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GOVERNMENT OF INDIA
भाभा परमाणु अनुसंधान केन्द्र
BHABHA ATOMIC RESEARCH CENTRE
ATOMIC FUELS DIVISION

Ref.: ***AFD/MWS/ENQ/18/108932*** Date: **07*.06.2018***

Sub: Design, fabrication, testing, supply and installation of Laboratory Fume Hood, Wet Scrubber and Exhaust Blower along with required Ducting.

Sealed quotation is invited for and on behalf of the President of India for design, fabrication, testing, supply, and installation of Laboratory Fume hood, Exhaust Blower and Wet Scrubber as per the specifications, terms and conditions given below:

A. Specifications:

1. Laboratory Fume Hood:

a. Mounting
Laboratory fume hood shall be bench type i.e., mounted on a bench/ stand with storage module in the lower half. The bench shall be fitted with level adjusting legs. The storage module shall be mounted on castor wheel and shall be removable for maintenance.

b. Size
   i. Overall dimensions with base cabinet: 1500 mm (W) x 900 mm (D) x 2400 mm (H)
   ii. Fume hood dimensions: 1500 mm (W) x 900 mm (D) x 1500 mm (H)
   iii. Fume hood inside dimensions: 1400 mm (W) x 650 mm (D) x 1100 mm (H)
   iv. Chemical storage base cabinet: 700 mm (W) x 500 mm (D) x 600 mm (H) – 2 Nos.

c. Material of Construction (MOC)

Fume hood shall be fabricated using GI sheet as per IS 277:2003 standard coated with chemical resistant epoxy powder coating. The sheet shall be pre- treated with 8 tank chemical processes followed by powder coating with chemical resistant epoxy powder. Powder coating thickness shall be 70- 80 µm.

d. Design
Fume hood shall be designed considering the relevant aerodynamic factors to minimize eddy currents and assure against air movement from the hood into the laboratory.

e. Front Top Panel
Front top panel shall be hinged and easily openable, so as to ensure easy access to electrical lighting fixtures for maintenance.

f. Sidewalls
Fume hood sidewalls shall be properly formed to present a smooth airfoil to the inflowing air. The hood interior lining shall be flush with the sides.

g. Sill
A radiused sill shall be provided. It shall be installed at the bottom of the hood opening and extend back under the sash. An open area of approximately 25 mm shall be present under the sill to direct air across the work surface at all sash positions.

h. Sash
The sash shall be vertical rising suitably counter balanced with pulleys and counter-weights. Toughened glass shall be used for sash having a thickness of minimum 4 mm. The sash shall be securely enclosed in a frame structure, welded and ground smooth at the corners. Sash operation shall be smooth and easy on timing belt. Clear openable height shall be ~750 mm.

i. Interior Lining
Interior lining material of the hood should be heat resistant, fire retardant, and resistant to vapors and fumes generated while handling of HCl, HNO_3, H_2SO_4 and HF acids and must form a smooth finish and easily cleanable panels. Panels shall be made of durable PRL of thickness 6 mm. ASTM flame spread index < 25.

j. Frame
A full rigid frame shall support the interior and exterior walls of the fume hood.

k. Working Surface
The working surface shall be recessed not less than 6 mm deep and have a raised area on all sides. Working surface shall be made from chemical resistant, splash and spillage proof granite having thickness of ~18 mm.

l. Chemical storage cabinets (2 N0s.)

Chemical storage cabinet shall be made from GI sheet of thickness 1 mm with highly corrosion resistant epoxy powder coating. Coating thickness shall be 60-80µm. Cabinet integral work walls shall be chemical resistant, heat resistant, smooth finish and easily cleanable panels made from PRL sheets. Two exhaust ports shall be connected to the fume hood exhaust system internally. It shall have one removable horizontal partition to store chemicals. PP trays shall be provided for chemical storage. Cabinets shall be on castors. Cabinet doors shall be fitted with durable "Roller catch" mechanism for locking.

m. Cable port
A port shall be provided at the bottom of fume hood so as to provide passage to cables from the hood to electrical sockets.

n. Electrical utility
4 Nos. of electrical sockets (6/16A, 230V, 50 Hz) of reputed make shall be provided outside the fume hood on bottom side. Electrical wirings shall be 'Fire Retardant Low Smoke Grade'.

o. Lighting
Hood shall be equipped with sufficient fluorescent lighting with flame-proof fitting. The light fixture shall be easily accessible from outside of the hood and shall be shielded from the hood interior by a laminated or tempered glass panel, and shall be vapor sealed. Lighting shall be designed so as to achieve illumination of ~ 400 lux at the working surface.

p. Airfoil
Airfoil shall be of aerodynamic design, horizontally mounted on the work top, and shall be made from Teflon coated AISI stainless steel 304.

q. Air by-pass mechanism
Hood shall be equipped with an air by-pass mechanism located above the hood face opening. By-pass louvers shall be directed upward away from the front of the hood and provide an effective barrier and deflector for flying debris from inside the hood. By-pass shall control the face velocity as the sash is lowered. Velocity of the air at any sash position shall never exceed three times the open face velocity. Air by-pass shall begin to operate when the sash is one-third to one-half closed.

r. Air flow measurement
The fume hood shall be equipped with a device to measure and monitor airflow. The system shall have a visual indicator of the hood face velocity. Additionally, adjustable low flow/caution alarm set points with audible buzzer or alarm are recommended. Air flow monitor shall have following features:
   i. Digital display of face velocity in m/sec or fpm
   ii. Audible alarm and LED indication.
   iii. Push button calibration and configuration
   iv. Plug- in connection for power supply and airflow sensor
   v. 3 programmable output relays

vi. 3 configurable inputs
vii. Communication port for local or PC network connection

s. Level adjusting screws
The fume hood shall have level adjusting bolts made from stainless steel to adjust the fume hood level by ± 10 mm.

t. Exhaust port
The fume hood shall have an exhaust port to exhaust fumes smoothly without any turbulence at exhaust port and with low noise level.

u. Flow control valve
The fume hood shall be fitted with flow control valve to regulate the air flow.

2. Wet Scrubber:

a. Fume hood shall be connected to exhaust blower through a suitably designed wet scrubber system.
b. The wet scrubber shall be capable of effectively scrubbing the acidic fumes/vapors coming from fume hood.
c. The wet scrubber shall occupy minimum floor space as possible.
d. Material of construction (MOC) of wet scrubber shall be stainless steel AISI 304L or poly propylene (PP) + FRP.
e. Detailed design of the wet scrubber, explicitly indicating inlet and outlet ports, construction details, and methodology/technique adapted to effectively scrubbing the incoming air from fume hood off any acidic vapors shall be supplied along with quotation supported by relevant drawings.
f. Total height of the wet scrubber shall be less than 3000 mm.

3. Exhaust Blower:

a. Exhaust blower and duct systems for hood are to be sized and designed to provide an average hood face velocity of 200 - 250 feet per minute, as measured at the face, with the sash wide open. Deviations in this value shall not be greater than 20% at any point across the hood face as possible. Blower capacity shall be worked out considering the distance between wet- scrubber and blower to be ~10 m.
b. Exhaust blower shall be located on the roof, or in an adequately ventilated area.
c. Blower shall have built-in starter of reputed make suitable to blower motor capacity.
d. Exhaust blower design, technical specifications and construction material details shall be supplied along with the quotation.

4. Ducting:

a. Ducting shall be provided for connecting the fume hood with wet scrubber and connecting wet scrubber to exhaust blower. Distance between wet-scrubber and blower to be ~10 m.
b. Material of construction of the ducting shall be stainless steel AISI 304L or PP and FRP.
c. Ductwork shall take the straightest route to the scrubber and blower, minimizing bends and horizontal runs. When elbows are necessary, they shall have proper centerline radius to minimize eddying and resistance to air flow.
d. Ductwork shall not enter the exhaust blower on an elbow. Exhaust blower shall be located suitably so that a negative pressure will be maintained in the ductwork and prevent escape of toxic material through holes and cracks in the duct.

B. Raw material clearance

All raw materials which will be used in fabrication shall be identified by the vendor and shall be tested as per relevant material specifications. Test certificates for the same shall be forwarded to BARC for review and approval.

C. Drawings & approval

Detailed design, drawings, material specifications, test certificates, and details of all electrical items with make to be submitted for user's approval before taking up the actual fabrication work.

Sizes and dimensions provided above are indicative hence the suppliers are requested to **visit the site before submitting the quotation**. The supplier would also be required to depute its engineer for final measurement at site after placement of work order and before preparation of drawings for approval.

D. Inspection & Testing

Fume hood must meet the testing criteria established by the American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) in ANSI/ASHRAE 110-2016, "Method of Testing Performance of laboratory Fume Hoods."

Fume hood with all the fittings shall be offered for inspection & trials as per order specifications to purchasers authorized representatives at supplier's works before dispatch. Complete functional testing of the set-up shall be demonstrated by the supplier.

E. Installation and commissioning:

Fabricated, tested and accepted set-up shall be installed and commissioned and performance demonstration at AFD, BARC, Trombay, Mumbai by the supplier.

F. Guarantee/ Warrantee:

The supplier shall provide guarantee/ warrantee for the period of ONE year from the date of installation against manufacturing defects.

G. Terms and conditions:

a. All dimensions/ details specified in the technical specifications are indicative. Hence, suppliers are requested to visit the site at Atomic Fuels Division, BARC, Trombay, Mumbai-400085 for on-site measurement and detailing, before submitting the quotation. Prior intimation of visit should be provided at least 2 days before visit to:

Name : Shri S Swami Naidu
Site : Atomic Fuels Division, BARC, Trombay, Mumbai – 400085
Contact : 022-2559 4966/4589
Email : ssnaidu@barc.gov.in

"Quotations from parties who have not visited the site and NOT having complete design, construction, and relevant technical details and specifications of bought-out components will NOT be considered for further evaluation"

b. The visit will be approved only after verification of credentials of the visitor. The visit may be carried out between **27/06/2018 to 29/06/2018,** i.e. between Wednesdays to Friday, 10:00 am to 6:00 pm. No visitor will be entertained **before 27/06/2018 and after 29/06/2018.**

c. The supplier and /or his personnel visiting for the above job should have valid police verification certificate to visit BARC, Trombay, Mumbai. **Entry permits will not be prepared for persons NOT having PVC**

d. The supplier and /or his personnel are not allowed to move inside BARC without the escort person from the department.

e. Personnel working at site should carry out cleaning of site and its surrounding at regular intervals and after completion of installation, maintain safe and hygienic work environment.

f. The fabrication, supply and installation jobs shall be completed within a period of 10 weeks after the placement of order.

g. The fabricated items are to be delivered, installed and commissioned at Atomic Fuels Division, BARC, Mumbai – 400085.

h. Payment shall be made after installation and commissioning of the supplied and fabricated set-up and satisfactory performance demonstration at site and on receipt of advance stamped receipt, delivery challan and bill in triplicate. The bill shall clearly indicate taxes, if any.

i. Quotations are to be printed in letter head / quotation format mentioning GST number and PAN of the firm.

j. BARC is the final consumer of the goods/services procured and does not intend to make any outward supply. BARC will not avail the benefits of Input Tax Credit and hence, the goods can be supplied without quoting the GSTIN of BARC, Mumbai on the invoice. The invoices taxed under GST, as per rates applicable under the GST Schedule of Rates, shall be admitted for payment.

k. The quotation should clearly mention the name of signatory and should bear company seal.

l. Quotations shall be sent only by Registered Post/ Speed Post.

m. There will not be any Free Issue Material (FIM).

H. Declaration to be submitted along with the offer.
The prospective supplier shall declare as to whether he has any relative working in BARC, or himself is an ex-employee of BARC, or has an ex-employee of DAE on his pay rolls.

I. The quotation, typed on a printed letter-head shall reach in a sealed cover super scribing enquiry no. and due date to the undersigned at the address given below on or before **06/07/2018** up to **1600 hrs.**

S. Swami Naidu
Atomic Fuels Division
Bhabha Atomic Research Centre
Trombay
Mumbai - 400085

Thanking you,

07/06/2018
(S Swami Naidu)
SA/C, MWS, AFD

7/6/'18
(M. M. Hussain)
Head, MWS, AFD
For & on Behalf of President of India