money Deposit (EMD)**: EMD shall be submitted in the form of Demand Draft / Pay Order / Banker's cheque issued by a Scheduled Bank, drawn in favor of **“TIFR Center for Interdisciplinary Sciences”**, (To be enclosed with the Technical Bid (Part-I))

**Earnest Money Deposit (EMD)**: Every Bidder has to pay EMD of amount as specified elsewhere in this tender by Demand Draft in favor of **“TIFR Center for Interdisciplinary Sciences”** along with the offer. Quotations received without EMD shall be rejected and no correspondence whatsoever will be entertained. For successful bidders the EMD will be adjusted against Performance Guarantee and will be refunded after completion of work /supply of material at site and for unsuccessful bidders EMD will be refunded after placing the order to successful bidder.

#### **4. Performance guarantee**

The tenderer, whose tender is accepted, will be required to furnish a performance guarantee of 2.5% of the tendered amount within 7 (seven) working days from the date of intimation. This guarantee shall be in the form Demand Draft / Pay Order / Banker's cheque / Deposit or Government Securities / Fixed Deposit Receipt (FDR) or Guarantee Bonds (BG) of any Scheduled Bank in accordance with the form as Annexure – I hereto. In case a fixed deposit receipt of any Bank is furnished by the contractor to TIFR as part of the performance guarantee and the Bank is unable to make payment against the said fixed deposit receipt, the loss caused thereby shall fall on the contractor and the contractor shall forthwith on demand furnish additional security to TIFR to make good the deficit.

The Performance Guarantee shall be initially valid up to the stipulated date of completion **plus 60 days** beyond that. In case the time for completion of work gets enlarged, the contractor shall get the validity of performance Guarantee extended to cover such enlarged time for completion of work. The performance guarantee shall be returned to the contractor, without any interest, after recording of the completion certificate for the work by the competent authority.

The Engineer-in-charge shall make a claim under the Performance guarantee for amounts to which TIFR entitled under the contract (notwithstanding and / or without prejudice to any other provisions in the contract agreement) in the event of:

a) Failure to attend and rectify the problems in the guarantee period, in which event the Engineer- in-charge may claim the full amount of the Performance guarantee.



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b) Failure by the contractor to pay TIFR, Hyderabad any amount due, either as agreed by the contractor or determined under any of the Clauses / Conditions of the agreement, within 30 days of the service of notice to this effect by Engineer-in-charge.

In the event of the contract being determined under provisions of any of the relevant clauses of the agreement, the performance guarantee shall stand forfeited in full and shall be absolutely at the disposal of TIFR, Hyderabad.

**5.Security Deposit:** The tenderer, whose tender is accepted, will also be required to furnish by way of Security Deposit for fulfillment of his contract, an amount equal to 5% of the tendered value of the work. Earnest Money deposited at the time of tenders will be treated as part of the Security Deposit.

In case a fixed deposit receipt of any bank is furnished by the contractor to TIFR, Hyderabad as part of the security deposit and the bank is unable to make payment against the said fixed deposit receipt, the loss caused thereby shall fall on the contractor and the contractor shall forthwith on demand furnish additional security to TIFR, Hyderabad to make good the deficit.

All compensation or the other sums of money payable by the contractor under the terms of this contract may be deducted from, or paid by the sale of a sufficient part of his security deposit or from the interest arising there from, or from any sums which may be due to or may become due to the contractor by TIFR or any account whatsoever and in the event of his Security Deposit being reduced by reason of any such deductions or sale as aforesaid, the contractor shall within 10 days make good in cash or fixed deposit receipt tendered by the State Bank of India or by scheduled banks (if deposited for more than 12 months) endorsed in favor of the TIFR, HYDERABAD, any sum or sums which may have been deducted from, or raised by sale of his security deposit or any part thereof.

Security Deposit shall be initially valid up to one year from the date of completion of work. In case the time for completion of work gets enlarged, the contractor shall get the validity of Security Deposit extended to cover such enlarged time for completion of work. The Security Deposit shall be returned to the contractor, without any interest, after completion of defect liability period.

Security Deposit as deducted above can be released against Bank Guarantee issued by a Scheduled Bank on its accumulation to a minimum of Rs.5 Lakhs subject to the condition that amount of such Bank Guarantee, except last one, shall not be less than Rs.5 Lakhs. Bank Guarantee should be submitted which will be valid upto the expiry of defect liability period.

**6.Acceptance of Tender:** The competent authority, on behalf of TIFR, Hyderabad does not bind itself to accept the lowest or any other tender, and reserves to himself the authority to reject any



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or all the tenders received, without assignment of any reason. All tenders, in which any of the prescribed conditions is not fulfilled or any condition, including that of conditional rebates, is put forth by the tenderer, shall be summarily rejected.

The Competent Authority, on behalf of TIFR, Hyderabad reserves to itself the right of accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the rates quoted. The officer inviting tenders shall have the right of rejecting all or any of the tenders and will not be bound to accept the lowest tender or any other tender.

**7. Validity of Tender:** The tender for the work shall remain open for acceptance for a period of 75 days from the last date of submission of tenders. If any tenderer withdraws his tender before the said period, or before issue of Letter of Intent, whichever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the Department, then TIFR, Hyderabad shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money absolutely. Further the tenderer shall not be allowed to participate in the retendering process of the work.

**8. Levy / Taxes payable by contractor:**

i.GST or any other tax on materials and services in respect of this contract shall be payable by the contractor and TIFR shall not entertain any claim whatsoever in this respect.

ii.The contractor shall deposit royalty and obtain necessary permits as required for supply of the sand, aggregate, stone etc. from local authorities.

**9.Deduction of Income Tax :** As per Section 194-C of Income tax Act 1961, as amended by letter No. 275/9/72/9-TJ (Circular No. 86) dated 19.5.72 and No. 275/14/91-IT (B) (Circular No. 593) dated 5.2.91, received from Ministry of Finance, Department of Revenue, Central Board of Direct Taxes, New Delhi, the Income tax @ 2% and Surcharge thereon @12% (or any other amended rate by Ministry of Finance from time to time), of the gross value of the work done will be recovered from the bills. A certificate for the amount recovered will be issued by the Department.

**10.Site visit by the tenderer before tendering:** Tenderers are advised to inspect and examine the site and its surroundings during working hours and satisfy themselves before submitting their tenders as to the nature of the ground and subsoil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other



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circumstances which may influence or affect their tender. A tenderer shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charges consequent on any misunderstanding or otherwise shall be allowed.

**11. Signing of Tender and receipts for payments:** In the event of the tender being submitted by a firm, it must be signed separately by each partner thereof or in the event of the absence of any partner, it must be signed on his behalf by a person holding a power-of-attorney authorizing him to do so, such power of attorney to be produced with the tender, and it must disclose that the firm is duly registered under the Indian Partnership Act-1952. Receipts for payments made on account of work, when executed by a firm, must also be signed by all the partners, except where contractors are described in their tender as a firm, in which case the receipts must be signed in the name of the firm by one of the partners, or by some other person having due authority to give effectual receipts for the firm.

**12. Tenderer's responsibilities:** The tenderer shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a tender by a tenderer implies that they have read this notice & all other contract documents, and has made himself aware of the scope & specifications of the work to be done and local conditions and factors having a bearing on the execution of the work.

**13. Signing of contract:** The Notice Inviting Tender shall form a part of the contract document. The successful tenderer / contractor, on acceptance of his tender by the Accepting Authority, shall, within 15 days from the stipulated date of start of the work, sign the contract consisting of: the Notice Inviting Tender, all the documents including all conditions, specifications and drawings, if any, forms the tender as issued at the time of invitation of tender and acceptance thereof together with any correspondence leading thereto.

**14. Canvassing,** either directly or indirectly, in connection with the tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection and may be barred from future participation in TIFR works.

**Head-Technical Services**  
*For and on behalf of TIFR, Hyderabad*



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**SECTION-IV**

**GENERAL CONDITIONS OF CONTRACT**

**1. Definition of Terms:**

- 1.1. In constructing these general conditions and the specifications the following works shall have the meanings herein assigned to them unless there is something in the subject or context inconsistent with such construction.
- 1.2. The 'Purchaser' shall mean Tata Institute of Fundamental Research- -Hyderabad, Tata Institute of Fundamental Research, 36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy District, Hyderabad 500046 and shall include the Purchaser's heirs, successors and assigns.
- 1.3. The term 'Engineer In-Charge' and 'Engineer' shall mean Engineer In-Charge, TIFR- Hyderabad or some other person for the time being or from time to time duly appointed in writing by the Purchaser to act as Engineer In-Charge for the purpose of the Contract or in default of such appointment the Purchaser.
- 1.4. The term 'Contractor'/'Supplier'/'Bidder'/'Vendor' shall mean the Bidder whose tender has been accepted by the Owner and shall include the Bidder's heirs, successors and assigns approved by the Purchaser:
- 1.5. The term 'Sub-Contractor' shall mean the firm or persons named in the contract for any art of the work or any person to whom any part of the work has been sublet with the consent in writing of the Engineer In-Charge and shall include his heirs, successors and assigns approved by the Purchaser.
- 1.6. The Term 'Inspector' shall mean any person appointed by or on behalf of the Purchaser to inspect supplies, stores or work under the contract or any person deputed by the Inspector for the purpose.
- 1.7. The term 'Particulars' shall mean, the following :
  - 1.7.1. Specifications
  - 1.7.2. Drawing (ANNEXURE-V)
  - 1.7.3. Sealed Pattern denoting a pattern sealed and signed by the Inspector.
  - 1.7.4. Proprietary make denoting the product of an individual firm.
  - 1.7.5. Any other details governing the construction, manufacture and/or supply as existing for the contract.
- 1.8. The term 'Specification' shall mean the specifications annexed to or issued with these Conditions of Contract.
- 1.9. The term 'Site' shall mean the place or places at which the Equipment is to be delivered or work done by the Contractor; and shall include, where applicable, the lands and buildings upon or in which the works are to be executed and shall also include the place or places at which fabrication and other work is being carried out by the Contractor.
- 1.10. 'Electrical Equipment', 'Stores', 'Work' or 'Works' shall mean and include equipment and materials to be provided and work to be done by the Contractor under the Contract.



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- 1.11. The 'Contract' shall mean acceptance of the work order placed on contractor/supplier under section (2) of these conditions and shall include these conditions of Contract, Specifications, Schedule, Drawing, Letter of Intent of the Purchaser and any subsequent amendments mutually agreed upon.
- 1.12. 'Tests on Completion' shall mean such tests which are prescribed by the specifications or have been mutually agreed to between the Contractor/Supplier and the Purchaser to be made before the equipment is taken over by the Purchaser.
- 1.13. 'Writing' shall include any manuscript, typewritten or printed statement under or over signature or seal as the case may be. Words importing 'person' shall include firms, companies, corporations and association of individuals whether incorporated or not.
- 1.14. Words importing singular shall also include plural and vice versa where context requires.
- 1.15. Bidders are advised to visit and inspect the work-site to make themselves fully conversant with the site conditions and nature of work. Any claim by them after the opening of bids on account of themselves being unaware of any site condition shall not be entertained.

## 2. Contract

Contractor/Supplier/Manufacturer should send their acceptance letter on receipt of 'Letter of Intent' or 'Work Order' or 'Purchase Order' within the stipulated period. On expiry of said period or exorbitant delay in commencing or executing the work, the Purchaser shall not be liable to any claim from the Contractor/ Supplier for work entrusted to and may revoke the contract.

## 3. Work at Site

- 3.1. Access to the works shall be allowed only to the Contractor/Supplier, Sub-Contractors or his duly appointed representatives. The Contractor/ Supplier shall not object to the execution of other works by other contractors or tradesmen and shall afford them every facility for execution of their several works simultaneously with his own.
- 3.2. Work at the Purchaser's premises shall be carried out at such time as the Purchaser may approve but the Purchaser shall give the Contractor/ Supplier all reasonable facilities for the same. The Contractor/Supplier shall provide sufficient fencing, notice boards etc. to guard the works and warn the public.
- 3.3. The Contractor shall obey Central, Local and State regulations and enactments pertaining to workmen and labor and the Engineer In-Charge shall have the right to enquire into and decide all complaints on such matters. The Contractor should comply with the Minimum Wages Act and should also ensure that safe practices are followed by his people at site.
- 3.4. The contractor should follow safety precautions and maintain safety PPE's to their workmen throughout the project. Penalty will be imposed by TIFRH if violation of safety precautions.

## 4. Delays

The Contractor/Supplier shall not be entitled to any compensation for any loss suffered by him on account of delays in commencing or executing the work, whatever the cause for such delays may





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be, including delays in procuring Government controlled or other materials and delay in obtaining instructions and decisions from the Engineer In-Charge.

## 5. Taking Over

The equipment when erected at site shall be deemed to have been taken over by the Purchaser when the Engineer In-Charge will have certified in writing that the equipment has fulfilled the contract conditions.

## 6. Extension of Time

If the Contractor/Supplier is delayed in the progress of work by changes ordered in the work, or by any cause, which the Engineer In-Charge shall decide to justify the delay, then the time of completion shall be extended by a reasonable time. In this regard, the Contractor shall maintain a proper hindrance register and record all such events with due signature of E-I-C on occurrence of such instances for seeking extension of time. However, no such extension shall be allowed unless requested for extension is made in writing by the Contractor/Supplier to the Engineer In-Charge within 15 days from the date of occurrence of the delay.

## 7. Liquidated Damages

- 7.1. For all delays, which do not merit any extension of time, the Contractor/ Supplier shall attract 1% penalty per week for the first 4 weeks of delay and 2% penalty per week for the next 4 weeks of the total contract value. The amount of liquidated damages shall be recoverable from the payment due to the Contractor/Supplier up to maximum of 10% of value of contract.
- 7.2. The deduction of liquidated damages shall not, however, absolve the Contractor/Supplier of his responsibility and obligations under the contract to complete the work in its entirety and shall also be without prejudice to action by the Purchaser under clause:
- 7.3. 'Termination of Contract by the Purchaser'. After that the same shall be completed by the Purchaser at the Contractor's/Supplier's risk and cost.

## 8. Other Damages:

- 8.1. The Contractor/Supplier/Manufacturer shall be responsible for all injury to persons, animals or things and for all damage to the works, structure of, and decorative work in the property which may arise from operation or neglect of himself or any of his Subcontractor or of his or Sub-Contractor's employees, whether such injury or damage may arise from carelessness, accident or any other cause whatever in any way connected with the carrying out of this contract. This clause shall be held to include any damage to buildings, whether immediately adjacent or otherwise, any damage to roads, streets, foot paths, as well as all damage caused to the works forming the subject of this



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contract by frost or other inclemency of weather. The Contractor/Supplier shall indemnify the Purchaser and hold him harmless in respect of all and any expenses on property as aforesaid and also in respect of any claim made in respect of injury or damage under any acts of Government or otherwise and also in respect of any award of compensation or damages consequent upon such claim. Contractor shall furnish necessary insurance documents (Contractor All Risk Policy) taken for the site before commencement of work.

- 8.2. The Contractor/Supplier/Manufacturer shall reinstate all damage of every sort mentioned in this clause, so as to deliver up the whole of the contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of the Owner/third parties.
- 8.3. The Contractor/Supplier/Manufacturer shall indemnify the Purchaser against all claims which may be made against the Purchaser, by any member of the public or other party, in respect of anything which may arise in respect of the works or in consequence thereof and shall, at his own expense, effect and maintain, until the work has been 'Taken Over' under clause 5.
- 8.4. The Contractor/Supplier/Manufacturer shall also indemnify the Purchaser against all claims which may be made upon the Purchaser whether under the Workmen's Compensation Act or any other statute in force during the currency of this contract or at common law in respect of any employee of the Contractor/Supplier or of any of his sub-contractor and shall at his own expense effect and maintain until the work has been 'Taken Over', with an approved office. Contractor shall furnish a copy of the labor license before commencement of work. If the aforesaid are not applicable contractor should furnish declaration to this effect and shall indemnify TIFR-Hyderabad, Hyderabad for violation of any such compliances.
- 8.5. The Purchaser, with the concurrence of the Engineer In-Charge, shall be at liberty and is hereby empowered to deduct the amount of any damages compensation costs, charges and expenses arising or accruing from or in respect of any such claims or damages from any sums due to or become due to the Contractor/Supplier.

**9. Guarantee and Defects Liability Period:**

- 9.1. The Contractor/Supplier/Manufacturer shall guarantee that all equipment shall be free from any defect due to the defective materials and bad workmanship and that the equipment shall operate satisfactorily and that the performance and efficiencies of the equipment shall be not less than the guaranteed values. The guarantee shall be valid for a period of 12 months after the date of commissioning as certified by the Engineer In-Charge. Any parts found defective shall be replaced free of all costs by the Contractor/Supplier. The services of the Contractor's/Supplier's personnel if requisitioned during this period for such work shall be made available free of any cost to the Purchaser.
- 9.2. If the defects are not remedied within a reasonable time, the Purchaser may proceed to do so at the Contractor's/Supplier's risk and expense without prejudice to any other rights.



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## 10. Terms of Payment

The contractor will be paid only Three Running Account (RA) Bill and Final Bill considering the progress of works based on measurement of works completed. The contractor shall submit the bills for payments along with a detailed statement showing the actual works carried out under different heads of items in the format specified by TIFR-, Hyderabad. Minimum value of the work for interim payment shall be 30% of the work order value. TIFR officers may sanction the secured advance up to an amount not exceeding 90% of the value of the materials as assessed by the Engineer-in-charge, or an amount not exceeding 90% of the material element cost in the tendered rate of the finished item of work, whichever is lower on production of sufficient documentary evidence i.e. Original invoice, inventory, insurance for the fire and theft etc.

### 10.1 BILL FORMAT

Tender Item No.	Description of Items (At least 2 lines)	Unit	Tender Quantity	Executed Quantity	Rate	%work done	Amount

NOTE: All quantities in the bill should be cumulative.

All measurements should be in the order of tender sequence and should be recorded in the measurement book. The Measurement should be strictly in the below mentioned format only.

### 10.2 MEASUREMENT FORMAT

Tender Item No.	Description of Item & Location against each Measurement taken	Nos.	Length	Width	Height	Qty.	Remarks

The works which have been certified for running bills will also be verified along with the final bill and any defects found need to be replaced / rectified by the contractor at his cost. Till the time,



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the site is handed over in full, it is the contractor's liability to safeguard the works done and completed at site. The Progress of work should not be affected in any way quoting the reason of non-availability of funds / materials / releasing of Running bill. The liability of the contractor is to complete all works in his scope in the scheduled time as per the terms of contract and will not relieve the contractors from his obligations once the Running bill is paid / kept pending

### **10.3 Final Payment**

Payments of Final bill shall be made after deduction of security deposit /Performance guarantee as specified. The Security Deposit / Performance guarantee, shall be refunded on expiry of the Defects Liability Period after rectifying all defects to the satisfaction of the TIFR-Hyderabad/E.I.C. The acceptance of payment of the final bill by the Contractor would indicate that he would have no further claim in respect of the work executed.

## **11. Special conditions of Contract governing supplies of the Equipment of this Tender:**

### **11.1.Scope:**

- 11.1.1. This specification covers the supply of material as per the enclosed details and quantities and supervision of erection/installation, testing and commissioning of the material.
- 11.1.2. The Contractor/Manufacturer/Supplier shall quote for all the materials along with accessories as mentioned in the enquiry.
- 11.1.3. All the supply shall be in accordance with relevant I.S. Specifications and recognized standards.

### **11.2. Inspection & Testing and commissioning of Material:**

- 11.2.1. Contractor/Manufacturer/Supplier shall submit the lists of Type Tests and Routine Tests to be conducted on the material in the Technical Data Sheet.
- 11.2.2. All the materials shall be tested at factory as per IS Specifications of material by Purchaser's Engineer In-Charge/Engineers before dispatch at the cost of Contractor/Manufacturer/Supplier.
- 11.2.3. Contractor/Manufacturer/Supplier shall inform the concerned Engineer In-Charge for inspection and testing in accordance and fix up a suitable date for the same.

### **11.3.Test Certificates:**

Contractor/Manufacturer/Supplier shall submit the Test Certificates of all materials.

### **11.4. Taxes & Duty:**

- 11.4.1. Contractor/Manufacturer/Supplier shall quote the basic price of material. Excise Duty, Custom Duty, Sales Tax, GST, Octroi, Delivery Charges, Transit Insurance and/or any other charges, if any, must be indicated separately.



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11.4.2. TIFR being a research institute of Govt. of India, is eligible for Excise Duty Exemption on equipment supplies. Necessary exemption certificate will be provided by TIFR.

11.4.3. Transit Insurance: The Transit Insurance from the point of dispatch to the site of erection shall be in the scope of Supplier and the cost shall be indicated separately.

**11.5. Delivery of Material:**

11.5.1. The Contractor/Manufacturer/Supplier shall be held responsible for loading of all equipment and for the stores being sufficiently and properly packed for transport by rail, road, sea or air so as to ensure their being free from any loss or damage on arrival at destination. The packing and marking of packages shall be done by and at the expenses of Manufacturer/Supplier. Each package shall contain a packing note quoting purchase order number and detail of the contents.

11.5.2. All the materials must be delivered at site i.e. Hyderabad - TIFR at 36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy District, Hyderabad-500046. The unloading and positioning of all equipment at the designated locations specified by the Engineer In-Charge shall be in the scope of the Supplier. The Supplier shall arrange for handling equipment, labour for rigging, etc. as required.

11.5.3. Material must be delivered at site in all respects as mentioned in the Purchase Order.

**11.6. Guarantee:**

If during the period of guarantee any fault or defect arises, the material shall be replaced/repared immediately free of cost, as well as any replacement of accessories required shall be done free of cost.

**11.7. Mistake in Drawing:**

The Contractor/Supplier shall be responsible for and shall pay for any alterations in works due to any discrepancies, errors or omissions the drawings or other particulars supplied by him whether such drawings or particulars have been approved by the Purchaser or not.

**11.8. Responsibility for Completeness:**

Any fittings or accessories which may not be specifically mentioned in the specifications but which are usual or necessary are to be provided by the Contractor/Supplier without extra charge and the equipment must be complete in all details.



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#### 11.9.Extra/Deviation items & Variations in quantity

TIFR-Hyderabad has the right to omit/delete any of the items and also increase/decrease the quantities mentioned in the tender. No claim or any compensation in this regard will be accepted or paid to the contractor. However, if any new /additional items/deviated items are to be executed, the contractor is bound to execute such items with prior approval from TIFR-Hyderabad after furnishing the proper rate analysis for such extra/deviated items.

#### 11.10.Rejection of Defective Equipment:

11.10.1. If the equipment after the acceptance thereof is discovered to be defective, notwithstanding that such defects could have been discovered at the time of inspection or found to have failed to fulfill the requirements of the contract or developed defects after the erection within a period of 12 months from the date of erection, even if such erection is done by the Purchaser, he shall be entitled to give a notice on the Contractor/Supplier setting forth details of such defects or failure and the Contractor/Supplier shall, provided such notice is given within a period of 14 months from the date of such erection or acceptance, forthwith make the defective equipment good or alter the same to make it comply with the requirements of the contract at his own cost and further if in the opinion of the Purchaser, the defects are of such a nature that the defects cannot be made good or required without impairing the efficiency or workability of the equipment or if in the opinion of the Purchaser the Equipment cannot be repaired or altered to make it comply with the requirements of the Contract, the Contractor/Supplier shall, provided a notice given by the Purchaser in this behalf within a period of 14 months from the date of erection or acceptance thereof, remove and replace the same with the equipment conforming to the stipulated particulars, in all respects at the Contractor's/Supplier's own cost. Should he fail to do so within a reasonable time, the Purchaser may reject and replace, at the cost of the Contractor/Supplier, with equipment of the same particulars or if equipment conforming to the stipulated particulars are not in the opinion of the Purchaser readily procurable, such opinion being final, then with the nearest substitutes.

11.10.2. In the event of such rejection the Purchaser shall be entitled to use the Equipment in a reasonable and proper manner for a time reasonably sufficient to enable him to obtain replacement equipment as herein before provided.

#### 11.11.Inspection and Final Tests:

All tests necessary to ensure that the Equipment complies with the particulars and guarantee shall be carried out at such place or places as may be determined by the



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Inspector. Should, however, it be necessary for the final test as to performance or guarantee to be held over until the Equipment is erected at site they shall be carried out within one month of completion of erection.

**11.12.Intimation about Delivery:**

If the Purchaser shall have notified the Contractor/Supplier in writing that the former is not ready to take delivery, no equipment or materials shall be forwarded until an intimation in writing shall have been given to the Contractor/Supplier by the Purchaser that he is ready to take delivery.

**11.13.Delay in erection:**

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

**11.14.Definition of Equipment:**

The work 'Equipment' wherever, it appears in these 'Special Conditions of Contract' governing supplier of Equipment in this Tender shall mean all switchgears, panels, etc. or parts thereof or what the Contractor/Supplier agrees to supply under Contract as specified in the work order.

**11.15.Force Majeure:**

Normally Force Majeure shall cover only acts of God, fire, wars, strike, riots and civil commotion, floods, epidemic, quarantine related strikes, freight embargoes, etc. The contractor shall not be liable for any liquidated damages for delay or any failure to perform the contract arising out of Force Majeure conditions, provided that the contractor shall within ten days from the beginning of such delay notify the department in writing the cause of delay along with convincing supporting evidence. The department once convinced and accepted the reason may extend the supply completion period by a suitable / reasonable margin.



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#### 11.16. Termination of Contract by the Purchaser:

11.16.1. If the Contractor/Supplier commits any 'Act of Insolvency' or shall be adjudged an Insolvent or shall have an order for compulsory winding up made against him or pass effective resolution for winding up voluntarily, or if the Contractor/Supplier shall suffer any payment under this contract to be attached by or on behalf of any of the creditors of the Contractor/ Supplier, or shall assign the Contract without the prior consent in writing of the Engineer In-Charge, or shall charge or encumber this Contract or any payments due or which may become due to the Contractor/Supplier there under, or if the Engineer In-Charge shall certify in writing to the Purchaser that the Contractor/Supplier –

- 11.16.1.1. has abandoned the Contract, or
- 11.16.1.2. has failed to commence the works, or has without any lawful excuse these conditions suspended the progress of the works for seven days after receiving from the Engineer In-Charge written notice to proceed, or
- 11.16.1.3. has failed to proceed with the work with such due diligence and failed to make such due progress as would enable the works to be completed in accordance with the approved programme of work,, or
- 11.16.1.4. has failed to remove materials from the site or to pull down and replace work for seven days after receiving from the Engineer In-Charge written notice that the said materials or work were condemned and rejected by the Engineer In-Charge under these conditions, or
- 11.16.1.5. has neglected or failed persistently to observe and perform all or any of the acts matters or things by this contract to be observed and performed by the Contractor for seven days after written notice shall have been given to the Contractor/ Supplier requiring the Contractor/Supplier to observe or perform the same, or
- 11.16.1.6. has to the detriment of good workmanship or in defiance of the Engineer In-Charge's instructions to the contrary sub-let any part of the contract, then and in any of the above said causes, the Purchaser with the written consent of the Engineer In-Charge may, notwithstanding any previous waiver, after giving seven days' notice in writing under the provisions of this clause to the Contractor/Supplier, determine the contract but without prejudice to the powers of the Engineer In- Charge or the obligations and liabilities of the Contract, the whole of which shall continue to be in force as if the contract has not been so determined and as if the work





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- subsequently executed has been executed by and on behalf of the Contractor/ Supplier.
- 11.16.2. After the issue of such notice, the Contractor/Supplier shall not be at liberty to remove from site any equipment, tools and materials belonging to him which shall have been placed thereon for the purpose of the works and the Purchaser shall have lien upon such equipment, tools or materials to subsist from the date of such notice and until the notice shall have been complied with.
- 11.16.3. If the Contractor/Supplier shall fail to comply with the requirements of said notice for seven days after such notice has been given, the Purchaser shall have the power to enter upon and take possession of the works and site and all equipment, tools and materials thereon, and to engage any other person, firm or agency to complete the works, utilizing the equipment, tools and materials to the extent possible. The Purchaser shall not in any way be responsible for damage or loss of the tools, equipment and materials and the Contractor/Supplier shall not have any compensation therefore.
- 11.16.4. Upon completion of the works, the Engineer In-Charge shall certify the amount of expenditure properly incurred consequent on and incidental to the default of the Contractor/Supplier as aforesaid and such amount shall be deducted from the payments due to the Contractor/Supplier, including the Security Deposit. If the said amount exceeds the payment due to the Contractor/Supplier, the Purchaser shall be at liberty to dispose off any of the Contractor's/Supplier's materials, tools or equipment and apply the proceeds for the payments due from the Contractor/Supplier and recover the balance by process of law.
- 11.16.5. After the works have been completed after the amounts due to the Contractor/Supplier, the Engineer In- Charge shall give notice in writing to the Contractor/Supplier to remove the surplus equipment and material from site. If such equipment and materials are not removed within a period of 14 days after such notice, the Purchaser shall have the power to remove and sell the same holding the proceeds less the cost of removal and sale, to the credit of the Contractor/Supplier. The Purchaser shall not be responsible for any loss sustained by the Contractor/Supplier from the sale of the equipment and material.

**12. Contractor's Representative:**

The Contractor/Supplier shall employ at least one qualified representative (i.e.Hvac supervisory License with minimum 3 years of experience of similar works as stipulated by TIFR- Hyderabad in the work order) whose name shall have previously been communicated in writing to the Engineer In-Charge and approved by him to supervise the erection. Any written order or instructions given to the representative shall be



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deemed to have been given to the Contractor/Supplier. The Engineer In-Charge shall be at liberty to object to any particular representative/or any persons employed by the Contractor/Supplier on the work and the Contractor/Supplier shall remove the person objected to, on the receipt of the Engineer In-Charge, in writing, a request requiring him to do so and shall provide in his place another competent representative acceptable to the Engineer In-Charge.

The Contractor's/Supplier's representative shall be a qualified electrical/ mechanical engineer possessing adequate site experience in similar nature of works.

**13. Completion Time:**

Unless otherwise agreed in writing between the Purchaser and the Contractor/Supplier, the work contract shall be completed within the stipulated period mentioned elsewhere in this tender document from the date of Work/Purchase Order issued to Contractor/Supplier by the Purchaser.

**14. Delivery of Material at Site:**

The Contractor/Supplier/Manufacturer shall arrange for safe transit and delivery of material at site and unloading the material at site.

**15. Validity of Tender:**

The quotation should be valid for 75 days after opening of the Part—I: Technical Bids.

**16. Measurements:**

All joint measurements of quantities shall be done by the Contractor at his own cost in the presence of the Engineer In-Charge or any authorized person deputed by him who will certify the routes, length and quantities etc. for the purpose of determination of the amount payable.

**17. Spare Parts & Manuals:**

Manufacturer/Contractor/Supplier should submit operation, maintenance and spare part list and manuals for all equipment.

**18. Training:**

Manufacturer/Contractor/Supplier should provide training for operation and maintenance free of cost for equipment supplied.

**19. Special Instruction for bidding process**



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This tender is a two part tender. The Part-I: Technical Bid and Part-II: Financial Bid. Bidders shall seal each bid separately with a clear label on the envelope about its content. Both the bids should be submitted in a single drop two cover method. Any pricing details must not appear in the Part-I: Technical Bid.

**20. Drawings and Documentation:**

Contractor should make and submit the drawing as per the site conditions and take approval from EIC.As-built drawings as specified in this technical specifications shall be submitted by the Contractor.

**21. Permissions and Approvals:**

All statutory permissions and approvals from Electricity authority as may be required for commissioning of the entire system shall be carried out by the contractor. All necessary documentation for obtaining such permissions and approvals shall be done by the contractor. Purchaser shall assist in providing required declarations. Statutory fees shall be paid by the purchaser.

**22. Guarantee:**

The equipment shall be guaranteed against all design and manufacturing defects, poor workmanship etc. for a period of 12 months from the date of commissioning or 15 months from the date of supply, whichever is earlier. Any defects discovered during this period shall be rectified by the vendor free of cost to the purchaser.

SECTION-V

TECHNICAL SPECIFICATION



## **TECHNICAL SPECIFICATION**

### **1. AIR COOLED SCREW CHILLERS**

Each unit shall be completely factory packaged including evaporator, condenser, and compressor with semi hermetic motor, microprocessor control center and all interconnecting unit piping and wiring. The chiller shall be factory assembled and tested complete in all respects, painted prior to shipment. Unit should conform to the Indian / ASHRAE standard.

The chiller machine should be a single piece assembly and should consist of the following.

Semi-hermetic screw compressors with refrigerant cooled motors. Flooded type cooler common for all compressor circuits. Shell and tube condenser common for all circuit. Soft starter for compressor motor with single incoming source. Insulation for cooler and suction lines. Interconnected seamless copper lines with economizer and accessories. Automatic capacity control, safety devices, sensors and cabling. Thermostatic / Electronic expansion valve for ref flow control on demand. Microprocessor control panel with display and should also have the BMS connectivity ports along with communication link. Full oil of oil and ref gas, flow switches for cooler and condensers, victaulic couplings for pipe connections. The above mentioned components along with the standard accessories should be mounted on a common steel structure along with spring isolators.

#### **1.1. COMPRESSOR**

The compressor – motor shall be an accessible semi hermetic screw compressor suitable for use with R – 134 A refrigerant. The compressor speed shall not exceed 3000 rpm. The compressor rotors shall have reduced tip clearances to improve energy efficiency and reduce the leakages between the high and low pressure sides during compression. A slide valve shall be provided for capacity control. The slide valve shall be positioned over both, male and female rotors. The slide valve shall be capable of controlling capacity from 100% to 20%. Bearings provided for the rotors shall be designed for the life of the equipment. Adequate protection shall be provided to the motor to protect the motor against high / low voltages; single phasing, voltage imbalances and voltage spikes. Temperature and current sensors (in each phase) shall be provided to protect the motor and increase motor reliability. The compressor shall incorporate an integral oil separator to eliminate oil carryover with the refrigerant. Economizer shall be included to improve the efficiency and reduce power consumption. The chiller machine shall be factory assembled and tested complete in all respects and should conform to Indian / ASHRAE standard.

#### **1.2. MOTOR & STARTER**



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The motor shall be of refrigerant cooled induction type motor suitable for operation at 415V / 3Ø / 50 Hz power supply and should be able to withstand any fluctuations of  $\pm 15\%$ . All the circuits should have independent circuits to attend on maintenance. The motor / compressor should be statically and dynamically balanced for reducing vibration and noise. A removable sheet metal terminal box encloses the terminal board area shall be provided. The starter provided on the unit shall be of VFD. It shall also include all necessary safety devices i.e., overload relays, under voltage release, single phase preventing device and phase unbalance or reversal. They shall be provided with over current and under current protection.

### 1.3. COOLER

Chillers shall be DX type/Flooded type. The shell is of carbon steel and the tubes of copper. The shell shall be provided with removable end plates. An adequate number of drain points of ample size shall be provided to permit draining and cleaning of the shell side. Chillers shall incorporate segmental baffles in the shell to secure the desired fluid velocity, promote turbulence and hereby achieve efficient heat transfer. The refrigerant heads shall incorporate liquid inlet and suction gas outlet connections, pass divisions, equalizer and oil return connections. Chillers shall be suitable for use with thermostatic / electronic expansion valves as refrigerant feeding devices. Provision shall be made for fixing manually reset type antifreeze thermostats. Cori-rubber made rubber bellows shall be provided both at inlets and outlets of all chillers to minimize transmission of vibration to the connected piping system. The chiller shall be insulated with nitrile rubber insulation material of suitable thickness.

### 1.4. CONDENSER

Condensers shall be of one shell and tube water-cooled type multi-pass condenser with 1 pass or 3 pass type. The shell is of carbon steel plate with fusion welded seam; it shall be fitted with machined steel tube sheets on either end. The condenser tube shall be at least 12 mm OD and 1mm thick seamless copper with integral fins. The shell shall be provided with removable end plates. An adequate number of descaling points to be provided to permit draining and cleaning of the tubes. The refrigerant heads shall incorporate discharge gas inlet and liquid outlet connections, pass divisions, equalizer and oil return connections. The coils shall be sized so as to optimize performance with respect to water flow rate, pressure drop, condensing temperature, power consumption etc. Thus the valves furnished elsewhere for the parameters of the coil shall be regarded as suggested values rather than specified values. The condenser coils shall be designed to limit the system charge to the minimum, nevertheless, if they do not themselves have adequate capacity to hold the entire charge in the system, receivers shall be provided. If receivers thus become inevitable, the following specifications shall apply. The coils shall be factory tested for a minimum air pressure of 30-kg/sq. cm (420 Psig). In the field, they shall be tested to



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a pressure of not less than 25 kg / cm<sup>2</sup> (350 Psig). Cori-rubber made rubber bellows shall be provided both at inlets and outlets of all chillers to minimize transmission of vibration to the connected piping system.

### 1.5. CASING

The Heavy Duty Gauge (HDG) casing should be used for the chiller package. The panels shall be of heavy gauge, hot-dip galvanized steel and they shall be machine-pressed and folded. All joints shall be folded joints. Where and if ferrous materials are used whether for the supporting structure or for any other item or for components, such materials / components /sections shall be qualified to 500 liters. Salt spray testing (or) hot-dip galvanized.

In the event of importing the chilling units, the tenderer shall bring out to their tender clearly (and in detail) in any case, the details of construction of the equipment offered by them, highlighting in particular, the thickness and kind of materials used, the manufacturing technique employed, finish provided for weather protection etc.

### 1.6. MICRO COMPUTER CONTROL CENTRE:

Each unit shall be furnished with a microcomputer control center in a locked enclosure, factory mounted, wired and tested. The control center shall include a 40-character alphanumeric display showing all system parameters in English language with numeric data in English (FPS) units.

Digital programming of essential set points through a color coded, tactile-feel keypad shall include: entering and leaving chilled water temperature and condensing water temperature; percent loading; pull down demand limiting; seven-day time clock for starting and stopping chiller (complete with local holiday schedule); and remote reset temperature range.

All safety and cycling shutdowns shall be enunciated through the alphanumeric display and consist of day, time, cause of shutdown, and type of restart required. Safety shutdowns shall include: high oil pressure; high compressor discharge temperature: low evaporator pressure: motor controller fault: and sensor malfunctions. Cycling shutdowns shall include: low water temperature; low oil temperature: chiller/condenser water flow interruption; power fault; internal time clock; and entire cycle.

System operating information shall include: return/leaving chilled water temperatures; return/leaving condenser water temperatures; evaporator /condenser refrigerant pressure; differential oil pressure; percent motor current; evaporator/condenser saturation temperatures; operating hours (Hours Run) and number of compressor starts.

Security access shall be provided to prevent unauthorized change of set points to allow local or remote control of the chiller, and to allow manual operation of the pre-rotation vanes and oil pump.



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The chiller shall be provided with an RS-232 port to output all system operating data, shutdown/cycling messages and a record of the last four cycling or safety shutdowns to a remote printer or Building Automation System (BAS). The control center shall be programmable to provide data logs to the BAS/printer at a set time interval.

Control center shall be able to interface with the Building Automation System (BAS) to provide remote chiller start/stop reset of chilled water temperature reset of current limit; and status messages indicating chiller is ready to start, chiller is operating, chiller is shut down on a safety requiring reset, and chiller is shut down on a recycling safety.

### 1.7 INSTALLATION

Rig and install in full accordance with Manufacturer' recommendations and project drawings. Locate the chiller as indicated on drawings, including cleaning and service maintenance clearance as per manufacturer instructions. Adjust and level chiller on pedestals. Installing contractors shall provide and install all auxiliary devices and accessories for fully operational chillers. Coordinate electrical requirements and connections for all power feeds with electrical contractor. Vendor should coordinate with BMS vendor for proper connectivity. Installation contractor shall paint damaged or scratched factory finish with touch up paint matching factory finish.

### 1.8. PERFORMANCE

The performance of the unit shall be proved at site at the time of testing and commissioning along with power consumption. The power should not exceed the confirmed rating throughout the period of service of the equipment. The company should stand guarantee for the mentioned condition and shall compensate the client in the case of more power consumption than the indicated power. The contractor shall submit along with the rating charts of the machines offered in terms of percentile capacity at maximum ambient conditions along with the tender.

#### AIR COOLED SCREW CHILLERS:

Type of Chiller	: Air cooled screw chiller
Refrigerant	: R 134 A
Type of compressor	: Semi-hermetic screw
Type of drive	: VFD
Chilled Water Inlet Temperature	: 54 °F



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Chilled Water Outlet Temperature	: 44 °F
Chiller	: Shall be AHRI / Eurovent certified chillers
Cooler Fouling Factor	: 0.00025
Power Consumption	: Lowest possible
Number of incoming feeder	: One
Harmonic Filters	: Front end active harmonic filters to restrict the harmonics less than 5% at all the loads as per IEEE 519 Guidelines

- Chillers shall have a microprocessor panel and shall be able to display all graphs, trends, etc.
- Chillers shall have protective wire guards for the compressor compartment and for condenser compartment.
- Chillers on the concrete pedestal with spring vibration isolators, flow switch, Victaulic couplings / flanged connections, canopy for chiller control panel, BMS Compatibility, adaptor box for aluminum cable terminations, isolator in the power panel, etc.
- Chillers shall have front end active harmonic filters to restrict the harmonics. Heat exchangers shall be as per ASME.
- Shall be suitable for integrating with a third party BMS system.

#### **1.9. EFFICIENCIES OF CHILLERS:**

Type of Chiller	Capacity	EER at AHRI	EER at IPLV
Air Cooled Screw	>= 80 TR	>10.5	>14.5

#### **2. VERTICAL INLINE PUMPS:**





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- Pumps shall be vertical in line pumps suitable for vertical / horizontal mounting without base foundation. Pumps shall be built in VFD. VFD shall be IP 65 and shall be suitable for installing in the open area.
- Pumps shall be supported on the pipe lines. Pump volute shall be Class 30 CI. Impeller shall be cast bronze enclosed type, dynamically balanced. Internally flushed mechanical seal with ceramic seal seat and carbon seal ring suitable for continuous operation shall be provided. Replaceable bronze shaft sleeves shall completely cover the wetted area under the seal.
- Pumps shall be rated min. 300 psi pressure. Volute shall have gauge tapings, vent and drain tapings.
- Motor shall meet NEMA specifications. Motor and pump shall be factory aligned. It shall be suitable to work in an open area with 110 deg. F ambient temperature. Base plate shall be of structural steel or fabricated steel channel with fully enclosed sides and ends and securely welded cross members. A flexible type, center design drop out coupler, capable of absorbing tensional vibration shall be used between the pump & motor. Coupler shall be shielded by a coupler guard. Pump set shall be factory painted with weather protected paint. Pumps shall be rated at 300 psi pressure. Volute shall have gauge tapings, vent and drain tapings.
- Motor shall meet NEMA specifications. Motor and pump shall be factory aligned. It shall be suitable to work in an open area with 110 deg. F ambient temperature. Pump set shall be factory painted with weather protected paint. These should be Direct coupled design eliminates stub shaft, oiled bearing and coupling, reducing maintenance.

### **3. VARIABLE SPEED DRIVE FOR SECONDARY PUMPING SYSTEMS:**

- The pumps shall be provided with adjustable frequency drives and pump controllers for the automatic adjustment of the pump speed to achieve the desired pumping conditions whenever a change in demand is experienced. The pump controller shall incorporate the adjustable frequency device and shall be of the microprocessor based programmable type dedicated for the pumping system.
- The frequency drive shall employ sine wave pulse width modulation control and shall be suitable for operation on a three phase, 415 Volts, 50 Hertz input supply with an input voltage variation of +10% and -15% and frequency variation of  $\pm 1$  Hertz. The drive shall be capable of providing a variable frequency output of 0 to 50 Hertz proportional to a 4 to 20 mA or 0 to 10V input signal obtained from a field sensor/transmitter. The field sensors/transmitters required for pump control shall be supplied as part of the variable speed pumping system. The sensors/transmitters shall be suitable for measuring the appropriate process parameters (i.e. pressure, differential pressure, temperature, flow etc). The pump controller with the adjustable frequency drive shall be housed in IP65 enclosure. Adequate ventilation shall be ensured for continuous operation at the maximum ambient temperature specified by the manufacturer. All



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power, control and instrument cabling shall be provided and installed as described elsewhere in this specification.

- Shall be suitable for integrating with a third party BMS system.

#### **4. VARIABLE FREQUENCY DRIVES:**

- Drive shall be a dedicated HVAC drive designed for variable torque. The frequency drive shall employ sine wave pulse width modulation control and shall be suitable for operation on a three phase, 415 Volts, 50 Hertz input supply with an input voltage variation of +10% and -15% and frequency variation of  $\pm 1$  Hertz. The drive shall be capable of providing a variable frequency output of 0 to 50 Hertz proportional to a 4 to 20 mA or 0 to 10V input signal obtained from a field sensor/transmitter. Adequate ventilation shall be ensured for continuous operation at the maximum ambient temperature specified by the manufacturer. Drives shall be capable of operating in ambient temperatures of 45 deg. C without any derating. Display shall be graphical, alphanumeric, 6 line and back lit. Drive shall have two level password protection for read & write to prevent unauthorized access. All power, control and instrument cabling shall be provided and installed as described elsewhere in this specification. Drives shall have Bacnet IP for integrating with third party BMS. VFDs shall have harmonic filters, RFI filters and shall have energy (kW-hr) measurement. Harmonics shall not exceed 5% wrt to voltage and 35% wrt to current. Shall be suitable for integrating with a third party BMS system.

#### **5. HOT WATER GENERATOR:**

##### **5.1. Codes & Standards:**

- The design, materials, manufacture, testing & performance of Hot Water Generator & Humidifier shall comply with all currently applicable codes, regulation & standards in the locality where the equipment is to be installed. The Hot Water Generator shall also conform to the latest application of Indian Standards.

##### **5.2. Constructional Feature of Hot Water Generator:**

- Hot Water Generator shall have fresh water connection, drain water connection within the AHU room. Hot water generator vessels shall have lining with SS 304 10 G. Tubular heating element made of 80% nickel & 20% chromium, control module, controllers, powder coated 16 G CRCA steel sheet, insulated with 50 mm thk. 24 Kg/cub. mt. fiberglass glass clad with aluminum sheet, temperature control, high temperature cut off, low water cut off, contactors, fuses, MCCB disconnect switch, pilot lamp & alarm package, etc. Heating element shall be sheathed with incoloy. A Flow switch shall be installed at the outlet to prevent operation of the



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hot water generator when there is no water flow. Hot water generators shall have Vernier / SCR control to provide infinitely variable heating from 0 to 100%.

- Shall be suitable for integrating with a third party BMS system.

### **5.3.Controls & Accessories:**

The hot water generator will be provided and not limited to following controls & accessories.

- Thermometers at inlet & outlet (Range 0 -100 °C)
- Pressure gauge with ball valve at inlet & outlet (Range 0 to 7 Kg/cm<sup>2</sup>.)
- Flow switch, float switch, automatic alarm for low water level and high temperature with independent indication lights.
- Pressure relief valves.
- Inlet & outlet pipes with flanges.
- Drain points with valves.
- Descaling valves.
- Automatic air vent.
- Thermostat for individual heater banks or step controllers.
- Safety thermostat.

### **5.4.Pressure Testing:**

- The hot water generator shall be tested in the factory at 250 PSI

### **5.5.Insulation:**

- The hot water generator shall be insulated with 50mm thick fiber glass of density 24 Kg / m<sup>3</sup> & clad with 0.5 mm aluminum sheet on Ms Frame welded on generator body.

### **5.6.Painting:**

- The external surface of the shell shall be de-rusted, cleaned & applied with one coat of primer & finally painted with two coats of finish paint.

## **6. END SUCTION PUMPS:**

- They shall be base mounted, single stage, end suction design with a foot mounted valve. Pump volute shall be Class 30 CI. Impeller shall be cast bronze enclosed type, dynamically balanced. Internally flushed mechanical seal with ceramic seal seat and carbon seal ring



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suitable for continuous operation shall be provided. Replaceable bronze shaft sleeve shall completely cover the wetted area under the seal.

- Pumps shall be rated at 175 psi working pressure. Volute shall have gauge tapings, vent and drain tapings.
- Motor shall meet NEMA specifications. Motor and pump shall be factory aligned. It shall be suitable to work in an open area with 110 deg. F ambient temperature. Base plate shall be of structural steel or fabricated steel channel with fully enclosed sides and ends and securely welded cross members. A flexible type, center design drop out coupler, capable of absorbing tensional vibration shall be used between the pump & motor. Coupler shall be shielded by a coupler guard. Pump set shall be factory painted with weather protected paint. Pumps shall be rated at 175 psi working pressure. Volute shall have gauge tapings, vent and drain tapings.
- Motor shall meet NEMA specifications. Motor and pump shall be factory aligned. It shall be suitable to work in an open area with 110 deg. F ambient temperature. Pump set shall be factory painted with weather protected paint. These should be Direct coupled design eliminates stub shaft, oiled bearing and coupling, reducing maintenance.
- The hot water pumps shall include thermal insulation & cladding.

#### **7. PAN HUMIDIFIER:**

- A pan type humidifier of required capacity as specified in the bill of quantities shall be provided. The pan type humidifier shall be constructed from 1 mm thick stainless sheet SS-304 with top cover open able for maintenance. The humidifier shall be complete with quick fill, make up overflow & drain connections. The humidifier shall be insulated with fiberglass of density 32 kg / cm<sup>2</sup> & shall be clad with aluminum sheet. The humidifier is divided in two chambers from inside, one bank of heater is always kept on to maintain water temperature between 60 to 70 °C with the thermostat. All controls such as low level cut out, thermostat, float valve shall be provided. It shall be factory wired & tested. The humidifier shall have its own powder coated electrical panel made of 16 G CRCA sheet complete with contactors, MCB, Low level cut out, Heating thermostat, fault indicating lamp, high temperature cut out etc. & internally wired. Humidistat shall be supplied along with pan humidifier to maintain RH within +/- 5%.
- Shall be suitable for integrating with a third party BMS system.

#### **8. PAN HUMIDIFIER PIPING WITH INSULATION:**

- Humidifier piping shall be of 25 mm dia MS Class 'C' ERW piping with welded construction as per the piping specifications. Humidifier piping shall be insulated with 13 mm thk. Class 'O' closed cell nitrile rubber insulation. Insulation shall have built in glass cloth for physical



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protection and UV protection. Alternatively self-adhesive glass cloth shall be wrapped circularly over the insulation. Manufacturer recommended adhesive shall be used wherever required. 100 mm long PVC sleeve shall be provided over the insulation at supports. Piping shall be clamped over the insulation with GI clamps at every 1.5 mt. distance. Humidifier piping shall be tested for leaks before commissioning. Same insulation specification shall be followed for all valves and accessories in the humidifier piping.

### **9. PIPING WORKS:**

- The scope of this section comprises the supply and laying of all piping works, chilled water piping, drain piping, allied works like fixing of valves and other accessories involved in this project.

#### **MATERIAL:**

- All chilled water shall be of MS **Class C** ERW pipe and shall conform to IS 1239 Standards & joints shall be welded.
- All piping 450 mm dia. and over, shall be fabricated using MS plates of thickness indicated below:

#### **Pipe dia – mm**

- 150 mm dia.
- 200 mm dia.
- 250 & 350 mm dia.
- 400 & above

#### **Thickness – mm**

- : MS Class 'C' as per IS 1239 Part - I
- : 6 mm as per IS 3589
- : 6 mm as per IS 3589
- : 7 mm as per IS 3589

#### **Pipe Fittings dia( mm)**

- Up to 150 mm dia.
- Above 150 mm dia.

#### **Specification**

- : MS to IS 1239 Part - II
- : To be fabricated from parent pipe

Pipe Flanges as per IS 6392 Table 17.

### **FABRICATION AND INSTALLATION:**

- The ends of pipe lengths to be welded shall be cut square by saw or cutter and the edges beveled to form a 'V' groove before welding.



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- The contractor shall design adequately all brackets, saddles, clamps, hangers, etc., and be responsible for structural safety and integrity. Further, while providing the supports, care shall be taken to ensure freedom from vibration.
- All supporting arrangements including necessary suspenders, brackets, rods, bolts and nuts, etc., and all civil work related thereto - including drilling of holes for fixing grip bolts and any chipping and finishing, shall be included within the scope of the work of the contractor and shall be carried out under the scope of HVAC system.
- All MS angles, channels, rods, brackets, etc., used for supporting arrangements shall be provided with a coat of red-oxide primer both before and after placing them in position. All supports shall be finally painted with two coats of black enamel paint.
- Vertical risers shall be parallel to walls and column lines and shall be straight and plumb. Risers passing from floor to floor shall be supported at each floor by clamps or collars attached to pipes and transmitting the load to the structure through 12 mm (1/2 ins.) Thick rubber pad or any suitable resilient material. Where pipes pass through terrace floor, suitable flashing shall be provided to prevent leakage. Risers shall also have a suitable elbow or concrete pipe support at the lowest point.
- Pipe sleeves of 50 mm & larger in diameter shall be provided wherever pipes pass through walls or structures and the annular space shall be filled with felt and finished with retaining rings to isolate any vibrations from being transmitted to walls/structures. Fire sealant shall be used wherever is required.
- Insulated piping shall be supported in such a manner as not to put undue pressure on the insulation. 14 G GSS shall be provided between the insulation and the clamp, the saddle or roller extending at least 100 mm on either side (of the clamp, saddle or roller). The method of support shall be approved by the Consultants / Project Managers. PUF saddles of 120 kg/cub. Mt. shall be used for supporting the piping on the channels / concrete pedestals. PUF saddles shall be painted with bituminous paint.

#### **SUPPORT SPACINGS:**

The following spacing is recommended for the pipe supports:

<b>Pipe dia – mm</b>	<b>Spacing of Supports - Mtr</b>
➤ 19 to 25 mm	1.80
➤ 32 to 150 mm	2.40
➤ 150 mm & above	2.40

#### **10. PIPING INSULATION**



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## 10.1 CHILLED WATER PIPING WITH INSULATION FOR ABOVE GROUND LEVEL:

Chiller water piping, Joints, fittings, valves and other accessories in the chilled water line shall be insulated with PUF pipe sections of 75 mm / 50 mm / 30 mm thk. Thickness and specifications as per boq. PUF pipe sections shall be stuck to the pipe with hot bitumen and all joints shall be sealed with bitumen. Polythene paper shall be wrapped over the insulation. All joints of polythene sheet shall be sealed with self-adhesive tape. 24 G x 12 mm chicken wire mesh shall be wrapped and tied over the polythene paper. Aluminum cladding shall be done with 24 G aluminum sheet.

## 10.2 HOT WATER PIPING WITH INSULATION FOR ABOVE GROUND LEVEL:

Hot water piping, Joints, fittings, valves and other accessories in the hot water line shall be insulated with one layer of 32mm thk. Class 'O' Closed cell nitrile rubber insulation. Class 'O' closed cell nitrile rubber insulation having density of 40 to 60 Kg/cub.mt. Insulation shall be stuck to the pipe with hot bitumen and all joints shall be sealed with bitumen. Polythene paper shall be wrapped over the insulation. All joints of polythene sheet shall be sealed with self-adhesive tape. 24 G x 12 mm chicken wire mesh shall be wrapped and tied over the polythene paper. Aluminum cladding shall be done with 24 G aluminum sheet.

## 11. VALVES:

### 11.1. BUTTERFLY VALVES:

- Butterfly valves shall be of slim seal, short wafer type with standard finish. The valves shall be suitable for mounting between flanges drilled to ANSI 125. The valve body shall be cast iron. The disc shall consist of disc pivot and driving stem. The disc shall move in bearings on both ends with 'O' Ring to prevent leakage. The seat shall be moulded black nitrile rubber or nylon. The valves shall have pressure rating of PN 16 shall be complete with flow control lever and notches, factory machined companion flanges, bolts & nuts. The valves shall have a long spindle to accommodate insulation on the chilled water piping.

### 11.2. Y-STRAINERS:

- "Y" strainers up to 50 mm shall be of gunmetal and above 50 mm shall be of cast iron / SG iron body. Strainers shall incorporate a removable bronze screen with 3 mm perforations and a permanent magnet. Strainers shall be provided with flanges at both inlet and outlet. They shall be designed to enable blowing out the accumulated dirt and facilitate removal / replacement of screen without disconnecting the main pipe. Ball valve shall be provided on the strainer to remove the dirt without opening the flange. Strainers shall be rated for pressure



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rating of PN16. These valves shall have insulation with the same specifications of pipe insulation.

### **11.3. NON-RETURN VALVES:**

- Check valves shall be of Dual plate check valves with CI body, aluminum-bronze plates, SS 316 hinge pins, springs & Buna-N seals to ANSI series 125. The check valves shall have pressure rating of PN 16. The Non-Return valves shall be of PN 16 rating. The valves shall be installed with threaded nipples with unions / flanges as required for easy removal. These valves shall have insulation with the same specifications of pipe insulation.

### **11.4. GATE VALVES / GLOBE VALVES / BALL VALVES:**

- Gate valves of smaller diameter shall be made of gun metal with screw ends. In case of ball valves, the rotating ball shall be made of SS. All such valves shall be supplied with I.S.I marking. Valves shall have Teflon seating. The valves shall be installed with threaded nipples with unions / flanges as required for easy removal. These valves shall have insulation with the same specifications of pipe insulation. The pressure rating of the valves shall be PN 16.

### **11.5. FLANGES & UNIONS:**

- Sufficient number of flanges and unions shall be provided as required to facilitate the maintenance work after the piping is installed. Necessary gaskets shall be used. These shall be insulated with the same specifications of pipe insulation.

### **11.6. PRESSURE GAUGES:**

- Pressure gauges shall not be less than 100 mm dia. Industrial type pressure gauges with gun metal/ brass valves. Chilled water pipe insulation shall not be damaged during removal and refixing of pressure gauge.

### **11.7. THERMOMETERS:**

- These shall not be less than 100 mm dia. The mercury in glass industrial type thermometer. Chilled water pipe insulation shall not be damaged during removal and refixing of the thermometer.





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### **11.8. BALANCING VALVES:**

- Manual Balancing Valve with built in measuring facility with CI body flanged construction with EPDM coated disc with long pitch, with insulation, with matching flanges, gasket, bolt & nuts, insulation, etc. Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16.

### **12. 3 WAY MOTORIZED CONTROL VALVE:**

- 3-way motorized Control Valve for chilled water application , having efficient flow characteristics with copper alloy metal gun body and disc must be copper alloy rod and bars EPDM diaphragm screw and unique connections. This includes smart actuator with provision of fail safe opening provision ( manual operation button with lock) , Actuator should be provided with appropriate enclosure to protect from rain,with required supports and accessoires like flanges, bolts, nuts | gaskets, pressure rating PN 25. It should have a provision of an auto closing module able to set the valve to Zero signal position when the AHU motor is stopped which includes integrating cables between AHU starter , Actuator and thermostat . Consider that the starters are having one no spare NC point. The control cable qty within 12 rmt per AHU to be included . Actuator Voltage either 24V AC/DC, control signal either 0-10 V DC or 4-20 ma. Vendor to submit the selection for approval. Necessary temperature controllers shall be provided for maintaining the required return air / exhaust air temperature.
- Shall be suitable for integrating with a third party BMS system.

### **13.FLEXIBLE CONNECTORS::**

- The flexible connectors shall be with AISI 321 SS corrugated tubing with AISI 304 SS single overbraid & SS fittings.

### **14.PRESSURE INDEPENDENT DYNAMIC BALANCING VALVES:**

- Dynamic balancing valves shall be supplied and installed as shown in the drawings. The valves shall be capable of dynamic / automatic balancing of water, controlling flow of chilled water depending on the return air temperature and metering of the chilled water flow. Valves shall be compatible with BMS. Necessary actuators shall be supplied with the valve. Digital thermostat or temperature controller shall be provided with required wiring inside the AHU room or near the valve. Valves shall get closed when the AHU is switched OFF. Pressure



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rating of the valves shall be PN 16. Shall be capable of integrating with a third party BMS system.

- Shall be suitable for integrating with a third party BMS system.

#### **15. FULLY AUTOMATIC BALANCING VALVES:**

- Balancing valves shall be supplied and installed as shown in the drawings to ensure proper balancing of water. The balancing valves shall be fully automatic. Irrespective of upstream pressure, automatic balancing valves shall maintain the designed flow and shall not exceed the designed flow. Pressure rating of the valves shall be PN 16. Shall be suitable for integrating with a third party BMS system.

#### **16. DRAIN PIPING:**

- CPVC drain piping shall be used for the drain piping. Proper care shall be taken to lay the drain piping with sufficient slope and should be clamped or supported at 1.5 m interval. All drain pipe joints shall be done with adhesive. Drain piping should be tested for leaks before commissioning. Drain piping shall be insulated with 9 mm thk. Wherever specified in the BOQ. Closed cell nitrile foam insulation shall have the density of 40 to 60 kg/m<sup>3</sup>. Insulation joints shall be finished with self-adhesive tape procured from the same supplier.

#### **17. PRESSURISED EXPANSION TANK:**

- It shall be a vertical precharged diaphragm type pressure vessel. It shall be designed to absorb the expansion forces of heating / cooling system water while maintaining proper system pressurization under varying operating conditions. It will be made out of carbon steel shell and heavy duty butyl rubber diaphragm. Maximum design pressure and temperature shall be 125 PSI and 115 deg.C Tank shall have a charging valve. Expansion tank shall be supplied with a make up water pumping station with two pumps. One shall be working and the other shall be stand by. Necessary fittings and valves shall be part of the expansion tank. Expansion tank shall have PN 16 pressure rating.

#### **18. AIR SEPARATOR:**

- The centrifugal type air separator. The unit shall have (NTP/Flange/grooved) inlet and outlet connections tangential to the vessel shell. An NPT vent connection shall be fitted to the top of the vessel to enable installation of piping. Air separator shall have all steel body construction.

#### **18.1. MATERIALS CONSTRUCTION:**



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- Steel –ANSI 150# flange Construction,All steel body construction,Stainless steel strainer

### **18.2.MAXIMUM OPERATING CONDITIONS:**

- Maximum working pressure: 125 psig (8.8 bar)  
150 psig (10.5 bar)
- - Maximum Operating temperature: 350 deg.F/177 deg.C

### **18.3.FEATURES:**

- Designed, constructed and tested at works,Tangential design with low velocity vortex action,Flanged or grooved pipe connectors,Removable stainless steel strainer available,Blowdown connection to enable cleaning od unit and strainer.NPT vent connection.Connection sizes 1” to 24”.

### **19.MOTORIZED BUTTERFLY VALVES:**

- Motorized Butterfly Valves with The valves shall be suitable for mounting between flanges drilled to ANSI 125. The valve body shall be cast iron. The disc shall consist of disc pivot and driving stem. The disc shall move in bearings on both ends with ‘O’ Ring to prevent leakage. The seat shall be moulded black nitrile rubber or nylon. The valves shall have pressure rating of PN 16 shall be complete with flow control lever and notches, factory machined companion flanges, bolts & nuts. The valves shall have a long spindle to accommodate insulation on the chilled water piping..Motorized Butterfly Valves with CI body,SS Disc,O-ring and minimum PN-16 rating,Conforming to BS5155,IS13095 with IP-55 actuator,capable of accepting upto 10V DC and upto 20mA electric signal and providing similar transduced feedback output to control system as required.Duly insulated to the same specifications as the connected piping.
- Shall be suitable for integrating with a third party BMS system.



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**LIST OF APPROVED MAKES**

S. NO.	ITEM	APPROVED MAKES
1	Chillers	York / Trane / Carrier / Climaveneta / Blue Star/Equivalent
2	Hot Water Generators	Emerald / KEPL / Rapid Cool/Equivalent
3	Pumps	Xylem / Grundfos / Armstrong/Equivalent
4	Variable Frequency Drives	Danfoss / ABB / Schneider/Equivalent
5	Pipes	TATA / Jindal / SAIL/Equivalent
6	Butterfly Valves	Audco / Intervalve / Advance / L&T/Equivalent
7	Ball Valves	Sant / Leader / Kitz/Equivalent
8	Check Valve	Advance / Intervalve / Audco / L&T/Equivalent
9	Y Strainers / Suction Guides	Sant / Emerald / Armstrong/Equivalent
10	Automatic Balancing Valve	Flowcon / T&A / Danfoss/Equivalent
11	Dynamic Balancing Valve	Flowcon / T&A / Danfoss/Equivalent
12	Motorized Butterfly Valve	Siemens / Sauter / Belimo / Jhonson / Honeywell/Equivalent
13	Cabling	Universal / Finolex / CCI / Polycab/Equivalent
14	Thermometers	Baumer / H Guru/Equivalent
15	Pressure Gauges	Baumer / H Guru/Equivalent
16	Automatic Air Vents	Anergy / Emerald/Equivalent
17	PUF Pipe Sections	Beardsell / Lloyds / Hyderabad Insulation/Equivalent
18	Flexible Connectors	Dunlop / Resistoflex / Cori/Equivalent
19	Communication Cable	Universal / Finolex / CCI / Polycab/Equivalent
20	Control Cable	Universal / Finolex / CCI / Polycab/Equivalent
21	Pan Humidifiers	Rapid Cool / Emerald / KEPL / Matrusree/Equivalent
22	CPVC pipes	Sudhakar / Astral / Supreme/Equivalent
23	Nitrile Rubber Insulation	Armacell / K Flex / Alp Aeroflex/Equivalent
24	Anchor Fasteners	Shakti / Fischier / Hilti/Equivalent
25	Open HDPE Expansion Tank	Syntex/Equivalent
26	3 way motorized valves	Honeywell / Sauter / Jhonson / Siemens / Belimo/Equivalent
27	Pressurise Expansion Tank	Anergy/KD accessories/Equivalent
28	Air Separator	Anergy/KD accessories/Equivalent



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### **STANDARDS**

1. IS: 659 - Safety Code for A/C System
2. IS: 1239 Part I – MS Tubes & Pipes
3. IS: 1239 Part II – Pipe Fittings
4. IS: 3589 – MS pipes
5. IS: 6392 – Pipe Flanges
6. IS: 5312 – Check Valves
7. IS: 8183 – Thermal Insulation Mineral Wool
8. IS: 325 - 3 phase induction motor
9. IS: 277 - Galvanized steel sheet (plain & corrugated) wire for fencing
10. IS: 2379 - Color code for identification of pipelines
11. IS: 3103 - Code of Practice for industrial Ventilation
12. ASHRAE Standards for Health Care
13. Carrier System Design Manual
14. JCI Standard for Hospitals.
15. ISO 14644 Cleanroom classification standards.



## **MEASUREMENTS METHODOLOGY**

Mode of Measurement for payment of items of piping & their insulation shall be as follows:

### **1.PIPING:**

- Shall be measured in units of length along the centerline of installed pipes including all pipe fittings, flanges (with gaskets and nuts and bolts for joining), unions, bends, elbows, tees, concentric and/or eccentric reducers, inspection pieces, expansion loops etc. The above accessories shall be measured as part of piping length along the centerline of installed pipes and no special rates for these accessories shall be permitted. The quoted unit rates for center line linear measurement of piping shall include all wastage, allowances, pipe supports includes hangers, MS channel, wooden bunches, nuts and check nuts, vibration isolator suspension where specified or required, and cost of excavation, bedding back filling and finishing as required to complete the piping installation as per the specification. None of these items will be separately measured and paid for. However, all valves (gate/globe/butterfly/check -balancing/purge/drain etc.), strainers, orifice plates, temperature gauge, pressure gauges shall be separately measured and paid as per their individual unit rates, which shall also include their insulation as per specifications, piping measurements shall be taken before application of the insulation. The cost shall also include any excavations and making masonry valve chamber with steel cover etc.

### **2.PIPE INSULATION:**

- Shall be measured in units of length along the centerline of the installed pipe, strictly on the same basis as the piping measurements described above. It may be noted that for piping measurements, all valves, orifice plates and strainers are separately measurable and their quoted unit rates shall include the insulation cost in the valve required and as specified.

## **TESTING PROCEDURE AT SITE**

### **1.GENERAL:**

- The Contractor must perform all inspections and tests of the system as a whole and of components individually as required, under the supervision of the Engineer, in accordance with the provisions of the applicable 'ASHRAE' standards or approved equal and as per site requirements. All tests shall be recorded in the format approved by the Consultant/Owner.



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## **2.PIPING SYSTEM PRESSURE TESTING & CHEMICAL FLUSHING:**

- In general pressure tests shall be applied to piping only before connection of equipment and appliances. In no case shall piping, equipment appliances be subjected to pressures exceeding their test ratings. Tests shall be completed and approved before insulation is applied. After tests have been completed, the system shall be drained and cleared of all dust and foreign material. All strainers, valves and fittings shall be cleaned of all dirt, fillings and debris. All water piping shall be tested and proven tight under hydrostatic pressure of 10 Kg/Sq cm, unless stated otherwise in the specifications. The prescribed pressure shall be maintained at least three complete days of 24 hours each.
  - Fill the system with clean water and drain the water after 30 minutes.
  - Refill the system with clean water and run the chilled water pump for 2 hours.
  - Open the drain valves in the main lines and drain the water completely. Clean the strainers.
  - During the flushing process the drain valves shall be kept open while the pump is running, until the water appears clean.
  - Close all the drain valves.
  - Refill the system with clean water and add chemicals in required quantities as per Specialist supplier's instructions).
  - Samples of solution shall be collected from various parts of the system to ensure the chemical solution has reached all parts of the system.
  - Run the pump and circulate the water (with chemicals added) for a minimum period of 24 hours as per specialist supplier's recommendations
  - .After the cleaning process is completed as described above the cleaning solution shall be flushed out.
  - The entire system is re-filled with fresh and clean water and treated with corrosion and scale inhibiting treatment chemicals as approved.

## **3.ELECTRICAL EQUIPMENT:**

All electrical equipment shall be cleaned and adjusted at site before connection of power. The contractor as per relevant IS/IE rules shall carry out the following minimum tests:

- Wire and Cable continuity tests. Insulation resistance test between phase to phase, phase to earth and phase to neutral on all circuits and equipment, using a 1000 volt Megger. The earth resistance between the conduit system and earth must not exceed half (0.5) ohm. The phase rotation tests. Operating tests on all protective relays to



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prove their correct operation before energizing the main equipment including secondary injection test at site. Operating tests on all starters, circuit breakers etc.,

#### **4.PERFORMANCE TESTS:**

- The installation as a whole shall be balanced and tested upon completion and all relevant information shall be submitted to the owner. Electrical current reading in Amperes of full and average load running and starting together with name plate current in each electrical motor. Daily records should be maintained of hourly readings, taken under varying degrees of internal heat load and use and occupation, of wet and dry bulb temperatures, upstream 'ON-COIL' of each cooling coil. Also suction temperatures and pressures for each refrigerating unit. The current and voltage drawn by each machine. Any other reading shall be taken which the Engineer may subsequently specify.

#### **5.ACCEPTANCE TEST AND SEASONAL TESTS:**

- After completing all installation works, commissioning, water balancing and air balancing, acceptance tests shall be conducted for 24 hours recording temperature, humidity, equipment inlet & outlet conditions, power consumption readings, etc. Necessary schedules with test formats shall be submitted for approval before starting the test.
- Seasonal test shall be done for 24 hours during warranty period when peak summer and peak monsoon occurs recording all the above readings.
- The above tests shall be repeated if major abnormality is observed during the tests in achieving the conditions or functioning of equipment.
- Sufficient manpower with tools and tackles shall be arranged for successful completion of the above tests. Necessary data loggers shall be used during the tests for recording various readings





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SECTION-VI

ANNEXURES

ANNEXURE I

FORM OF PERFORMANCE GUARANTEE (BY BANK GUARANTEE)

1. In consideration of the TIFR-Hyderabad, Hyderabad having agreed under the terms and conditions of Letter of Intent / Agreement No..... dated..... made between and..... (Here in after..... called "the said Contractor{s}") for the work ..... (Here in after called "the said Letter of Intent / Agreement") having agreed to production of a irrevocable bank Guarantee for Rs..... (Rupees ..... only), as a security / guarantee from the contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement, we .....(Indicate the name of the Bank) (hereinafter referred to as "the Bank") Here by undertake to pay to TIFR an amount not exceeding Rs. .... (Rs only) on demand by TIFR.

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

3. We, the said bank, further undertake to pay to TIFR any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) in any suit or proceeding pending before any Court or Tribunal relating thereto, our liability under this present being absolute and unequivocal. The payment made by us under this bond shall be a valid discharge of our liability for payment thereunder and the Contractor(s) shall have no claim against us for making such payment.

4. We (indicate the name of Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of TIFR under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till Engineer-in-charge on behalf of the TIFR certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.

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

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

7. We..... (indicate the name of Bank) lastly undertake not to revoke this guarantee except with the previous consent of TIFR in writing.

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

Signed and sealed

Dated the ..... day of..... for..... (indicate the name of Bank) \*(Note: The Letter of Intent shall form part of the Agreement)



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**ANNEXURE II**

**UNDERTAKING BY THE TENDERER**

I / We have read and examined the Tender document including terms & conditions, specifications, Schedule of quantities, drawings and designs, general rules & directions, General Conditions of Contract, Special Conditions of Contract and all relevant other documents, publications and rules referred to in the Conditions of Contract and all other contents in the tender documents for the work.

I / We, hereby tender for execution of the work specified for the TIFR-Hyderabad, Hyderabad within the time specified and in accordance in all respects with the specifications, designs, drawings and instructions in writing.

We agree to keep the tender open for seventy five (75) days from the last date of its submission and not to make any modifications in its terms and conditions. A sum of Rs..... has been deposited in cash / receipt treasury challan / deposit at call receipt of scheduled bank / fixed deposit receipt of scheduled bank / demand draft of a scheduled bank / Bank Guarantee issued by a Scheduled Bank as earnest money. If I / we, fail to furnish the prescribed performance guarantee within prescribed period, I / we agree that the said TIFR-Hyderabad, Hyderabad or its authorized officer shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely. Further, if I / we fail to commence work as specified, I / we agree that the TIFR-Hyderabad, Hyderabad shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said earnest money and the performance guarantee absolutely, otherwise the said earnest money shall be retained by TIFR- Hyderabad, Hyderabad towards security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein.

Further, I / We agree that in case of forfeiture of earnest money or both Earnest Money & Performance Guarantee as aforesaid, I / We shall be debarred for participation in the re-tendering process of the work.

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

Seal & Signature of Contractor Postal Address

Dated

Witness Address Occ



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**ANNEXURE-III**

**CERTIFICATE OF LOCAL CONTENT**

\*We [name of manufacturer] hereby confirm in respect of quoted item(s) that local Content is equal to or more than 50% and come under 'Class-I Local Supplier' Category. As being 'Class-I Local Supplier', we are eligible for Purchase Preference under 'Make in India' Policy vide Gol Order No.P-45021/2/2017-PP (B.E.-II) dated 15.06.2017 (subsequently revised vide orders dated 28.05.2018, 29.05.2019 and 04.06.2020)

OR

\*We [name of manufacturer] hereby confirm in respect of quoted items(s) that Local Content is more than 20% but less than 50% and come under 'Class-II Local Supplier' Category.

The details of the location (s) at which the local value addition made is / are under:

1. ....

2. ....

Date:

Seal & Signature of the Bidder

**NOTE:**

Self-certification that the item offered meets the minimum local content (as above) giving details of the location(s) at which the local value addition is made in case the bidder wishes to avail the benefits under the make in India policy, if applicable.

In cases of procurement for a value in excess of Rs.10 crores, the local supplier shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the 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 to avail the benefits under the make in India policy, if applicable.



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ANNEXURE-IV

**TECHNICAL DATA SHEET**

**1. AIR COOLED CHILLER:**

SL.NO.	PARAMETER	DETAILS
<b>1</b>	<b>GENERAL:</b>	
1.1	Manufacturer	
1.2	Country of Origin	
1.3	Model	
1.4	Capacity at specified conditions(TR)	
1.5	Refrigerant	
1.6	Dimensions (L x W x H in mm)	
1.7	Operating Weight (Kg.)	
1.8	Refrigerant Qty. (Kg.)	
1.9	Micro Processor Panel	
	Display: No. of digits per line	
	Display: No. of lines	
1.10	Compatible for integration with third party BMS	
1.11	Type of starter	
1.12	Noise Level (dB A) @ 3 mt. distance	
1.13	Shall be suitable for primary chilled water flow and variable condenser water flow	
<b>2</b>	<b>POWER CONSUMPTION DETAILS:</b>	
<b>2.1</b>	<b>At AHRI Conditions:</b>	
	IKW / TR at 100%	
	IKW / TR at 75%	
	IKW / TR at 50%	
	IKW / TR at 25%	
	COP at 100% Load	
	IPLV (IKW/TR)	
<b>2.2</b>	<b>At Tender Conditions With AHRI Relief:</b>	
	IKW / TR at 100%	
	IKW / TR at 75%	
	IKW / TR at 50%	
	IKW / TR at 25%	



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	COP at 100% Load	
	NPLV (IKW/TR)	
<b>2.3</b>	<b>At constant CWET:</b>	
	IKW / TR at 100%	
	IKW / TR at 75%	
	IKW / TR at 50%	
	IKW / TR at 25%	
<b>3</b>	<b>Motor</b>	
3.1	Make	
3.2	Type	
3.3	Model	
3.4	Full Load Current (Amp)	
3.5	Starting Current (Amp)	
3.6	Locked Rotor Current (Amp)	
3.7	Power Factor @	
	100% Load	
	75% Load	
	50% Load	
	25% Load	
<b>4</b>	<b>Compressor</b>	
4.1	Make of compressor	
4.2	Type of compressor	
4.3	No. of circuits	
4.4	No. of compressors	
4.5	Type of loading and steps	
4.6	Type of unloading and steps	
<b>5</b>	<b>Evaporator</b>	
5.1	Type of construction (DX / Flooded)	
5.2	Fouling Factor (British Units)	
5.3	Chilled Water Temp. in deg. F	
5.4	Chilled Water Temp. out deg. F	
5.5	Water Flow (USGPM)	
5.6	Water Pressure Drop (PSIG)	
5.7	Water Connection Size ( mm )	
5.8	No. of passes	



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5.9	Minimum chilled water flow (USGPM)	
<b>6</b>	<b>Condenser</b>	
6.1	Type of construction (DX / Flooded)	
6.2	Fouling Factor (British Units)	
6.3	Condenser Water Temp. in deg. F	
6.4	Condenser Water Temp. out deg. F	
6.5	Water Flow (USGPM)	
6.6	Water Pressure Drop (PSIG)	
6.7	Water Connection Size ( mm )	
6.8	No. of passes	
6.9	Minimum condenser water flow (USGPM)	

Note: Enclose the computer selection sheet at AHRI conditions, Tender Conditions and CEWT.

**2. HOT WATER GENERATOR:**

Sl.No	Parameter	Detail
	<b>Unit Make &amp; Model</b>	
<b>A</b>	<b>HWG Basic Design</b>	
1	HWG inlet Temp (Deg. C)	
2	HWG Outlet Temp (Deg. C)	
3	Hot Water Flow Rate (liters per second)	
4	Capacity (KW)	
5	Type	
<b>B</b>	<b>HRW Material of Construction</b>	
1	Shell	
2	Dishend	
3	Insulation	
4	Cladding	
5	Shell cabinet	
6	Base Frame	
7	Power requirement	
<b>C</b>	<b>Heaters:</b>	
1	Material	
2	Type	
3	Rating	



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4	No. Of Stages	
<b>D</b>	<b>Microprocessor</b>	
1	Controller	
<b>E</b>	<b>Controls &amp; Accessories</b>	
<b>F</b>	<b>Pressure Testing</b>	
<b>G</b>	<b>Electrical Control Panel</b>	
1	Mounting	
2	material of Construction	
3	Incomer	
4	Outgoing	
<b>H</b>	<b>Alarms</b>	
<b>I</b>	<b>Safeties</b>	
<b>J</b>	<b>GA drawing &amp; wiring SLD</b>	
<b>K</b>	<b>Painting</b>	

**3. PAN HUMIDIFIER:**

SI.No	Parameter	Detail
	Unit Make	
	Unit Capacity	
A	Material of construction	
1	Body	
2	Top Cover	
3	No. Of chambers from inside	
4	Unit mounting	
B	Insulation	
1	Material	
2	Density	
3	Cladding	
C	Heating element	
1	Material	
2	Warm Up Heater	
3	No.Of Banks	
4	Heaters for one bank	
D	Safeties	
E	Accessories	



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SI.No	Parameter	Detail
	Unit Make	
	Unit Capacity	
A	Material of construction	
1	Body	
2	Top Cover	
3	No. Of chambers from inside	
4	Unit mounting	
B	Insulation	
1	Material	
2	Density	
3	Cladding	
C	Heating element	
1	Material	
2	Warm Up Heater	
3	No.Of Banks	
4	Heaters for one bank	
D	Safeties	
F	Terminal Box	

**4.PUMPS:**

S.No	PARAMETER	DETAILS
	<b>Hot WaterPump</b>	
1	Make	
2	Model	
3	Type of pump	
4	Capacity (USGPM)	
5	Head (feet)	
6	Speed (RPM)	
7	BHP (Kw)	
8	Efficiency (%)	
9	Casing Material	
10	Impeller Material	
11	Seal	





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12	Motor (Kw)	
13	Type of Motor	
14	Speed of Motor	
15	Make of the motor	
16	Efficiency rating of the motor	
17	Efficiency of the motor (%)	
18	Overall Dimensions (mm)	
19	Operating Weight (Kg)	
	<b>CHW Primary Pump</b>	
1	Make	
2	Model	
3	Type of pump	
4	Capacity (USGPM)	
5	Head (feet)	
6	Speed (RPM)	
7	BHP (Kw)	
8	Efficiency (%)	
9	Casing Material	
10	Impeller Material	
11	Seal	
12	Motor (Kw)	
13	Type of Motor	
14	Speed of Motor	
15	Make of the motor	
16	Efficiency rating of the motor	
17	Efficiency of the motor (%)	
18	Overall Dimensions (mm)	
19	Operating Weight (Kg)	
	<b>CHW Secondary Pump</b>	
1	Make	
2	Model	
3	Type of pump	

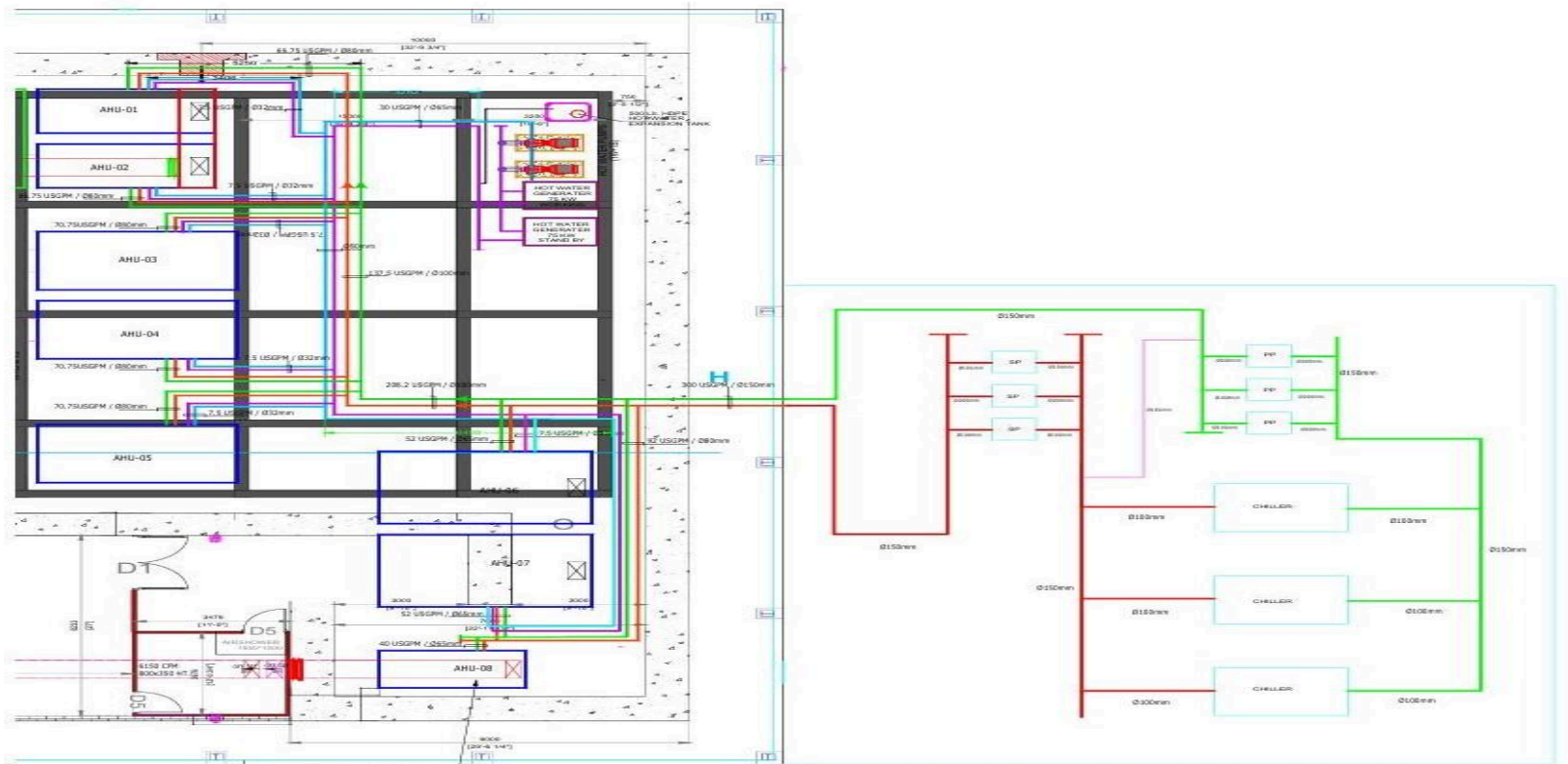


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4	Capacity (USGPM)	
5	Head (feet)	
6	Speed (RPM)	
7	BHP (Kw)	
8	Efficiency (%)	
9	Casing Material	
10	Impeller Material	
11	Seal	
12	Motor (Kw)	
13	Type of Motor	
14	Speed of Motor	
15	Make of the motor	
16	Efficiency rating of the motor	
17	Efficiency of the motor (%)	
18	Overall Dimensions (mm)	
19	Operating Weight (Kg)	
	<b>VFD</b>	
1	Make	
2	Model	
3	Type	
4	Power Rating	
5	IP Rating	
6	Type of Filters	
7	Harmonics w.r.t. Voltage	
8	Harmonics w.r.t. Current	
9	BMS protocol third party integration	

**CHILLER LAYOUT DRAWING**

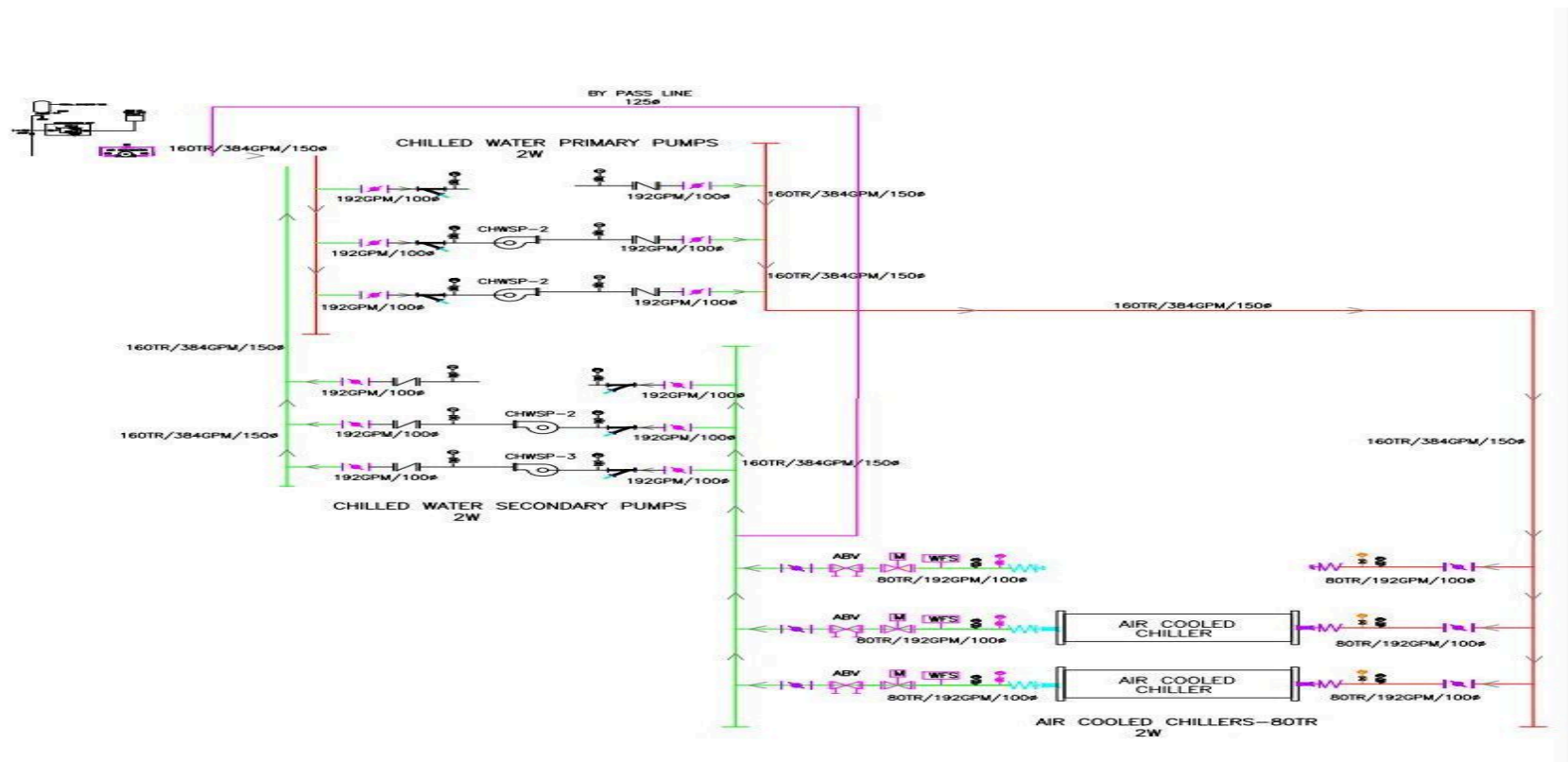




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### CHILLER-SCHEMATIC DRAWING





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SECTION-VII

FINANCIAL BID

## INVITATION OF BIDS FOR

**Supply, Installation, Testing and Commissioning of HVAC High side and Low side works for Petawatt Laser Facility, TIFR, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.**

### PART II

### FINANCIAL BID



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### SCHEDULE OF QUANTITIES

S. No.	Description	Unit	Quantity (A)	Rate(B)	Total(C=A*B)
1	Supply ,Installation, Testing and Commissioning, Charges including the customs clearance, transporting to site and positioning of 80 TR air cooled VFD screw chiller with R 134a refrigerant. Chillers on the concrete pedestal with spring vibration isolators, flow switch, Victaulic couplings / flanged connections, canopy for chiller control panel, BMS Compatibility, adaptor box for aluminum cable terminations, isolator in the power panel, etc. as per specification. Chillers shall be AHRI / Eurovent certified chillers. Chiller shall have a graphical microprocessor panel and shall be able to display all graphs, trends, etc. Chillers shall have protective wire guards for the compressor compartment and for condenser compartment. Chillers shall have a single isolating switch in the power panel. 80 TR capacity shall be actual delivered capacity under the specified conditions as given in the selection criteria. Chillers shall have front end active harmonic filters to restrict the	NO	02		



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	harmonics.Heat exchangers shall be as per ASME. Chillers shall be selected for chilled water in/out temp.:54/ 44 deg. F and ambient temperature of 110 deg. F and fouling factors on the chiller : 0.00025.				
2	Supply, Installation, Testing and Commissioning of vertical inline primary pumps with necessary grouting, foundation bolts, base frame, mechanical seal, bronze impeller, split coupling, coupling guard, IE4 TEFC motor, 1450 rpm speed, etc. Pump capacity shall be 192 USGPM @ 15 mt. head. Pump shall be fully assembled and delivered to site.	NO	2		
3	Supply, Installation, Testing and Commissioning of vertical inline secondary pumps with necessary grouting, foundation bolts, base frame, mechanical seal, bronze impeller, split coupling, coupling guard, IE4 TEFC motor, 1450 rpm speed, etc. Pump capacity shall be 192 USGPM @ 20 mt. head. Pump shall be fully assembled and delivered to site. Pumps shall be built in VFD. Harmonics shall be less than <5% wrt voltage and <35% wrt current.	NO	2		
4	Supply, Installation, Testing and Commissioning of Pump Logic Controller for Sr. No. 3 secondary pumps of 3 No.s with BMS compatibility and panel to accommodate logic	NO	1		



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	controller with power cabling, control cabling, etc. Panel shall be fully assembled and should be delivered. Panel shall be floor mounted and shall have provision for fresh air and exhaust fans.				
5	Supply, Installation, Testing and Commissioning of DP Sensors ( 3 sets) to install on chilled water piping (secondary pump side) at critical locations and to be connected to pump logic controllers with all the accessories required.	NO	1		
6	Supply, Installation, Testing and Commissioning of 3C x 1.5. sq.mm. twisted cable or required cable in GI conduit as required for DP sensor. Cable needs to be laid from DP sensor to pump logic controller. Necessary signal boosters shall be considered.	RMT	100		
7	Supply, installation, testing and commissioning of 75KW Hot Water Generator with fresh water connection, drain water connection, etc. to be located within the AHU room. Hot water generator vessels shall have lining with SS 304 10 G. Tubular heating element made of 80% nickel & 20% chromium, control module, controllers, powder coated 18 G CRCA steel sheet, insulated with 50 mm thk. 24 Kg/cub.	NO	2		





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	mt. fiber glass & cladded with aluminium sheet, temperature control, high temperature cut off, low water cut off, contactors, fuses, MCCB disconnect switch, pilot lamp & alarm package, etc. Heating element shall be sheathed with incloy. Flow switches shall be installed at the outlet to prevent operation of hot water generators when there is no water flow. Hot water generators shall have Vernier / SCR control to provide infinitely variable heating from 0 to 100%..(1 Working+1StandBy).				
8	Supply, installation, testing and commissioning of horizontal / vertical monoblock end suction / multistage pump set for hot water recirculation complete with TEFC motor, base plate, vibration isolators, mechanical seal, SS shaft, bronze / SS impeller, etc. conforming to technical specification. The hot water pumps shall include thermal insulation & cladding.Flow : 30 USGPM, Head : 15 M..(1 Working+1StandBy).	NO	2		
9	Supply,installation, testing and commissioning of 3KW pan humidifiers with actuator, SS tank, fresh water connection, overflow connection, drain connection, humidistat for controlling the RH within $\pm 5\%$ , supports, etc., of the	NO	7		



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	following capacities. Pan humidifier shall be suitable for integration with a stand alone controller. Shall be allowed to operate manually also. Air flow switch shall be provided to switch off the pan humidifier in case of no air flow.				
10	Supply, installation, testing and commissioning of MS Class C ERW piping of diameter 25mm with fittings, supports, etc. for steam from pan humidifier. Piping shall be insulated with 13 mm thk. tube nitrile rubber insulation and shall have factory laminated glass cloth or shall be finished with self adhesive glass cloth applied circularly over the insulation.	RMT	30		
11	Supply, Installation, Testing and Commissioning of M.S class'C' ERW chilled water pipe of diameter 150mm with supports, fittings, flanges, etc.The pipes of sizes 150 mm & below shall be M.S.'C' class as per IS:1239 and pipes sizes above 150mm shall be welded black steel pipe heavy class as per IS:3589.Pipe welding shall be carried out with valid 6G certified welders.	RMT	130		
12	Supply, Installation, Testing and Commissioning of M.S class'C' ERW chilled water pipe of diameter 125mm with supports, fittings, flanges, etc.The pipes of sizes 150 mm & below shall be M.S.'C' class as per IS:1239 and pipes sizes	RMT	20		



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	above 150mm shall be welded black steel pipe heavy class as per IS:3589.Pipe welding shall be carried out with valid 6G certified welders.				
13	Supply, Installation,Testing and Commissioning of M.S class'C' ERW chilled water pipe of diameter 100mm with supports, fittings, flanges, etc.The pipes of sizes 150 mm & below shall be M.S.'C' class as per IS:1239 and pipes sizes above 150mm shall be welded black steel pipe heavy class as per IS:3589.Pipe welding shall be carried out with valid 6G certified welders.	RMT	120		
14	Supply, Installation,Testing and Commissioning of M.S class'C' ERW chilled water pipe of diameter 80mm with supports, fittings, flanges, etc.The pipes of sizes 150 mm & below shall be M.S.'C' class as per IS:1239 and pipes sizes above 150mm shall be welded black steel pipe heavy class as per IS:3589.Pipe welding shall be carried out with valid 6G certified welders.	RMT	100		
15	Supply, Installation,Testing and Commissioning of M.S class'C' ERW chilled water pipe of diameter 65mm with supports, fittings, flanges, etc.The pipes of sizes 150 mm & below shall be M.S.'C' class as per IS:1239 and pipes sizes	RMT	115		



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	above 150mm shall be welded black steel pipe heavy class as per IS:3589.Pipe welding shall be carried out with valid 6G certified welders.				
16	Supply, Installation,Testing and Commissioning of M.S class'C' ERW chilled water pipe of diameter 50mm with supports, fittings, flanges, etc.The pipes of sizes 150 mm & below shall be M.S.'C' class as per IS:1239 and pipes sizes above 150mm shall be welded black steel pipe heavy class as per IS:3589.Pipe welding shall be carried out with valid 6G certified welders.	RMT	40		
17	Supply, Installation,Testing and Commissioning of M.S class'C' ERW chilled water pipe of diameter 40mm with supports, fittings, flanges, etc.The pipes of sizes 150 mm & below shall be M.S.'C' class as per IS:1239 and pipes sizes above 150mm shall be welded black steel pipe heavy class as per IS:3589.Pipe welding shall be carried out with valid 6G certified welders.	RMT	30		
18	Supply, Installation,Testing and Commissioning of M.S class'C' ERW chilled water pipe of diameter 32mm with supports, fittings, flanges, etc.The pipes of sizes 150 mm & below shall be M.S.'C' class as per IS:1239 and pipes sizes	RMT	110		



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	above 150mm shall be welded black steel pipe heavy class as per IS:3589.Pipe welding shall be carried out with valid 6G certified welders.				
19	Supply, Installation,Testing and Commissioning of RPUF TF pipe insulation for MS 'C' Class chilled water piping of diameter 150mm. Chilled water piping shall be insulated with 36 kg./cub.mt. density , 50 mm thickness insulation.Joints shall be finished with cold bitumen or fevicol. Insulation shall be covered with polythene paper, chicken wire mesh and 24 G aluminium cladding. Hi tech supports shall be provided over the insulation suspending from the ceiling.	RMT	130		
20	Supply, Installation,Testing and Commissioning of RPUF TF pipe insulation for MS 'C' Class chilled water piping of diameter 125mm. Chilled water piping shall be insulated with 36 kg./cub.mt. density, 50 mm thickness insulation.Joints shall be finished with cold bitumen or fevicol. Insulation shall be covered with polythene paper, chicken wire mesh and 24 G aluminium cladding. Hi tech supports shall be provided over the insulation suspending from the ceiling.	RMT	20		



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21	Supply, Installation, Testing and Commissioning of RPUF TF pipe insulation for MS 'C' Class chilled water piping of diameter 100mm. Chilled water piping shall be insulated with 36 kg./cub.mt. density, 30 mm thickness insulation. Joints shall be finished with cold bitumen or fevicol. Insulation shall be covered with polythene paper, chicken wire mesh and 24 G aluminium cladding. Hi tech supports shall be provided over the insulation suspending from the ceiling.	RMT	150		
22	Supply, Installation, Testing and Commissioning of RPUF TF pipe insulation for MS 'C' Class chilled water piping of diameter 80mm. Chilled water piping shall be insulated with 36 kg./cub.mt. density, 30 mm thickness insulation. Joints shall be finished with cold bitumen or fevicol. Insulation shall be covered with polythene paper, chicken wire mesh and 24 G aluminium cladding. Hi tech supports shall be provided over the insulation suspending from the ceiling.	RMT	75		
23	Supply, Installation, Testing and Commissioning of RPUF TF pipe insulation for MS 'C' Class chilled water piping of diameter 65mm. Chilled water piping shall be insulated with 36 kg./cub.mt. density, 30 mm thickness insulation. Joints	RMT	65		



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	shall be finished with cold bitumen or fevicol. Insulation shall be covered with polythene paper, chicken wire mesh and 24 G aluminium cladding. Hi tech supports shall be provided over the insulation suspending from the ceiling.				
24	Supply, Installation, Testing and Commissioning of 32mm thk. Class 'O' Closed cell nitrile rubber insulation for MS 'C' Class Hot water piping of diameter 40mm. Class 'O' closed cell nitrile rubber insulation having density of 40 to 60 Kg/cub.mt. Insulation shall be stuck to the pipe with hot bitumen and all joints shall be sealed with bitumen. Polythene paper shall be wrapped over the insulation. All joints of the polythene sheet shall be sealed with self-adhesive tape. 24 G x 12 mm chicken wire mesh shall be wrapped and tied over the polythene paper. Aluminum cladding shall be done with 24 G aluminum sheet.	RMT	30		
25	Supply, Installation, Testing and Commissioning of 32mm thk. Class 'O' Closed cell nitrile rubber insulation for MS 'C' Class Hot water piping of diameter 65mm. Class 'O' closed cell nitrile rubber insulation having density of 40 to 60 Kg/cub.mt. Insulation shall be stuck to the pipe with hot	RMT	50		



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	bitumen and all joints shall be sealed with bitumen.Polythene paper shall be wrapped over the insulation. All joints of the polythene sheet shall be sealed with self-adhesive tape. 24 G x 12 mm chicken wire mesh shall be wrapped and tied over the polythene paper. Aluminum cladding shall be done with 24 G aluminum sheet.				
26	Supply, Installation,Testing and Commissioning of 32mm thk. Class 'O' Closed cell nitrile rubber insulation for MS 'C' Class Hot water piping of diameter 50 mm.Class 'O' closed cell nitrile rubber insulation having density of 40 to 60 Kg/cub.mt. Insulation shall be stuck to the pipe with hot bitumen and all joints shall be sealed with bitumen. Polythene paper shall be wrapped over the insulation. All joints of the polythene sheet shall be sealed with self-adhesive tape. 24 G x 12 mm chicken wire mesh shall be wrapped and tied over the polythene paper. Aluminum cladding shall be done with 24 G aluminum sheet.	RMT	40		
27	Supply, Installation,Testing and Commissioning of 32mm thk. Class 'O' Closed cell nitrile rubber insulation for MS 'C' Class Hot water piping of diameter 32 mm.Class 'O' closed	RMT	110		





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	cell nitrile rubber insulation having density of 40 to 60 Kg/cub.mt. Insulation shall be stuck to the pipe with hot bitumen and all joints shall be sealed with bitumen. Polythene paper shall be wrapped over the insulation. All joints of the polythene sheet shall be sealed with self-adhesive tape. 24 G x 12 mm chicken wire mesh shall be wrapped and tied over the polythene paper. Aluminum cladding shall be done with 24 G aluminum sheet.				
28	Supply, Installation, Testing and Commissioning of 100mm Diameter Automatic Balancing Valve with matching flanges, gasket, bolt & nuts, insulation, etc. Pressure rating shall be PN 16	NO	3		
29	Supply, Installation, Testing and Commissioning of 80mm Diameter Manual Balancing Valve with built in measuring facility with CI body flanged construction with EPDM coated disc with long pitch with protected outpipe insulation with matching flanges, gasket, bolt & nuts, insulation, etc. Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16.	NO	5		
30	Supply, Installation, Testing and Commissioning of 65mm Diameter Manual Balancing Valve with built in measuring	NO	3		



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	facility with CI body flanged construction with EPDM coated disc with long pitch with protected outpipe insulation with matching flanges, gasket, bolt & nuts, insulation, etc. Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16.				
31	Supply, Installation, Testing and Commissioning of 32mm Diameter Manual Balancing Valve with built in measuring facility with CI body flanged construction with EPDM coated disc with long pitch with protected outpipe insulation with matching flanges, gasket, bolt & nuts, insulation, etc. Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16.	NO	7		
32	Supply, Installation, Testing and Commissioning of 80mm Diameter electronic, self-balancing, pressure independent type dynamic balancing valve with integrated 2 way modulating control valve in a single body. The actuator shall be capable of accepting upto 10V DC and upto 20mA electric signal and shall provide similar transduced feedback output to control system. Maximum close off pressure shall not be less than 6 Bar for upto 50 mm valves and 7 Bar for 65mm above. Duly insulated to the	NO	5		



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भारत सरकार के परमाणु ऊर्जा विभाग की स्वायत्त संस्था एवं समविश्वविद्यालय  
(An Autonomous Institute of the Department of Atomic Energy,  
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सर्वेक्षण संख्या 36 / पी, गोपनपल्ली गांव, सेरिलिंगमपल्ली मंडल, रंगारेड्डी जिला, हैदराबाद - 500 046  
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	same specifications as the connected piping.Valves should have pressure rating of 25Bar Minimum.				
33	Supply, Installation,Testing and Commissioning of 65mm Diameter electronic,self-balancing,pressure independent type dynamic balancing valve with integrated 2 way modulating control valve in a single body.The actuator shall be capable of accepting upto 10V DCand upto 20mA electric signal and shall provide similar transduced feedback output to control system.Maximum close off pressure shall not be less than 6Bar for upto 50mm valves and 7Bar for 65mm above.Duly insulated to the same specifications as the connected piping.Valves should have pressure rating of 25Bar Minimum.	NO	3		
34	Supply,Fixing,Testing and Commissioning of following sizes 100mm Diameter Motorized Butterfly Valves with CI body,SS Disc,O-ring and minimum PN-16 rating,Conforming to BS5155,IS13095 with IP-55 actuator,capable of accepting upto 10V DC and upto 20mA electric signal and providing similar transduced feedback output to control system as required.Duly insulated to the same specifications as the connected piping.	NO	3		



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35	Supply, Installation, Testing and Commissioning of 150mm Diameter Butterfly valve (Manual) with CI body SS Disc, Nitrile Rubber Seal & O-Ring with matching flanges, bolt & nuts, extended stem etc. Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16..	NO	5		
36	Supply, Installation, Testing and Commissioning of 100mm Diameter Butterfly valve (Manual) with CI body SS Disc, Nitrile Rubber Seal & O-Ring with matching flanges, bolt & nuts, extended stem etc. Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16.	NO	18		
37	Supply, Installation, Testing and Commissioning of 80mm Diameter Butterfly valve (Manual) with CI body SS Disc, Nitrile Rubber Seal & O-Ring with matching flanges, bolt & nuts, extended stem etc. Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16.	NO	14		
38	Supply, Installation, Testing and Commissioning of 65mm Diameter Butterfly valve (Manual) with CI body SS Disc, Nitrile Rubber Seal & O-Ring with matching flanges,	NO	14		



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	bolt & nuts, extended stem etc. Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16.				
39	Supply, Installation, Testing and Commissioning of 100mm Diameter Y Strainers of Ductile CI Body flanged ends with SS strainer matching flanges, gasket, bolts & nuts, insulation, etc.Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16	NO	6		
40	Supply, Installation, Testing and Commissioning of 80mm Diameter Y Strainers of Ductile CI Body flanged ends with SS strainer matching flanges, gasket, bolts & nuts, insulation, etc.Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16	NO	5		
41	Supply, Installation, Testing and Commissioning of 65mm Diameter Y Strainers of Ductile CI Body flanged ends with SS strainer matching flanges, gasket, bolts & nuts, insulation, etc.Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16	NO	5		
42	Supply, Installation, Testing and Commissioning of 32mm Diameter Y Strainers of Ductile CI Body flanged ends with	NO	7		



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	SS strainer matching flanges, gasket, bolts & nuts, insulation, etc. Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16				
43	Supply, Installation, Testing and Commissioning of 100mm Diameter dual plate non return valve with matching flanges, gasket, bolts & nuts, insulation, etc. Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16.	NO	6		
44	Supply, Installation, Testing and Commissioning of 65mm Diameter dual plate non return valve with matching flanges, gasket, bolts & nuts, insulation, etc. Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16.	NO	2		
45	Supply, Installation, Testing and Commissioning of 100mm Diameter flexible connections at inlet and outlet of coolers and pumps with matching flanges, gaskets, control unit, bolt & nuts, etc. Pressure rating shall be PN 16.	NO	6		
46	Supply, Installation, Testing and Commissioning of 65mm Diameter flexible connections at inlet and outlet of coolers and pumps with matching flanges, gaskets, control unit,	NO	8		



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	bolt & nuts, etc. Pressure rating shall be PN 16.				
47	Supply, Installation, Testing and commissioning of 32mm Diameter 3 way motorized valve to control the hot water flow based on relative humidity. Valves shall be supplied with actuator, humidistat, transformer if required, control and power cabling, etc. Valve shall be suitable to maintain RH within +/- 5%. Valve shall be capable of integrating with BMS. Duly insulated to the same specifications as the connected piping. Pressure rating shall be PN 16.	NO	7		
48	Supply, Installation, Testing and Commissioning of 32mm Diameter globe valves with flanges/nipples, supports, bolt & nuts. Valve Diameter shall be made of gun metal with screw ends. And the rotating ball shall be made of SS. Insulation shall be similar to insulation of hot water piping insulation. Valves shall be of PN 16 rating	NO	7		
49	Supply, Installation, Testing and Commissioning of 4 inch Diameter Dial type thermometers with copper thermo well mounting box, extend capillary, etc. Thermometer shall be of complete SS. All internals, casing, etc. Pressure rating shall be PN 16	NO	34		



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50	Supply, Installation, Testing and Commissioning of 4 inch Diameter Dial type pressure gauge with isolating ball valve with insulation. Pressure gauge shall be of complete SS. All internals, casing, etc. Pressure rating shall be PN 16.	NO	34		
51	Supply, Installation, Testing and Commissioning of 32mm Brass Ball valve for equipment connections, drain with necessary fitting, threaded nipples, dummy caps, etc. Pressure rating shall be PN 16.	NO	14		
52	Supply, Installation, Testing and Commissioning of 25mm Brass Ball valve for equipment connections, drain with necessary fitting, threaded nipples, dummy caps, etc. Pressure rating shall be PN 16.	NO	20		
53	Supply, Installation, Testing and Commissioning of 5/8 Inch auto air vents with isolating ball valves.	NO	6		
54	Supply, Installation, Testing and Commissioning of 3/8 Inch auto air vents with isolating ball valves.	NO	4		
55	Supply, Installation, Testing and Commissioning of 80mm drain piping of CPVC with 9 mm thick nitrile foam insulation & all fittings, supports and clamps including drilling, wall	RMT	75		





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	chipping etc. and conceal the wall opening wherever required.				
56	Supply, Installation, Testing and Commissioning of 50mm drain piping of CPVC with 9 mm thick nitrile foam insulation & all fittings, supports and clamps including drilling, wall chipping etc. and conceal the wall opening wherever required.	RMT	50		
57	Supply, Installation, Testing and Commissioning of 40mm drain piping of CPVC with 9 mm thick nitrile foam insulation & all fittings, supports and clamps including drilling, wall chipping etc. and conceal the wall opening wherever required.	RMT	30		
58	Supply, Installation, Testing and Commissioning of Closed loop expansion tank of capacity 500 lts with two pumps, make up tank and accessories, valves, insulation and controls etc. for chilled water. Shall be of PN16 pressure rating.	NO	1		
59	Supply, Installation, Testing and commissioning of centrifugal air separator to be installed in the chilled water piping with flanges, valves, gaskets, bolt & nuts, supports,	NO	1		



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	insulation, etc. Air separator shall be installed in 150 mm Diameter chilled water piping. Air separator shall be PN 16 rating				
60	Supply, Installation, Testing and Commissioning of HDPE expansion tank of 500 lit. with fresh water connection, drain, overflow, float valve, etc. for hot water. Shall be installed in the Plant room with necessary supports.	NO	2		
61	Supply, Fabrication, Installation, Testing and Commissioning of structural supports with MS channels, angles, pipes, etc. with one coat of primer and two coats of final enamel paint. This item is only for supports inside the pump room and near the AHUs. All other supports shall be part of the respective item.	KGS	1500		
<b>SUB-TOTAL (D)</b>					
<b>GST @ 18% (E)</b>					
<b>GRAND TOTAL (D+E)</b>					
<b>Amount in words Rupees.....Only</b>					



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**NOTE:**

1. Please mention the item rate in figures and also in words.
2. Rates are all inclusive of profit, Transport, Loading & Unloading, Shifting Taxes, Etc.
3. TIFR, Hyderabad has the right to delete any of the above items from scope of work or may increase/reduce quantities as per its requirement during execution of work. No claim or compensation for such deletion/increase/decrease will be accepted/paid to the contractor. Payment will be made as per actual quantities executed at tender rates.
4. Manufacturer's warranty of respective supply items to be provided.
5. For any above item quantity exceeding more than 10% of projected qty, contractor shall take prior approval from TIFR Engineer in writing.
6. For any deviating items, the contractor shall take prior approval from TIFR Engineer In charge with proper rate analysis.