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Ref: IMSc / New Building C.T Enquiry / 2024

09.04.2024

To:

Sir,

Kindly send your competitive Quote / rate for the following new FRP Cooling tower which is to be installed in New Institute building packaged AC system. You are requested to inspect our existing cooling tower and the air conditioning systems and send your **sealed quotations** to reach us **on or before 23.04.2024**. The Institute reserves the rights to reject any or all the quotations without assigning any reason. It is requested that Manufacturers / dealers / contractors should quote their rates in below given space only. It is mandatory to indicate our reference number and due date in the top of your envelopes. If any clarification, contact our number : Mr. S.MOHAN, Scientific officer (Electrical), 044- 22543300.

Item No	Description	Qty	Unit	Rate in Rs.	Amount in Rs.
1.	Supply, Installation, Testing and Commissioning of rectangular / square, Top throw Induced draft counter flow more energy efficient NEW FRP Cooling tower of 100 TR Capacity with adequate capacity top mounted direct driven, axial flow IP 55, CLASS F motor assembly and its all accessories including removal of existing bharpur cooling tower. The new cooling tower shall complete with FRP basin bottom out let sump , MS / SS 304 Motor mounting frame assembly in top , PVC fills, air intake louvers, water distribution system including header pipes & spray nozzles, fan blade assembly, hot / cold water connections, overflow, drain & equalizer piping connections, MS hot dip Galvanized frame and supporting structures for the cooling tower, damaged existing pipeline modifications and supply & fixing of new valve to the new cooling tower, GI Flanges for inlet and out let pipe line connections, MS hot dip Galvanized metal ladder, drift eliminator etc. located on roof,				

<p>quick fill, float valve, drain valve, SS 304 bolts & nuts, GI sturdy mesh filter and Sump of FRP Complete with neat work man ship, necessary metallic base from for the installation of entire cooling tower systems, antivibration mounting, hot dipped galvanized suction strainer with all accessories and as specified in Annexure-1. The quoted rates shall be inclusive of GST , Transport charges, unloading and shifting of the materials to the place of installation etc. (Contractors are requested to inspect our site and refer required technical specifications placed in annexure sheets before quote their rates. This cost includes shut-down and commissioning charges of the entire works).</p> <p>Preferrable make: Advance / Paharpur / Star / Technically equivalent</p>	1	set		
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Final Amount : Rs.....

(Amount in words:)

Vinayalatha S.

Registrar 9.4.2024

[Signature]

For and on behalf of the Director,
IMSc.

(Signature of Contractor / Vendor with seal and Address)

ANNEXURE - 1:

I. **Description of Item:**

Design, fabrication, Supply, installation, testing and commissioning of Top throw induced draft, counter flow FRP cooling towers (square / round type) with FRP basin with all accessories. This cooling tower would be installed over the roof of the existing pump room including removal of existing cooling tower, modification of bottom civil works suitable for new cooling tower, modification of existing water pipelines, supply and fixing of new butterfly valve suitable for the new cooling tower and as directed by engineer in charge.

II. **Detailed technical specifications & quantity:**

General Information :

Application : Condenser water cooling for air conditioning purposes.

No. of cooling towers required : 01 set.

Location : Outdoor

Duty : Continuous operation

Type : Induced draft counter flow

Design Parameters:

Cooling capacity required : 100 TR (each)

Hot water temperature : 36.4 °C

Cold water temperature : 32.2 °C

Wet bulb temperature : 29 °C

Range : 4 °C

Water flow : 1510 LPM.

Atmospheric condition : Dusty, hot and humid

Working Pressure : 2 to 3 bar.

Inlet water flow : 1510 LPM.

Tower Details :

Type of cooling tower : Induced draft square counter flow,
electrically operated top throw with motor.

Material of construction : FRP / HDG - MS structure.

Material of Basin : FRP.

Fills :

Material of fills : PVC.

Type : Honeycomb.

Colour : Black or Blue.

Operating temperature : 55 Deg. C.

Electric Motor:

Type : Vertical, flange mounted extended shaft motor, squirrel cage
TEFC weather-proof induction motor suitable for 415 V, 50 Hz,
with Class F insulation and IP 55 degree protection. 5HP, 710 RPM.

Drive : Direct Driven.

Make : Hindustan / EDL / Stak / Technically equivalent.
Motor Shaft : EN-8.

Fan Details:

Type : Axial Flow No. of fan : 01 .
No. of blades : 4 - 6.

Output conditions:

Evaporation Loss : < 0.59%.
Spray Loss : < 0.25%.
Drift Loss : < 0.2%.
Blow down Loss : < 0.4%.
Make up water requirement: 21600 per cell (Ltr per day).

Materials of construction:

Structure : FRP
Casing : FRP
Fills : Rigid PVC
Fills support : HDG steel
Nozzles : ABS
Fan blades : Cast Aluminium Alloy/Energy efficient FRP / Hot dipped heavily galvanized steel
Fan Hub : Cast Aluminium Alloy / Hot dipped heavily galvanized steel
Drift eliminator : PVC
Drift eliminator support : HDG steel
Nut,Bolt & washers : Stainless steels (SS-304)
Motor Shaft : EN-8
Ladder : HDG steel
Header pipe : PP with FRP coating
Motor stand : M.S.HDG
Quantity : 1 set with all accessories and components.

Codes and Standards :

The design, manufacture, inspection and testing and performance of the Cooling Tower as specified hereinafter shall comply with the requirements of all applicable latest Indian / British / American Standards and Codes of practice. The latest editions of the following standards and publications shall be followed in particular.

a) Cooling Tower Institution of USA, Bulletin ATP-105 : Acceptance Test Code for Industrial Water Cooling tower.

b) PTC-23:ASME Performance Test Code for Atmospheric Water Cooling equipment.

c) For Electrical, Civil Codes/ Standards refer respective Specification.

d) BS-4485.

Scope of work :

1. Design, Fabrication, supply and installation of cooling towers and integration with existing header lines of one numbers of 100TR Cooling towers considering the space constraint of existing layout.
2. Performance test at site.
3. Technical documents has to be supplied.

Design Requirements:

1. The Cooling Tower shall be designed for continuous operation to cool not less than the design flow of water from specified inlet temperature to outlet temperature at a design ambient wet bulb temperature as indicated to this specification.
2. All the components shall be capable of safe, proper and continuous operation at all cooling water flows up to and including those specified in the technical specification and shall be designed with regard to ease of maintenance, repair, cleaning and inspection.
3. The supplier under this specification shall assume full responsibility in proper design and operation of each and every component of the cooling tower as well as the cooling tower as a whole unit.
4. The Cooling Tower structure shall be of adequate strength to withstand the wind load and the effect of earthquake on the structure. Design wind pressure and horizontal/vertical seismic coefficient shall be taken while structure design.

Constructional features :

1. Casing and Louver :

- The Louvers shall be designed for air entry to the tower with low velocity for minimum pressure drop and less chance of re-circulation of moist air. To eliminate splash out, louvers shall slope to shed water inwards.
- The louvers and casing shall be made of material as specified in the Data

2. Fills :

- Cooling tower fills type and material shall be as specified in specification
- Design and arrangement of the fills shall be so as to expose high air/ water surface with minimum air pressure drop.

3. Fill Supports :

- Fills shall be supported at frequent intervals which shall minimize sag. Possibility of dislodgement and damage to fill materials as a consequence of induced vibration in the fill.

4. Drift Eliminations :

- Multi pass drift eliminators with minimum two pass zig zag path type shall be provided
- The eliminator frame shall be of rugged construction and shall be firmly secured to the structural frame to arrest vibration. Suitable access to the eliminator frame work from the basin should be provided for any maintenance or physical replacement of eliminator blades etc., when the particular cell is taken out for maintenance.

5. Fans & Accessories :

- The fans shall be multiple blade, axial flow type located for each cell above the top deck level of the cooling tower and the blades shall be individually fastened to the fan hub.
- The fan rotating assembly shall be statically balanced.
- Each fan blade shall be adjustable as to the degree of pitch and shall be of the material as indicated in specification . It shall be possible to vary blade pitch angle to + 5 degree.
- The fan shall be connected directly to the drive shaft of the electric motor.
- Bolts, nuts etc. for fan assembly and mounting shall be of adequate design for the duty envisaged and shall be made of material as indicated in the technical specification.
- The drive motors for fans shall be mounted outside the air stream i.e. outside the fan cylinder. The KW rating of the drive motor shall have at least 15% margin over maximum fan power consumption. The design and construction of the drive motor shall be in accordance with standard specification for AC motors.

The supplier shall furnish detailed schematic diagram of the cooling tower with their quotations. All components as supplied shall be clearly indicated in the supplier's quotation. A lay out diagram with all major dimensions of the tower shall be included in the offer.

Pre dispatch Inspection and testing

Authorized department representatives shall have the right to inspect at any stage of manufacture & construction, all materials, components & workmanship & testing of material. The supplier shall provide all facilities for inspection & testing without any extra cost to the purchaser.

- The manufacturer shall conduct the following minimum specific tests to ensure that the equipment shall conform to the requirements of this section and in full compliance with the requirements spelt out in applicable codes and standards.
- Material identification and testing of fan blades and hubs, all supporting structural assemblies, fill supports, all nuts and bolts, fan shafts, fills packs, nozzles and all other applicable components constituting each cooling tower.
- Dynamic balancing of drive shaft assembly and all other rotating components
- Measurement of proof strength and contour for each fan blade.
- Static balancing test, checking of fan blade moment weight and blade track variation of fan blades, with checking of pitching and blade tip variation at site.
- Complete assembly of drive shaft, Fan hub and Fan blades shall be statically balanced at Site.
- Hydro static testing of hot water distribution piping regulating valves and all other pressure parts at a pressure and duration as spelt out in this specification.
- Visual, dimensional checking of all components of each cooling tower.

Performance test at site:

1. After completion of erection and commissioning of the cooling tower, performance tests of each cooling tower shall be carried out by supplier in accordance with cooling tower Institute Bulletin No. ATC-105 "Acceptance Test Procedure for Industrial Cooling Tower". However the performance testing shall be based on permissible ambient inlet Wet bulb temperature, Range, CW flow etc. as per CTI code.
2. Supplier shall arrange all instruments, duly calibrated, required for performance testing.

3. The supplier shall assume full responsibility for proper design & operation of each & every component of the cooling tower as well as the cooling tower as a whole.
4. The supplier shall submit cooling tower performance test procedure as per ATC 105 for approval in the event of order & conduct the test as per the approved procedure.
5. Performance testing of cooling tower shall be done to demonstrate the guaranteed cooling water temperature at rated duty point.
6. All mounting and calibrating instruments required for site performance tests shall be arranged by the cooling tower supplier without any extra cost.

Prices, Taxes and other charges:

1. The supplier shall quote unit price for equipments as per the schedule of requirement furnished with the tender inquiry. The rate quoted shall cover the price for the main equipment's and component and all the accessories associated with it.
2. The price quoted shall be inclusive of packing, forwarding and transportation charges including insurance of the materials.
3. The quoted rates shall be inclusive of GST and other charges and IMSc will not .
4. No charges are payable by the department to the suppliers staff deputed to department site for installation and commissioning of the plant.
5. Payment terms for the supply, installation, erection and commissioning will be as per the terms and conditions.

Time schedule for supply and commissioning:

Supply of the cooling towers and all accessories, etc shall be within 2 months from the date of purchase order and installation and commissioning of the towers shall be within 3 months from the date of the purchase order.

Guarantee:

Performance Guarantee @ 5% of work order value shall be submitted within 15 days from the date of issue of letter of acceptance in the form of Fixed Deposit Receipt or Demand Draft or Bank Guarantee. (Extension of time for submission of Performance guarantee at the request of contractor shall be charged @ 0.1% per day of performance guarantee amount). This amount will be released after successful completion of the work.

- All materials, components, equipments, instruments etc as supplied shall be guaranteed for a period of 18 months from the date of dispatch or 12 months from the date of actual commissioning at department site (which ever is earlier).All items shall be guaranteed against material defects and manufacturing defects.
- The supplier shall furnish guarantee certificate for a minimum period of 12 months from actual date of commissioning and handing over the plant to department. Malfunctioning of any of the components, devices, instruments shall be rectified / replaced free of charge as the per the actual requirement.

Validity: The supplier's offer shall be valid for a minimum period of 120 days from the due date of opening of the quotation.

Payment Terms :

80% of the purchase order value will be paid against supply of the equipment and all the required accessories and 20% will be paid after the satisfactory commissioning and handing over of the plant to department.

Security deposit @ 2.5% of the Work order value shall be recovered from the bills. The security deposit amount recovered shall be released after completion of warranty period / against the submission of BG submission.

Income tax as applicable at source shall be deducted from the payments made. Contractor shall furnish his PAN No. and bank details along with a xerox copy of the same duly countersigned by him.

Note:

The supplier shall furnish the list and complete address of customers to whom they have supplied similar capacity units which are in operation. The supplier shall arrange a visit for department representative to one of their client to ascertain the plant performance. This will be one of the criteria for evaluation of offer.

The quotation shall be submitted by manufacturers / authorized firms only. The offers submitted by others will not be accepted.