Ref. No. INST/12(341)/2017 - PUR Dated: 28th March, 2018

NOTICE INVITING TENDER

Dear Sir,

Sealed Quotations are invited on behalf of Director, INST Mohali for the Purchase of **Chemical Fumehood (Qty: 2)** for technical specification refer page no. 14 to 22 so as to reach latest by **23rd April 2018** on or before 2.00 pm. The Quotations will be opened on the same day at 3.00 pm in the presence of tenderers, if any:

Before quoting, please read the instructions and technical specifications carefully as enclosed.

Note: Please attach the copies of previous supply order to any Government Institutes/ autonomous bodies/ PSU, if any, with the quotation and provide the contact person and his contact Nos.

The tender form can also be downloaded from the websites www.inst.ac.in or www.eprocure.gov.in.

Yours faithfully

Sd/-
Head of Office

INSTRUCTIONS

i) Inquiry, if any, may be sent by Courier or Speed Post. INST will not be liable for any kind of postal delay.

ii) The Quotation Should be addressed to the Director INST, Mohali invariably giving on the envelop Quotation for _____, Reference No. With date and due date with time.

iii) The Quantity mentioned in this inquiry shall be deemed to be only approximate and will not in any manner be binding on the Institute.

iv) The quotation should be enclosed in a sealed envelope.

v) Firms will quote separately for each article.

vi) The rates offered should be FOR Mohali in case of firms situated outside Tricity and free delivery at the Institute premises in case of local firms.

vii) GST: The Institute is not exempted from the payment of GST. The rate (i.e., percentage of taxes applicable should be clearly indicated, wherever chargeable.

viii) In case of Ex-godown terms the amount of packaging forwarding freight etc. should clearly be indicated by percentage or lump sum amount. Current rate of Sales Tax/VAT must be mentioned. The institute is exempted from Customs and Excise Duty.

ix) The delivery period should be specifically stated. Ex-Stock and earlier delivery may be preferred.

x) The firms are requested to give detailed description and specifications together with the detailed drawings, printed leaflets and literature of the Article quoted.

xi) The name of the manufacturers and country of manufacture should also invariably be stated. In the absence of these particulars the quotation is liable for rejection.

xii) Quotation should have minimum validity of 90 days from the date of opening.

xiii) The rates quoted should be for each item separately otherwise your quotation is liable to be ignored.

xiv) Late or delayed quotation will not be accepted.

xv) Director has the right to reject to the quotations and to split up the requirements or change any or all the above conditions without assigning any reason.

Institute of Nano Science and Technology

Habitat Centre, Sector 64, Phase X, Mohali -160062, Punjab, India

Ph: +91-172-2210073/75; Fax: +91-172-2211074; E-mail ID: purchase@inst.ac.in

NOTICE INVITING TENDER

INST invites sealed quotations from the reputed manufacturers or their authorized dealers so as to reach this office on or before scheduled date and time for the instrument, as per specifications given in the Annexure attached. All offers should be made in English and should be written in both figures and words.

The bidders are requested to read the tender instructions carefully and ensure compliance with all specifications/instructions herein. Non-compliance with specifications/instructions in this document may disqualify the bidders from the tender exercise. The Director, INST reserves the right to select the item (in single or multiple units) or to reject any quotation wholly or partly without assigning any reason. Incomplete tenders, amendments and additions to tender after opening or late tenders are liable to be ignored and rejected.

1.	**Name of the Instrument**	Chemical Fumehood
2.	**Ref. No.**	INST/12(341)/2017 – PUR
3.	**Quantity required**	Two
4.	**EMD**	Rs. 7,500/- (Rupees Seven Thousand Five Hundred Only)
5.	**Tender Fee (Non-Refundable)**	Rs. 500/- (Rupees Five Hundred Only)
6.	**Time for completion of supply after placing purchase order**	One Month
7.	**Last Date of submission of Tender**	23rd April 2018 (Monday) before 2.00PM
8.	**Tender to be submitted at the following address**	The Director, Institute of Nano Science and Technology, Habitat Centre, Sector 64, Phase –X, Mohali, 160062, Punjab, India
9.	**Date and time of opening of bid**	23rd April 2018 (Monday) at 3.00PM

Note: The Institute shall not be responsible for any postal delay about non-receipt / non delivery of the bids or due to wrong address.

TERMS AND CONDITIONS

Important Conditions of the tender to be abide by the tenderer

1. **Due date**: The tender has to be submitted before the due date. The offers received after the due date and time will not be considered.
2. **Preparation of Bids**: The offer/bid should be submitted in single bid system (i.e.) Technical bid cum financial bid. **The Quotations should be valid for 90 days from the due date**. The Quotations duly sealed and super scribed on the envelope with the reference No. and due date, should be addressed to "**The Director, Institute of Nano Science and Technology, Habitat Centre, Sector 64, Phase –X, Mohali, 160062, Punjab**" so as to reach on or before the due date.

3. **Delivery of the tender**: The tender shall be sent to the addressee given in para 2 (above) either by post or by courier so as to reach our office before the due date specified in our Schedule. The offer/bid can also be dropped in the tender box on or before the due date specified in the schedule. The tender box is kept in Foyer area of INST.

4. **Opening of the tender**: The offer/bid will be opened by a committee duly constituted for this purpose. The bidders if interested may participate on the tender opening Date and Time. The bidder should produce authorization letter from their company to participate in the tender opening. Only one representative will be allowed to participate in the tender opening.

5. **Acceptance/Rejection of bids:** The INST reserves the right to reject any or all offers without assigning any reason.

6. **EMD**: Tender fee/EMD is to be obtained from the bidders except those who are registered with the Central Purchase Organisation, National Small Industries Corporation (NSIC) or the concerned Ministry or Department. The tenderer should submit Tender Fee/EMD amount as per tender ref. no. through NEFT/RTGS in INST Account. Account Details are as follows:
   - **a.** Name of Beneficiary: Institute of Nano Science and Technology (INST)
   - **b.** Account No. **2452201001102**
   - **c.** Name of Bank: **Canara Bank, Sector 34, Chandigarh**
   - **d.** IFS Code: **CNRB0002452**
   - **e.** MICR Code:**160015003**
   - **f.** Swift Code: **CNRBINBBFFC**

The details of transaction for EMD viz. Name of bidder firm, Tender Description, Transaction ID/No. of Transfer, Transaction date, Amount of Transaction, Name of Bank, Address of Bank shall be furnished by the tenderer on their letterhead separately along with their tender.

7. **Refund of EMD**: Bid securities of the unsuccessful bidders shall be returned to them at the earliest after expiry of the final bid validity and latest on or before the 30th day after the award of the contract**.** In case of successful Tenderer, it will be retained till the successful and complete installation of the equipment.

8. **Performance Security**: The supplier shall be required to submit the performance security in the form of irrevocable bank guarantee issued by any Indian Nationalized Bank for an amount which is equal to the 10% of Purchase value at the time of the installation of the equipment covering warranty period of the equipment and should be kept valid for a period of 60 days beyond the date of completion of warranty period.

9. **Reasonability of prices :**

Please quote best minimum prices applicable for a premier Research Institution. **The quoting party should give a certificate to the effect that** the quoted prices are the minimum and they have not quoted the same item on lesser rates than those being offered to INST to any other customer nor they will do so till the validity of offer or execution of the purchase order, whichever is later. We request you to fill the price reasonability certificate format in the enclosed file (Annexure "1")

The party must give details of identical or similar equipment, if any, supplied to any CSIR labs/DBT Institutes during last three years along with the final price paid and Performance certificate from them.

10. **Force Majeure:** The Supplier shall not be liable for forfeiture of its performance security, liquidated damages or termination for default, if and to the extent that, it's delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

- For purposes of this Clause, "Force Majeure" means an event beyond the control of the Supplier and not involving the Supplier's fault or negligence and not foreseeable. Such events may include, but are not limited to, acts of the Purchaser either in its sovereign or contractual capacity, wars or

revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes.

- If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such conditions and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

11. **Risk Purchase Clause**: In event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from the other source on the total risk of the supplier under risk purchase clause.

12. **Packing Instructions**: Each package will be marked on three sides with proper paint/indelible ink, the following:

    i. Item Nomenclature
    ii. Order/Contract No.
    iii. Country of Origin of Goods
    iv. Supplier's Name and Address
    v. Consignee details
    vi. Packing list reference number

13. **Delivery of Goods:**

Delivery should be given at **Institute of Nano Science and Technology, Habitat Centre, Sector - 64, Phase 10, Mohali** within a maximum of one month's time from the date of placement of purchase order.

14. **Delayed delivery:** If the delivery is not made within the due date for any reason, INST will have the right to impose penalty @ 0.5% per week and the maximum deduction is 10% of the contract value / price.

15. **Prices**: The price should be quoted in net per unit (after breakup) and must include all packing and delivery charges. The offer/bid should be exclusive of taxes and duties, which will be paid by the purchaser as applicable. However the percentage of taxes & duties shall be clearly indicated.

The price should be quoted without custom duty and excise duty, since INST is exempted from payment of Excise Duty and is eligible for concessional rate of custom duty. Necessary certificate will be issued on demand. **(Please refer Annexure – 2 for the price to be quoted).**

16. **Notices:** For the purpose of all notices, the following shall be the address of the Purchaser and Supplier.

i. ***Purchaser:*** The Director,
Institute of Nano Science and Technology,
Habitat Centre, Sector – 64, Phase X, Mohali – 160064.

ii. ***Supplier:*** (To be filled in by the supplier)
.....
.....
.....

17. **Resolution of Disputes**: The dispute resolution mechanism to be applied pursuant shall be as follows:

i. In case of Dispute or difference arising between the Purchaser and the supplier relating to any matter arising out of or connected with this contract, such disputes or difference shall be settled in accordance with the Indian Arbitration & Conciliation Act, 1996, the rules there under and any statutory modifications or re-enactments thereof shall apply to the arbitration proceedings. The dispute shall be referred to the Director, Institute of Nano Science and Technology (INST) Mohali and if he is unable or unwilling to act, to some other person appointed by him willing to act as such Arbitrator. The award of the arbitrator so appointed shall be final, conclusive and binding on all parties to this order.

18. **Applicable Law:** The place of jurisdiction would be Mohali (Punjab) INDIA.

19. **Right to Use Defective Goods**

If after delivery, acceptance and installation and within the guarantee and warranty period, the operation or use of the goods proves to be unsatisfactory, the Purchaser shall have the right to continue to operate or use such goods until rectifications of defects, errors or omissions by repair or by partial or complete replacement is made without interfering with the Purchaser's operation.

20. **Training**

The Supplier is required to train the designated Purchaser's technical and end user personnel to enable them to effectively operate the total equipment.

21. **Installation & Demonstration**

The supplier is required to do the installation and demonstration of the equipment within one month of the arrival of materials at the INST site of installation, otherwise the penalty clause will be the same as per the supply of materials.

22. **Warranty**: Minimum One Year Warranty shall have to be provided by the firm. The Warranty should be comprehensive on site.

23. **Taxes and Duties**

Suppliers shall be entirely responsible for all taxes, duties, license fees, octroi, road permits, etc., incurred until delivery of the contracted Goods to the Purchaser. However, GST in respect of the transaction between the Purchaser and the Supplier shall be payable extra, if so stipulated in the order.

24. **Payment**: 100% payment shall be made by the Purchaser after delivery, inspection, successful installation, commissioning and acceptance of the equipment at INST in good condition and to the entire satisfaction of the Purchaser and on production of unconditional performance bank guarantee as specified in Clause 8 of tender terms and conditions**.**

25. **User list:** Brochure detailing technical specifications and performance, list of industrial and educational establishments where the items enquired have been supplied must be provided.

26. **Manuals and Drawings**

- Before the goods and equipments are taken over by the Purchaser, the Supplier shall supply operation and maintenance manuals. These shall be in such details as will enable the Purchaser to operate, maintain, adjust and repair all parts of the works as stated in the specifications.
- The Manuals shall be in the ruling language (English) in such form and numbers as stated in the contract.

- Unless and otherwise agreed, the goods equipment shall not be considered to be completed for the purposes of taking over until such manuals and drawing have been supplied to the Purchaser.

27. **Site Preparation**: The supplier shall inform to the Institute about the site preparation, if any, needed for the installation of equipment, immediately after the receipt of the purchase order. The supplier must provide complete details regarding space and all the other infrastructural requirements needed for the equipment, which the Institute should arrange before the arrival of the equipment to ensure its timely installation and smooth operation thereafter.

    The supplier shall visit the Institute and see the site where the equipment is to be installed and may offer his advice and render assistance to the Institute in the preparation of the site and other pre-installation requirements.

28. **Acknowledgement**: It is hereby acknowledged that we have gone through all the conditions mentioned above and we agree to abide by them.

SIGNATURE OF TENDERER
ALONG WITH SEAL OF THE COMPANY WITH DATE

BID PARTICULARS

1. Name of the Supplier
   :_____
2. Address of the Supplier
   :_____
3. Availability of demonstration of equipment : Yes / No
4. Tender cost enclosed: : Yes/No if yes
5. Online EMD submission information enclosed : Yes / No if Yes

Sr. No.	Particulars	EMD Details	Tender Fee Details
i)	Transaction ID / UTR No.		
ii)	Transaction date:		
iii)	Amount of Transaction		
iv)	Name of Bank		
v)	Address of Bank		

6. Name and address of the Officer/contact person to whom all references shall be made regarding this tender enquiry.

Sr. No.	Particulars	Details
i)	Name:	
ii)	Address:	
iii)	Phone Number	
iv)	Fax	
v)	Mobile No.	
vi)	Email ID	
vii)	Website address	

Compliance statement for the tender specifications

Tender Ref No.: **INST/12(341)/2017 – PUR**

S.No.	Check list of documents/Undertakings	Yes/No	Remarks (give explanation if the answer is No)
1.	Is EMD details attached? (if applicable)		
2.	Is the bidder original equipment manufacturer (OEM)/authorised dealer?		
3.	If authorised dealer, recent dated certificate to this effect from OEM, attached or not?		
4.	Undertaking from OEM regarding technical support & extended warranty period		
5.	Validity of 90 days or not?		
6.	Price Reasonability Certificate enclosed as per format??		
7.	Undertaking from bidder regarding acceptance of tender terms & conditions		
8.	Whether list of reputed users (along with telephone numbers of contact persons) for the past three years specific to the instrument attached?		
9.	Does the instrument comply with all the specifications detailed? Attach a separate sheet showing compliance with the specifications and explanations thereto if the equipment varies from the requested specifications.		
10.	Whether free Installation, Commissioning and Application Training offered?		
11.	Whether comprehensive onsite warranty offered?		
12.	Whether Annual maintenance after expiry of comprehensive onsite warranty quoted separately?		
13.	Whether free of cost shifting of instrument from transit campus to main campus offered?		

Annexure – 1

PRICE REASONABILITY CERTIFICATE

This is to certify that we have offered the maximum possible discount to you in our Quotation No. _____ dated _____ for (Value Rs.) _____.

We would like to certify that the quoted price are the minimum and we have not quoted the same item on lesser rates than those being offered to INST to any other customer nor we will do so till the validity of offer or execution of purchase order, whichever is later.

Seal and Signature of the tenderer

Annexure - 2

Name of Equipment with Model No**:** _____

Name & Address of Manufacturer:_____

Price Quoted

A. <u>For Indigenous Equipment</u>

I. Cost of equipment (Rs.)_____

II. Taxes (GST@_____) (Rs.)_____

III. Any other charges (Rs.)_____

IV. Total cost of equipment (in Rs.) F.O.R, INST, Mohali _____

B. <u>For Imported Equipment</u>

I. Cost of equipment (In Foreign Currency) _____

II. Packing and Forwarding _____

III. FOB/FCA Price _____

IV. Freight charges upto Delhi Airport _____

V. Insurance (110% of the cost of the equipment) _____

VI. CIF/CIP upto Delhi Airport _____

Signature of Tenderer with date and seal

TECHNICAL SPECIFICATION FOR CHEMICAL FUMEHOOD WITH BASE CABINET

DESCRIPTION OF WORK

1.00 SUMMARY AND SCOPE

Required Specifications for Chemical Fume Hood with Base Storage Cabinet

Overall Fume Hood Dimension: 1800 mm L □ 850 mm D □ 2700 mm H [minimum].

Working Dimension: 1600 mm L □ 700 mm D □ 800 mm H [minimum].

Sink, Tap Water, Drainage: At least one sink made of chemical resistant material required inside the hood with inlet and outlet arrangement.

Base Storage Cabinet: Provision required.

Airflow Type: For Air Condition laboratories.

Construction and Material: Made of good quality steel covered with a sheet, that is chemical, heat, fire resistant and easily cleanable.

Ducting: Required [approximately 15-18 feet length], the fume extraction system should comprise a blower with dynamically balanced impeller fitted at the top of the fume chamber, PVC make ducting.
Baffle Arrangement: Airflow uniformity throughout the chamber with smooth and immediate exhaust of fumes.

Centrifugal Blower: Silent high efficiency remote blower is required. Blower capacity should be 1 H.P. 1 number or 1⁄2 H.P. 2 numbers. It should confirm international face velocity norms. The construction should be chemical and heat resistant.

Sash: Glass with opening for unobstructed usage in the fume hood.

Worktop: Table top with mild steel covered with GRANITE, which should be chemical and heat resistant.

Sink, Tap Water, Drainage: At least one sink made of porcelain required inside the hood with inlet and outlet arrangement.

Gas (Nitrogen, Argon etc) Lines: Provisions with regulators are must.

Lighting: Lighting system with explosion proof fluorescent lamp.

Air Flow Monitor: Required and/or with provision from company for routine inspection.

Scrubber: Required.

Electrical Connections: Minimum two 15 A combined with 5 A electrical plug points, should be installed in the left and right side walls of the cabinet.

Base Storage Cabinet Type: Should be compatible for chemical storage. Proper ventilation is required. The construction should be compatible to chemicals.

Accessories:

Furnishing and delivering all service outlets, accessory fittings, electrical receptacles and switches as listed in these specifications, equipment schedules or as shown on drawings. Fittings attached to the fume hood superstructure shall be mounted at the factory.

1.02 STANDARD FUME HOOD PERFORMANCE REQUIREMENTS

A. Fume hoods shall be of complete airfoil design to insure maximum operating efficiency. Foil sections at the front facias of the hood shall minimize eddying of air currents at the hood face and the rear baffle system shall minimize turbulence in the upper portion of the hood interior.

B. Standard Fume Hood Type Variable Air Volume:
The fume hoods shall be of the variable air volume type in which the exhaust air volume varies proportionally to the hood opening when used with a hood face velocity controller system. The air bypass shall be RESTRICTED AS PER THE VAV Manufacturer's recommendation.

2.01 MATERIALS AND CONSTRUCTION

A. Fume Hood Superstructure Frame:

A free-standing rigid frame structure of steel angle shall be provided to support exterior panels and interior liner and baffle panels. To allow for maintenance and replacements, the interior liner panels shall be removable without disassembly of the frame structure and outer steel panels. Likewise, the exterior steel panels shall be removable without disassembly of the frame structure and inner liner panels. Fume hoods that require disassembly of the superstructure for liner replacement are not acceptable.

B. Fume Hood Interior Walls:

Double wall ends, not more than 4" wide, shall be provided to maximize interior working area. The area between the double wall ends shall be closed to house the remote control valves. The front vertical facia section shall have a full 135 degree 1" radius at the front leading edge to provide a streamlined section and insure smooth even flow of air into the hood. The vertical facias shall contain the required service controls, electrical switches and receptacles. The hood interior end panels and sash track shall be flush with the facia to prevent eddy currents and back flow of air.

C. Fume Hood Airfoil:

A streamlined airfoil shall be integral at the bottom of the hood opening on bench and distillation hoods. This foil shall provide a nominal 1" open space between the foil and the top front edge of the work surface to direct an air stream across the work

surface to prevent back flow of air. The airfoil shall extend back under the sash, so that the sash does not close the 1" opening. The foil shall be removable to allow large equipment into the hood. The foil shall be of 12-gauge steel to resist denting and flexing. Walk-in hoods shall have a stop located at the bottom of the sash track that will ensure a nominal 1" opening between the bottom of the sash and the floor.

D. Fume Hood Top Panel:

Restricted Bypass Configuration:
The top front panel shall be of the same material as the exterior facia.

E. **Fume Hood Baffles:**
A stable, non-adjustable baffle with three fixed horizontal slots shall be provided to aid in distributing the flow of air into and through the hood. The baffle shall be spaced out 2-1/4" from the back liner. The baffle shall be removable for cleaning

F. **Fume Hood Duct Collar:**
A 12" diameter polyethylene bell-mouthed duct collar shall be located in the top of the hood plenum chamber. Coated common steel duct collars are not acceptable**. Lab vendor has to Supply ONLY Manual Damper with Flexible Hose, Tie-in connection to the Main Exhaust system will be done by Other Vendors**

G. **Fume Hood Lighting:**
A one-tube, energy-efficient, T-5 fluorescent light fixture of the size given below shall be provided in the hood roof. Illumination at 13" above the worksurface shall be at least 100 foot-candles.

The light fixtures shall be isolated from the hood interior by a 1/4" thick tempered glass panel sealed from the hood cavity.

H. **Fume Hood Sash:**
Combination Sash:
A combination sash shall be provided. The sash shall have horizontal sliding glass panels in a vertical rising steel frame. The bottom of the sash frame shall have a full length metal handle. The sash track shall be a neutral colored polyvinyl chloride set flush with the interior liner panels to minimize turbulence. The sash shall be counterbalanced with a single weight to prevent tilting and binding during operation. The glass panels shall be 1/4" laminated safety float glass mounted on metal rollers in an aluminum track.

I. **Fume Hood Plumbing Service:**
Utility services like **Nitrogen, Vacuum, Compressed Air and Raw water** shall consist of remote control valves as selected located within the end panels, controlled by extension rods projecting through the control panels of the hood, with color coded plastic handles. Interior fitting for gases and water shall be nylon panel flanges and angle serrated hose connectors, color coded. Interior fittings for distilled water shall consist of a bronze tin lined, white color-coded, panel flange and angle serrated hose connector. Interior fittings for steam shall consist of a cast bronze flange and angle serrated hose connector with a chemical resistant metallic bronze finish. Water goosenecks shall be cast bronze with a chemical resistant metallic bronze finish. All plumbing fittings shall be factory

installed and piped between the valve and the outlet. Inlet piping shall have a single-point connection for each valve provided and carried to a point 1" above the fume hood roof. Points of final service connection by other trades shall be at the stub provided by the fume hood manufacturer.

J. Fume Hood Electrical Service:

The hood superstructure shall be pre-wired and contain wire gauge, connections, fixtures and wire color coding. Wiring electrical services shall consist of two duplex receptacles and a light switch. 4 nos of 5/15 Amps (Make: North West), 230 Volt AC, and 3-wire polarized grounded with ground fault interruption. The receptacles shall be of specification grade, side wired only, to insure a positive connection. The light switch shall be 5 Amps. 230 volt AC and 3-wire polarized grounded. Wiring shall terminate in one 6" x 6" x 4" service junction box located on the fume hood roof

K. Hood Work Surface:

Black Granite:

Hood worksurface shall be 1-1/4" thick jet black granite made in the form of a watertight pan, not less than 3/8" deep to contain spillage with a 8"& 6" wide safety ledge across the front edge. A cup drain flush with the recessed worksurface shall be provided. The worksurface and cup drain shall be available in black.

L. Polyethylene Cup Sinks:

Molded polyethylene cup drains shall be molded in one-piece of acid-resistant polyethylene. They shall have an integral mounting flange and an integral tailpiece with a 1-1/2" I.P.S. male straight thread outlet.

M. Access Opening:

The interior end liner panels shall be furnished with an opening that provides access to the service piping and valves to facilitate installation and maintenance. The openings shall be covered with a removable panel with rounded corners. Panels that require tools to remove are not acceptable. The panel shall provide an overlapping seal on all edges.

N. Fume Hood Finish:

After the component parts have been completely welded together and before finishing, they shall be given a pre-paint treatment to provide excellent adhesion of the finish system to the steel and to aid in the prevention of corrosion. Physical and chemical cleaning of the steel shall be accomplished by washing with an alkaline cleaner, followed by a spray treatment with a complex metallic phosphate solution to provide a uniform fine grained crystalline phosphate surface that shall provide both an excellent bond for the finish and enhance the protection provided by the finish against humidity and corrosive chemicals.

After the phosphate treatment, the steel shall be dried and all steel surfaces shall be coated with a chemical and corrosion-resistant, environmentally friendly, electrostatically applied powder coat finish. All components shall be individually painted, insuring that no area be vulnerable to corrosion due to lack of paint coverage. The coating shall then be cured by baking at elevated temperatures to provide maximum properties of corrosion and wear resistance.

The completed finish system in standard colors shall meet the performance test requirements specified under PERFORMANCE TEST RESULTS.

O. Performance Test Results (Chemical Spot Tests):

a. Testing Procedure:
Chemical spot tests for non-volatile chemicals shall be made by applying 5 drops of each reagent to the surface to be tested and covering with a 1-1/4" dia. watch glass, convex side down to confine the reagent. Spot tests of volatile chemicals shall be tested by placing a cotton ball saturated with reagent on the surface to be tested and covering with an inverted 2-ounce wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire test period, and at a temperature of 77° ±3° F. For both methods, leave the reagents on the panel for a period of one hour. At the end of the test period, the reagents shall be flushed from the surface with water, and the surface scrubbed with a soft bristle brush under running water, rinsed and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Immediately prior to evaluation, 16 to 24 hours after the reagents are removed, the test surface shall be scrubbed with a damp paper towel and dried with paper towels.

b. Test Evaluation:
Evaluation shall be based on the following rating system.
Level 0 – No detectable change.
Level 1 – Slight change in color or gloss.
Level 2 – Slight surface etching or severe staining.
Level 3 – Pitting, cratering, swelling, or erosion of coating. Obvious and significant deterioration.

After testing, panel shall show no more than three (3) Level 3 conditions.

c. Test Reagents

Test No.	Chemical Reagent	Test Method
1.	Acetate, Amyl	Cotton ball & bottle
2.	Acetate, Ethyl	Cotton ball & bottle
3.	Acetic Acid, 98%	Watch glass
4.	Acetone	Cotton ball & bottle
5.	Acid Dichromate, 5%	Watch glass
6.	Alcohol, Butyl	Cotton ball & bottle
7.	Alcohol, Ethyl	Cotton ball & bottle
8.	Alcohol, Methyl	Cotton ball & bottle
9.	Ammonium Hydroxide, 28%	Watch glass
10.	Benzene	Cotton ball & bottle
11.	Carbon Tetrachloride	Cotton ball & bottle
12.	Chloroform	Cotton ball & bottle
13.	Chromic Acid, 60%	Watch glass
14.	Cresol	Cotton ball & bottle
15.	Dichlor Acetic Acid	Cotton ball & bottle
16.	Dimethylformanide	Cotton ball & bottle
17.	Dioxane	Cotton ball & bottle
18.	Ethyl Ether	Cotton ball & bottle
19.	Formaldehyde, 37%	Cotton ball & bottle
20.	Formic Acid, 90%	Watch glass
21.	Furfural	Cotton ball & bottle

22.	Gasoline	Cotton ball & bottle
23.	Hydrochloric Acid, 37%	Watch glass
24.	Hydrofluoric Acid, 48%	Watch glass
25.	Hydrogen Peroxide, 3%	Watch glass
26.	Iodine, Tincture of	Watch glass
27.	Methyl Ethyl Ketone	Cotton ball & bottle
28.	Methylene Cloride	Cotton ball & bottle
29.	Mono Chlorobenzene	Cotton ball & bottle
30.	Naphthalene	Cotton ball & bottle
31.	Nitric Acid, 20%	Watch glass
32.	Nitric Acid, 30%	Watch glass
33.	Nitric Acid, 70%	Watch glass
34.	Phenol, 90%	Cotton ball & bottle
35.	Phosphoric Acid, 85%	Watch glass
36.	Silver Nitrate, Saturated	Watch glass
37.	Sodium Hydroxide, 10%	Watch glass
38.	Sodium Hydroxide, 20%	Watch glass
39.	Sodium Hydroxide, 40%	Watch glass
40.	Sodium Hydroxide, Flake	Watch glass
41.	Sodium Sulfide, Saturated	Watch glass
42.	Sulfuric Acid, 33%	Watch glass
43.	Sulfuric Acid, 77%	Watch glass
44.	Sulfuric Acid, 96%	Watch glass
45.	Sulfuric Acid, 77% and Nitric Acid, 70%, equal parts	Watch glass
46.	Toluene	Cotton ball & bottle
47.	Trichloroethylene	Cotton ball & bottle
48.	Xylene	Cotton ball & bottle
49.	Zinc Chloride, Saturated	Watch glass

* Where concentrations are indicated, percentages are by weight.

P. Performance Test Results (Heat Resistance):
Hot water (190° F - 205° F) shall be allowed to trickle (with a steady stream at a rate not less than 6 ounces per minute) on the finished surface, which shall be set at an angle of 45° from horizontal, for a period of five minutes. After cooling and wiping dry, the finish shall show no visible effect from the hot water treatment.

Q. Performance Test Results (Impact Resistance):
A one-pound ball (approximately 2" diameter) shall be dropped from a distance of 12 inches onto the finished surface of steel panel supported underneath by a solid surface. There shall be no evidence of cracks or checks in the finish due to impact upon close eye-ball examination.

R. Performance Test Results (Bending Test):
An 18 gauge steel strip, finished as specified, when bent 180^{o} over a 1/2" diameter mandrel, shall show no peeling or flaking off of the finish.

S. Performance Test Results (Adhesion):
Ninety or more squares of the test sample shall remain coated after the scratch adhesion test. Two sets of eleven parallel lines 1/16" apart shall be cut with a razor blade to intersect at right angle thus forming a grid of 100 squares. The cuts shall be made just deep enough to go through the coating, but not into the substrate. They shall then be brushed lightly with a soft brush. Examine less than 100 foot-candles of illumination. Note: This test is based on ASTM D2197-68, "Standard Method of Test for Adhesion of Organic Coatings".

T. Performance Test Results (Hardness):
The test sample shall have a hardness of 4-H using the pencil hardness test. Pencils, regardless of their brand are valued in this way: 8-H is the hardest, and next in order of diminishing hardness are 7-H, 6-H, 5-H, 4-H, 3-H, 2-H, F, HB, B (soft), 2-B, 3-B, 4-B, 5-B (which is the softest).

The pencils shall be sharpened on emery paper to a wide sharp edge. Pencils of increasing hardness shall be pushed across the paint film in a chisel-like manner until one is found that will cut or scratch the film. The pencil used before that one-that is, the hardest pencil that will not rupture the film-is then used to express or designate the hardness.

U. Fume Hood Dimensions

Required Specifications for Chemical Fume Hood with Base Storage Cabinet

Overall Fume Hood Dimension: 1800 mm L □ 850 mm D □ 2700 mm H [minimum].

Working Dimension: 1600 mm L □ 700 mm D □ 800 mm H [minimum].

V. Fume Hood Liners :
Interior liner panels shall be 1/4" thick fiberglass reinforced polyester sheet. Interior liner panels shall be fastened using stainless steel screws with plastic covered heads.

Q. Liner Tests – Chemical Spot Tests – 24 Hours

1. Chemical spot test shall be made by applying 10 drops (approximately 1/2 cc) of each reagent to the surface to be tested. Each reagent (except those marked **) shall be covered with a 1-1/2" diameter watch glass, convex side down to confine the reagent. Spot tests of volatile solvents marked ** shall be tested as follows: A 1" or larger ball of cotton shall be saturated with the solvent and placed on the surfaces to be tested. The cotton ball shall then be covered by an inverted 2-ounce, wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire 24-hour test period and at a temperature of 77 degrees F. ± 3 degrees F.

2. At the end of the test period, the reagents shall be flushed from the surfaces with water and the surface scrubbed with a soft bristle brush under running water, rinsed, and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Spots where dyes have dried shall be cleaned with a cotton swab soaked in alcohol to remove the surface dye. The test panel shall then be evaluated immediately after drying.

RESULTS:		1	2	3	4	5
1. Acetic Acid 98%	A	B	B	B	A	
2. Acetone **	A	D	A	A	A	
3. Acid Dichromate	A	A	A	A	A	
4. Ammonium Hydroxide ** 28%	A	A	B	B	A	
5. Amyl Acetate **	A	A	A	A	A	
6. Benzene **	A	A	A	A	A	
7. Butyl Alcohol **	A	A	A	A	A	
8. Carbon Tetrachloride **	A	A	A	A	A	
9. Chloroform **	A	D	A	A	A	
10. Chromic Acid 60%	B	B	C	C	A	
11. Cresol	A	A	A	A	A	
12. Dichloroacetic Acid	A	D	B	A	A	

13.	Dimethylformamide		A	A	A	A	A
14.	Dioxane **	A	A	A	A	A	
15.	Ethyl Acetate **		A	A	A	A	A
16.	Ethyl Ether **		A	A	A	A	A
17.	Ethyl Alcohol **		A	A	A	A	A
18.	Formaldehyde		A	A	A	A	A
19.	Formic Acid	90%	A	A	A	A	A
20.	Furfural **	B	B	A	A	C	
21.	Gasoline **		A	A	A	A	A
22.	Hydrochloric Acid	37%	A	A	B	B	A
23.	Hydrofluoric Acid	48%	B	D	D	D	A
24.	Hydrogen Peroxide	30%	A	A	A	A	A
25.	Methyl Ethyl Ketone **		A	A	A	A	A
26.	Methyl Alcohol **	A	A	A	A	A	
27.	Methylene Chloride **		A	D	A	A	A
28.	Monochlorobenzene **		A	A	A	A	A
29.	Naphthalene **		A	A	A	A	A
30.	Nitric Acid	20%	B	A	B	A	A
31.	Nitric Acid	30%	B	A	B	A	A
32.	Nitric Acid	70%	B	D	B	A	A
33.	Phenol **	85%	A	C	A	A	A
34.	Phosphoric Acid	85%	A	A	B	A	A
35.	Silver Nitrate		B	C	A	A	C
36.	Sodium Hydroxide	40%	A	D	A	A	A
37.	Sodium Hydroxide	20%	A	D	A	A	A
38.	Sodium Hydroxide	10%	A	D	A	A	A
39.	Sodium Hydroxide Flake		A	B	A	A	A
40.	Sodium Sulfide		A	B	A	A	A
41.	Sulfuric Acid	77%	A	A	C	A	A
42.	Sulfuric Acid	96%	C	D	C	A	C
43.	Sulfuric Acid	33%	A	A	C	A	A
44.	Tincture of Iodine		A	C	B	B	A
45.	Toluene **	A	A	A	A	A	
46.	Trichlorethylene **	A	A	A	A	A	
47.	Xylene **		A	A	A	A	A
48.	Zinc Chloride		A	A	B	A	A
49.	Nitric 70%/Sulfuric Acid 77%*		B	B	B	A	A

* Equal parts of Nitric Acid 70% and Sulfuric Acid 77%.
** Indicates these solvents tested with cotton and jar method

S. **Fume Hood Base Cabinets**

1. Standard Steel
   a. Unless otherwise indicated base units under hoods shall be fabricated of cold rolled prime grade roller leveled furniture steel. Gauges of steel used in construction shall be 18 gauge except as follows:
   b. Corner gussets for leveling bolts and apron corner braces, 12 gauge.
   c. Hinge reinforcements, 14 gauge.
   d. Top and intermediate front horizontal rails, apron rails and reinforcement gussets, 16 gauge.
   e. Drawer assemblies 20 gauge.

f. Performance of the painted surfaces shall match that of the fume hood outer panels.

2.0 MATERIAL OF CONSTRUCTION

Fume Hood superstructure	: 18 gauge CRC Sheets, Electrode position Powder coated 80-100 micron
Table top	: 32 mm Jet Black Granite Table top
Electrical sockets	: PVC
Gas fixtures	: Brass Lacquer Coated
Internal piping	: SS304
Vacuum Fixtures	: Brass Lacquer Coated
Water fixtures	: Brass Lacquer Coated
Electrical cables	: Copper wire with PVC Sheath

3.0 APPLICABLE CODES & STANDARDS:

ASHRAE Standard 110.1995	- Method of Testing Performance of Laboratory Fume Hoods
NSF STD#49	- Photometric Method of Testing
NIH03-112C	- National Institute of Health Specification
UL	- Underwriters Laboratories
ASTM D552	- Bending Test
NFPA-45	- National Fire Protection Association

Note: VENDOR MUST HAVE ASHRAE TESTING FACILITY AT MANUFACTURING PLANT & ABLE TO CONDUCT THE SAME IN THE SITE.