

Notice Inviting Tender

For

Supply & Installation of

LABORATORY FURNITURE, FUMEHOOD AND

EXHAUST SYSTEM

NIT No : J-11019(033)/2015-16/S&P

Issue Date : 14-03-2017

Pre-Bid Meeting : 24-03-2017 at 3.00PM

Last Date of Submission : 18-04-2017, 12.00 NOON

Tender opening date : 18-04-2017, 3.00 PM

(Technical bid)



All India Institute of Medical Sciences, Bhubaneswar
Website: www.aiimsbhubaneswar.edu.in

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Chapter I- Instruction to bidders

Notice Inviting Tender

All India Institute of Medical Sciences, Bhubaneswar

Email: info@aiimsbhubaneswar.edu.in

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All India Institute of Medical Sciences (AIIMS), Bhubaneswar, Odisha, an Apex Healthcare Institute, established by an Act of Parliament under aegis of Ministry of Health & Family Welfare, Government of India, invites sealed tenders in two-bid system for supply of the following items at the Institute. Intending Tenderers are requested to quote their best offer along with the complete details of specifications, Terms & Conditions.

S.No.	Item Description	Quantity	Tender Fee	EMD Amount
1.	LABORATORY FURNITURE, FUMEHOOD AND EXHAUST SYSTEM	As per Specification	Rs. 2,000/-	Rs. 3,00,000/-

(Refer Details as per chapter-‘III’)

Tender(s) should be sealed and Superscribed with Tender Number and Address to:

“Asst. Store Officer”

All India Institute of Medical Sciences
Patrapada, Sijua
Bhubaneswar- 751019

The sealed Tender(s) should reach the Institute, latest by dt.**18-04-2017** at 1200 hrs and the Technical Bid will be opened on the same day at 03:00 PM in the Administrative Office, AIIMS, Bhubaneswar of the Institute. The bidder(s) or their authorized representative(s) may remain present at the scheduled date and time. In case the appointed date is declared Holiday the next date of opening of the Office shall be applicable for Opening of Tender.

The tender is in two- bid system i.e. Technical Bid & Financial Bid .The Technical Bid will be opened on the designated date by the Purchase Committee. The Name of the technically qualified bidders shall be hoisted in the website of AIIMS, Bhubaneswar. No paper publication shall, however, be made for this.

Schedule of Tender

Issue Date	: Dt. 14-03-2017
Last date and time of receipt of tender	: Dt.18-04-2017, at 12:00 PM
Tender Fee (non refundable)	: Rs. 2,000/- (Rupees Two Thousand only)
Amount of Earnest Money Deposit (EMD)	: Rs. 3,00,000/- (Rupees Three Lakh only)
Date & time of opening of tender	: Dt. 18-04-2017, at 03.00 PM
Venue	: AIIMS Bhubaneswar - 751019

Chapter-II- Conditions of Contract

General Terms and Conditions

Terms & Conditions:

1. **Tender Fee:** The bidder shall be required to submit the Tender Fee (Non- Refunded) for an Amount of Rs.2,000/- (Rupees Two Thousand Only)) drawn in favour of the “AIIMS Bhubaneswar” in shape of Demand Drafts only, Payable at Bhubaneswar.
2. **Earnest Money Deposit:** The bidder shall be required to submit the Earnest Money Deposit (EMD)/ Bid Security for an amount of 3,00,000/- (Rupees Three Lakh only) In shape of FDR/BG only with Technical Bid (TENDERS NOT ACCOMPANIED WITH TENDER FEES AND EMD/BID SECURITY ALONGWITH THE TECHNICAL BID SHALL BE SUMMARILY REJECTED).

The EMD of the successful bidder shall be returned after the successful completion of contract / order and it would be returned to the unsuccessful bidders after award of the contract. No claim shall lie against the Government/AIIMS, Bhubaneswar in respect of erosion in the value or interest on the amount of Earnest Money Deposit / Security deposit.

- (i) The firms who are registered with National Small Industries Corporation (NSIC) / OR Small Scale Industries (SSI) Units having NSIC Registration also are exempted to submit the EMD (Copy of valid Registration Certificate must be provided along with).
 - (ii) The original documents of the bidders qualified in the Technical Bid shall be subject to verification at the appointed date & time.
3. **Rate:** Rates should be quoted in Indian Rupees (INR) on F.O.R Basis at AIIMS, Bhubaneswar, Odisha, Inclusive of all the Charges, with break-up as:
 - Basic Cost.
 - VAT /CST as applicable.
 - Custom/excise (if applicable)
 - Total Cost (F.O.R at AIIMS Bhubaneswar).

4. **Validity:** The quoted rates must be valid for a period for 180 days from the date of closing of the tender. The overall offer for the assignment and bidder(s) quoted price shall remain unchanged during the period of validity. If the bidder quoted the validity shorter than the required period, the same will be treated as unresponsive and it may be rejected.

In case the tenderer withdraws, modifies or changes his offer during the validity period, bid is liable to be rejected and the Earnest Money Deposit shall be forfeited without assigning any reason thereto. The Tenderer should also be ready to extend the validity, if required, without changing any terms, conditions etc. of their original Tender.

5. **Warranty / Guarantee:** Bid must be quoted with Three (03) year comprehensive on-site warranty / guarantee and it will be started from the date of the satisfactory installation / commissioning of goods, against the defect of any manufacturing, workmanship and poor quality of the goods or components thereof. Warranty would be followed by 5 year CMC (Comprehensive Maintenance Contract with spares) @ 3% of the cost of the Equipment with 5% increase every year. Vendor would submit list of Consumables required for running of the machine along with its cost. During the warranty and CMC period the supplier/ company should

provide a minimum of 04 (four) preventive maintenance as routine services. After sales services must be provided in the city of installation. In situations requiring service or repair of the unit outside the city of installation, the expenditure on that account will have to be borne by the supplier.

6. **Buy-Back Offer:** In case of a availability of a new Version of the existing Equipment, Institute may go for the same for replacement on Buy-Back offer basis. The Tenderer should mention his offer for buy back of the Equipment/Machinery /Plant / Instruments/ Apparatus stating the percentage of Basic cost of the old Equipment and other condition if any.
7. **Uptime guarantee:** The firm should provide uptime guarantee of 95% during warranty and CMC period, with acceptance of the penalty clause in case of failure to do so.
8. **Downtime penalty Clause:** During the comprehensive warranty period, the uptime guarantee of 95% of 365 days will be ensured. In case the down time exceeds the 5% limit, penalty of extension of guaranty period by two days for each additional day of down time will be enforced. The vendor must undertake to supply all spares for optimal upkeep of the equipment for at least FIVE YEARS after handing over the unit to the Institute.

If accessories/other attachment of the system are procured from the third party, the vendor must produce cost of accessory/other attachment and the CMC from the third party separately along with the main offer and the third party will have to sign the CMC with the Institute if required. The principal supplier or their service partners are required to submit a certificate that they have satisfactory service arrangements and fully trained staff available to support the uptime guarantee.

9. **Risk Purchase:** In case the tenderer on whom the supply order has been placed, fails to made supplies within the delivery schedule and the purchaser has to resort to risk purchase, the purchaser (AIIMS, Bhubaneswar) may recover from the tenderer (from the payment on account of subsequent supply or performance security as the case may be) the difference between the cost calculated on the basis of risk purchase price and that calculated on the basic of rates quoted by tenderer. In case of repeated failure in supplying the order goods the supply order may be cancelled and Bid/EMD/Performance security deposit will be forfeited.
10. **FALL CLAUSE:** If, at any time, during the said period, the supplier reduce the said prices of such Stores/Equipment or sales such stores to any other person/organization/Institution at a price lower than the chargeable, he shall forthwith notify such reduction or sale to the Director, All India Institute of Medical Sciences (AIIMS) Bhubaneswar and the price payable for the Stores supplied after the date of coming into force of such reduction or sale shall stand correspondingly reduced.

The supplier shall furnish the following certificate to Administrative Officer, AIIMS, Bhubaneswar.

“I/We certify that the Stores of description identical to the Stores supplied to the government under the contract against Tender herein have not been offered/sold by me/us to any other person/organization/Institution upto date of bill/the date of completion of supplies against all supply orders placed during the currency of the tender/rate contract at the price lower than the institute under contract /against tender”.

11. **Delivery & Installation:** All the goods ordered shall be delivered within 12 (Twelve) weeks from the date of issue of supply order/ acceptance letter. All the aspects of safe delivery shall be the exclusive responsibility of the supplier. The acceptance of the Supply order (invariably sent by E-Mail) should be furnished with 7 (seven) days from the date of issue failing which it shall be treated that the firm has accepted the Supply Order.

If the supplier fails to deliver, install and commission of the goods on or before the stipulated

date, then Late Delivery charges at the rate of 0.5% per week or part thereof exceeding 3 days of the total order value shall be levied subject to maximum of 10% of the total order value. (Excluding the date of issue of Supply Order / acceptance letter and date of delivery). Purchaser may also resort to termination of the Supply Order & even Tender at any time after expiry of the allowable period for supply of materials.

12. Performance Security:

- (a) The successful tenderer will be required to furnish a Performance Security Deposit of 5% of tender amount in the form of Fixed Deposit Receipt or Bank Guarantee from any Scheduled Bank duly pledged in the name of the "All India Institute of Medical Sciences, Bhubaneswar". The security deposit can be forfeited by this Institute in the event of any breach or negligence or non-observance of any condition of contract or for unsatisfactory performance or non-observance of any condition of the contract.

Performance Security should be kept valid upto 60 days after completion of obligations (including warranty period) under the contract.

- (b) The Tenderer shall have to execute a Contract Agreement with AIIMS, Bhubaneswar while accepting the Supply order.

13. Payment Term:

- 80% payment of the total order value shall be released after the successful installation/ Commissioning of the ordered goods against the submission of the test report & on furnishing of Performance security & execution of Contract Agreement.
- Balance 20% of the order value shall be released after one month of successful installation of the item and basing upon the report of satisfactory functioning to be furnished by the User Department.

14. Bidder shall submit the Tender document and addenda thereto, if any, with each page signed and with seal to confirm the acceptance of the entire Terms & Conditions as mentioned in the tender enquiry document.

15. Compliance sheet of the Technical Specification of the goods under due signature & Seal with Technical printed literature must be enclosed with the bid.

16. After due evaluation of the bid(s) Institute will award the contract to the responsive tenderer who has quoted the lowest Cost.

17. Conditional Bids will be treated as unresponsive and therefore may be rejected.

- 18. *The Institute reserves the right to accept in part or in full or reject any or more Tender / offer without assigning any reasons or cancel the tendering process and reject all Tender at any time prior to award of contract, without accepting any liability, whatsoever.***

19. TENDER EVALUATION

Tenders evaluation will be done in two stages:

- a. Technical bid and
- b. Financial bid.

Each bid to be submitted in separate sealed envelopes super-scribed "Technical Bid" and "Financial Bid" respectively mentioning therewith the name of Goods/Services. All these 2 envelopes should be put in another envelope marked as "Tender for Laboratory Furniture Fume hood and Exhaust System for AIIMS, Bhubaneswar" sealed with sealing wax.

- A) **TECHNICAL BID:** The firm should submit the technical bid in a sealed cover separately

super-scribed "Technical Bid for Laboratory Furniture Fume hood and Exhaust System" along with Name and address of the Bidder. Technical bid should contain information and copy of documents as required in Chapter – IV.

The Committee constituted by the Competent Authority shall evaluate the Technical Bid on the basis of Specification as per Chapter-III & documents/ information furnished as per Chapter-IV, Make/Brand quoted; literature enclosed, sample submitted wherever asked, Demo displayed wherever required, the authorization letter from manufacturer for the item etc. The items accepted in Technical Bid will only be considered for evaluation of Financial bid. Price should not be quoted with Technical Bid, otherwise the tender will be rejected without any correspondence.

- B) **FINANCIAL BID:** Should be submitted in a separate sealed envelope super-scribed the word "Financial Bid for Laboratory Furniture Fume hood and Exhaust System" along with Name and address of the Bidder.

The price should indicate cost on mentioned at Para /clause 3 above. Offers with price variation clause will not be accepted. The rates quoted in ambiguous terms such as "Freight on actual basis" or "Taxes as applicable extra" or "Packing forwarding extra" will render the bid liable for rejection. The Taxes of the successful bidder must be in order.

20. Applicable Law:

- The contract shall be governed by the laws and procedures established by Government of India, within the framework of applicable legislation and enactment made from time to time concerning such Commercial dealings / processing.
- Any disputes are subject to exclusive jurisdiction of Competent Court and Forum in Bhubaneswar, Odisha, India only.
- The Arbitration shall be held in accordance with the provisions of the Arbitration and Conciliation Act, 1996 and the venue of arbitration shall be at Bhubaneswar. The decision of the Arbitrator shall be final and binding on both the parties.
- Force Majeure: Any delay due to Force Majeure will be attributable to the supplier. Unless provide through recordal evidence.

CHAPTER-03 a

LAB FURNITURE SPECIFICATION

DESCRIPTION OF WORK

1.00 SUMMARY AND SCOPE

A. Section Includes:

1. Furnish all cabinets and casework, including tops, ledges, supporting structures. Include delivery to the building, set in place, level, and scribe to walls and floors as required. Furnish and install all filler panels, knee space panels and scribes as shown on drawings.
2. Furnish and deliver all utility service outlet accessory fittings, electrical receptacles and switches identified on drawings as mounted on the laboratory furniture. All plumbing and electrical fittings, not preinstalled in equipment, will be packaged separately and properly marked for delivery to the appropriate contractor.
3. Furnish and deliver, for installation by the mechanical contractor, all laboratory sinks, cup sinks or drains, drain troughs, overflows and sink outlets with integral tailpieces, which occur above the floor, and where these items are part of the equipment. All tailpieces shall be furnished less the couplings required to connect them to the drain piping system.
4. Furnish service strip supports where specified, and setting in place service tunnels, service turrets, supporting structures and reagent racks of the type shown on the drawings.
5. Removal of all debris, dirt and rubbish accumulated as a result of the installation of the laboratory furniture to an onsite container provided by others, leaving the premises broom clean and orderly.
6. Submittals: Individual items shop drawings to be in 1:50 scale floor plan and individual elevation in 1:25 scale and 3D Isometric format. 3D AutoCAD format must be submitted as part of submittal
7. Samples: Hardware, Colour and Finish Samples to be provided at time of evaluation

1.01 BASIS OF WORK

Laboratory Furniture as the standard of construction for steel laboratory furniture. The construction standards of this product line shall provide the basis for quality and functional installation.

2.00 CABINET STYLE:

Steel:

Cabinet bodies, drawer bodies, shelves, drawer heads and door assemblies shall be fabricated from Galvanised Steel.

2.01 DRAWER AND DOOR STYLE:

The outer drawer and door head shall have a channel formation on all four sides to eliminate sharp raw edges of steel and the top front corners shall be welded and ground smooth. Drawer and door, when closed, shall be recessed to create an overall flush face or overlay type, and with optional pull.

2.02 MATERIALS

- A. General Requirements:
It is the intent of this specification to provide a high quality steel cabinet specifically designed for the laboratory environment.
- B. Steel:
GalvanisedSteel:
Galvanisedsheet steel shall be prime grade 12, 14, 16, 18 and 20 gauge, and shall be treated at the mill to be free of scale, ragged edges, deep scratches or other injurious effects.
- C. Glass:
Glass used for framed sliding and swinging doors shall be 1/8" float glass. Glass used for unframed sliding doors, shall be 1/4" float glass. Glass used in fume hoods or other hazardous locations shall be 7/32" laminated safety float glass, except the glass shielding fluorescent lights in fume hoods shall be tempered glass to provide greater resistance to heat and impact.
- D. Drawer and Door Pulls:
Pull shall be of modern design, offering a comfortable handgrip with label holder, and be securely fastened to doors and drawers with screws. All pulls shall be satin finish Aluminiumaluminium, with a clear, lacquer finish. Two pulls shall be required on all drawers over 24" long. Use of plastic pulls (molded or extruded), or a design not compatible for usage by the handicapped will not be acceptable.
- E. Hinges:
Unechoic, torsion resistant door leaf from steel panels, 14 mm thickness with rounded safety corners, all around contact, cushioned with contact cushions. D-shaped metal handles, nickel-plated, with insert labelling facility. Aluminiumdiecast hinges with 270dec openable, integrated latches and 3D adjustable facility
- F. Positive Catch:
A two-piece heavy-duty cam action positive catch shall be provided on all base cupboard doors and shall be positioned near the pivoting edge of door to provide a clean unobstructed opening. Main body of the catch shall be confined within an integral cabinet divider rail, while latching post shall be mounted on the hinge side of door. Nylon roller type catches are not acceptable.
- G. Elbow Catches:
Elbow catches and strike plates shall be used on left hand doors of double door cases where locks are used, and are to be burnished cast aluminium, with bright brass finish.
- H. Shelf Adjustment Clips:
Shelf adjustment clips shall be nickel-plated steel.
- I. Base Molding:
Base Molding shall be provided on all table legs, unless otherwise specified, to conceal levelling device. Shoes shall be a pliable, black vinyl material. Corner clip should be provided to hold the base molding firmly. Use of a leg shoe, which does not conceal levelling device, will not be acceptable
- J. Sink Supports:
Sink supports shall be the hanger type, suspended from top front and top rear horizontal rails of sink cabinet by four 1/4" dia. rods, threaded at bottom end and offset at top to hang from two full length reinforcements welded to the front and rear top rails. Two 3/4" x 1-2/2" x 12 gauge channels shall be hung on the threaded rods to provide an adjustable sink cradle for supporting sinks. When sink capacity exceeds 3,750 cu. in., the sink supports shall be suspended from full-length

reinforcements welded to the two end rails. Two 1" x 2" x 10 gauge full-length channels shall be hung from the four 1/4" dia. rods to provide an alternate sink cradle.

2.03 CONSTRUCTION

A. Steel Base Cabinet Construction:

1. General:

- a. The steel furniture shall be of modern design and shall be constructed in accordance with the best practices of the industry. First class quality casework shall be insured by the use of proper machinery, tools, dies, fixtures and skilled workmanship to meet the intended quality and quantity for the project.
- b. All cabinet bodies shall be flush/overlay front construction with intersection of vertical and horizontal case members, such as end panels, top rails, bottoms and vertical posts in same plane without overlap. Exterior corners shall be spot welded with heavy back up reinforcement at exterior corners. All face joints shall be welded and ground smooth to provide a continuous flat plane.
- c. Each cabinet shall be complete so that units can be relocated at any subsequent time without requiring field application of finished ends or other such parts.
- d. Case openings shall be rabbeted on all four sides for both hinged and sliding doors to provide a dust resistant case.
- e. All cabinets shall have a cleanable smooth interior. Bottom edges shall be formed down on sides and back to create easily cleanable corners with no burrs or sharp edges, and front edge shall be offset to create a seamless drawer and door recess rabbet for dust stop.
- f. All Cabinets must have double skin at left & right sides easy cleanable flat side surface

2. Steel Gauges:

Gauges of steel used in construction of cases shall be 18 gauge, except as follows:

- a. Corner gussets for levelling bolts and apron corner braces, 12 gauge.
- b. Case and drawer suspension channels, 14 gauge.
- c. Top and intermediate front horizontal rails, table aprons, hinge reinforcements, and reinforcement gussets, 16 gauge.
- d. Drawer assemblies, door assemblies, bottom, bottom back rail, toe space rail, and adjustable shelves, 20 gauge.

3. Base Cabinets:

- a. End uprights shall be formed into not less than a channel formation at top, bottom, back and front. The front edge shall further offset to form a strike for doors and drawers, and shall be perforated for the support of drawer channels, intermediate rails and hinge screws. An upright filler shall be screwed in place in all cupboard units to close the back of the channel at front of the upright and to provide a smooth interior for the cupboard to

facilitate cleaning. The upright filler shall be perforated with shelf adjustment holes at not more than 2" centers painted prior to assembly. The inside front of the upright shall be further reinforced with a full height 16 gauge hinge reinforcement angle.

- b. Top horizontal rail on base cabinets shall interlock within the flange at top of end panels for strength, but shall be flush as face of unit. Top rail shall have a full width rabbet for swinging doors and drawers. Reinforcements shall be provided at all front corners for additional welded strength between vertical and horizontal case members.
- c. Intermediate rails shall be provided between doors and drawers, but shall not be provided between drawers unless made necessary by locks in drawers. When required, intermediate rails shall be recessed behind doors and drawer fronts, and designed so that security panels may be added as required.
- d. Intermediate vertical uprights shall be furnished to enclose cupboards when used in a unit in combination with a half width bank of drawers. However, to allow storage of large or bulky objects, no upright of any type shall be used at the center of double door cupboard units.
- e. Cabinet bottom, and bottom rail shall be formed of one piece of steel except in corner units and shall be formed down on sides and back to create a square edge transition welded to cabinet end panels, and front edge shall be offset to create a seamless drawer and door recess rabbet for dust stop.
- f. Toe space rail shall extend up and forward to engage bottom rail to form a smooth surfaced fully enclosed toe space, 2" to 3" deep x 3" to 5" high. Whenever toe space base is omitted for units to set on building bases on separate steel bases, then the toe space rail shall extend back 4-1/2".
- g. Back construction shall consist of a top and bottom rail, channel formed for maximum strength and welded to back and top flange of end uprights, open for access to plumbing lines.
Cupboard units only shall be provided with removable back panels.
- h. Die formed gussets, with multiple ends for strength, shall be furnished in each bottom corner of base units to insure rigidity, and a 3/8"-16 levelling bolt, 3" long, and shall engage a clinch nut in each gusset. Access to the levelling bolts shall be through plug buttons in the bottom pan. Each levelling bolt and gusset shall be capable of supporting 500 lbs. Access to levelling bolts through toe space or levelling bolts requiring special tools to adjust are not acceptable.
- i. Adjustable shelves shall be formed down 3/4", returned back 7/8" and up 1/4" into a channel formation front and rear; formed down 3/4" at each end, shelves over 42" long shall be further reinforced with a channel formation welded to underside of shelf.

Drawer tray constructed from panel sheet, 0.75 mm thickness. Full 'draw out' in ball bearing cage guide with hidden drawer guides. Automatic soft closure and air cushioning closure with full extendable drawer rails. Load capacity: 30 Kg. Drawer front 14 mm thickness, cushioned with contact cushions. D-shaped metal handles, nickel-plated, with optional labelling. At seating working height there must be 4 and when standing 5 drawers, each 150 mm, stacked.

- j. Drawer suspension assembly shall consist of 2 sections providing a quiet, smooth operation on Automatic soft closure and air cushioning closure with full extendable drawer rails. All drawers shall be self-closing from a point 5" open. Cabinet channels shall maintain alignment of drawer and provide an integral drawer stop, but the drawer shall be removable without the use of tools. Drawers shall provide 13-5/8" front to back clearance when fully extended. Drawers shall rise when opened thus avoiding friction with lower drawers and/or doors. Drawer suspension system shall incorporate a double stop, lock open feature.
- k. Steel Door assembly (one -piece) for solid pan swinging doors shall consist of an inner and outer door pan. Outer door pan shall be formed at all four sides. The corners on the pull side of the outer door pan shall be welded and ground smooth to prevent exposure of sharp edges of steel at these critical points. Inner door pan shall be flanged at all four sides with hinge reinforcements welded in place. The door assembly shall be 3/4" thick and contains sound deadening material.
- l. Steel Drawer/door assemblies shall be painted prior to assembly. Both shall be punched for attaching drawer pulls. Likewise, inner pan formation of door and drawer body shall be indented for in-field installation of locks when required.
- m. Doors shall be readily removable and hinges easily replaceable. Hinges shall be applied to the cabinet and door with screws. Welding of hinges to either cabinet or door will not be acceptable.
- n. Knee space panels, where shown or specified, shall be 20 gauge, finished same as casework cabinets, and easily removable for access to mechanical service areas.

2.04 PERFORMANCE REQUIREMENTS

A.Steel Casework Construction Performance:

1. Base cabinets shall be constructed to support at least a uniformly distributed load 200 lbs. per square foot of cabinet top area, including working surface without objectionable distortion or interference with door and drawer operation.
2. Base cabinet corner gussets with levelling bolts shall support 500 lbs. per corner, at 1-1/2" projection of the levelling bolt below the gusset.
3. Each adjustable and fixed shelf 4 ft. or shorter in length shall support an evenly distributed load of 50 lbs. per square ft. up to a maximum of 200 lbs., with nominal temporary deflection, but without permanent set.
4. Drawer construction and performance shall allow 13-5/8" clear when in an extended position and suspension system shall prevent friction contact with any other drawer or door during opening or closing. All drawers shall operate smoothly, a minimum of 1,00,000 cycles with an evenly distributed load of 150 lbs.
5. Swinging doors on floor-mounted casework shall support 200 lbs. suspended at a point 12" from hinged side, with door swung through an arc of 160 degrees.

Weight load test shall allow only a temporary deflection, without permanent distortion or twist. Door shall operate freely after test and assume a flat plane in a closed position.

B. Steel Paint System Finish and Performance Specification:

Steel Paint System Finish:

After Galvanised Steel and Textured Steel 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 solvent free polyurethane chemical and corrosion-resistant, environmentally friendly, electro statically 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 colours shall meet the performance test requirements specified under PERFORMANCE TEST RESULTS.

1. 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 colour 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.	Dimethylformamide	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 Chloride	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.

2. 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.

3. 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.

4. 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 under 100 foot-candles of illumination. Note: This test is based on ASTM D2197-68, "Standard Method of Test for Adhesion of Organic Coatings".

5. 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.

4. WorkTops:

The worktops shall be of 18/19mm Jet black Granite of a even surface and the level Tolerance less than 1 mm. The front edge of the granite shall be chamfered at an angle of 28 deg and smoothened. The back splash for the wall bench shall be granite 18/19mm thick material for an height of 4" from the finished table top level.

5. Polypropylene Molded Sinks:

The sinks should be injection molded from Poly propylene co-polymer resin. Polypropylene to have very high resistance to attack from a wide range of chemicals and the ability to withstand temperatures up to 100 deg C. The impact resistance should be high which will minimize damage during and after installation. The sinks should be with self draining base and should be suitable for mounting on top or underside of the work benches. The sinks should be compatible to a vast number of acids, alkalis and reagents. The size of the sink is 600Lx450Dx315Hmm AND BOWL SIZE: 550Lx400Dx315Hmmm. This sinks shall have bottle trap with reducing coupler of size 51x31mm and with 38mm polypropylene pipe of one foot length. All gaskets and Orings are made from Nitrile.

6. Laboratory Service fixtures:

I. General

- A. All laboratory service fixtures shall have the construction and shall meet the performance requirements set forth in this specification. Fixture types shall be as indicated in the fixture schedule or fixture details included in either the project drawings or these specifications.
- B. All service fixtures shall be factory assembled (including the assembly of valves and shanks to turrets, flanges and other mounting accessories), and each fixture shall be individually factory tested. Fixtures shall be tested in the manner and at the pressures set forth below.
- C. Except as otherwise indicated, faucet and valve handles shall be forged brass Nylon type and shall have a colour coded screw-on index disc. Colour code requirements for indexing service fixtures shall follow DIN Standard 12920:1995.

1. General

- i Laboratory service fixtures and safety equipment shall be furnished with a powder coated finish to enhance the appearance of the fitting and to protect against corrosion. Coating material shall be a blend of epoxy and polyurethane. The hybrid blend shall ensure a finish coating with an optimum combination of chemical resistance, mar and abrasion resistance and resistance to fading under ultraviolet (UV) light.
- ii Fittings inside fume hoods shall have an epoxy finish colour-coded to match the fixture service index colour. Coating material shall be free flowing epoxy powder with a particle size of 35-70 microns.

2. Mar and Abrasion Resistance

Finishes shall have a pencil hardness of 2H-4H with adhesion substantial enough to withstand both direct and reverse impacts of 160 inch pounds. Finish shall have excellent mar resistance and be capable of withstanding scuffing, marring and other ordinary wear.

3. Reparability

Finish shall be capable of surface repair in the event that a fixture is scratched or a surface rupture occurs. The service fixture manufacturer shall have available an air-drying aerosol coating, specially formulated to match the existing epoxy coating colour, which may be applied in the field to repair coated surfaces.

III. Water Faucets and Valves

- A. All faucets and valves for water service shall have a renewable unit containing all working components subject to wear, including a stainless steel replaceable seat and an

integral adjustable volume control (designated by the suffix "AC"). The renewable unit shall be interchangeable among all faucets and valves for water service. The renewable unit shall be broached for position locking in the valve body. The unit shall have a high durometer thermoplastic valve disc and a molded TFE stem packing. The unit shall be capable of being readily converted from compression to self-closing, and vice versa, without disturbing the faucet body.

B. Goosenecks shall have a separate outlet coupling with a 3/8" IPS female thread securely brazed to the gooseneck for attachment of serrated hose ends, aspirators and other outlet fittings. Rigid goosenecks shall have a 3/8" IPS male inlet thread and be threaded directly into the faucet body so as to be absolutely rigid. Swing goosenecks shall utilize a TFE packing with an externally adjustable packing nut.

C. Water faucets and valves shall be fully assembled and individually tested at 80 pounds per square inch (PSI) water pressure.

APPLICABLE CODES & STANDARDS

- a NFPA 30- National Fire Protection Association
- b NFPA-45 - National Fire Protection Association
- c UL - Underwriters Laboratories
- d
- e BGI/GUV-I 850-0 Laboratories
- f TRGS 526 Laboratories
- g DIN 12898 Laboratory fittings; hose nozzles
- h DIN 12918 Laboratories - laboratory fittings – part 1:
- i Water taps
- j DIN 12918 Laboratories – laboratory fittings – part 2:
- k Taps for combustion gases
- l DIN 12918 Laboratories-laboratories fittings – part 3:
- m Taps for industrial gases
- n DIN/EN 13792 Labels for laboratory fittings
- o DIN/EN 15154-1 Safety emergency showers – part 1:
- p Body showers with water connection for laboratories
- q DIN/EN 15154-2 Safety emergency showers – part 1:
- r Eye showers with water connection
- s DIN/EN 14470-1 Fire resistance storage cabinets – part 1:
- t Safety cabinets for flammable liquids
- u DIN/EN 14470-2 Fire resistance storage cabinets – part 2:

AIR SHOWER

Air Showers are self contained chambers installed at entrances to cleanrooms and other controlled environments. They minimize particulate matter entering or exiting the clean space. Personnel and materials entering or exiting the controlled environment are “scrubbed” by high velocity HEPA-filtered air jets with velocities of 20-22m/s (4000-4300fpm). Contaminated air is then drawn through the base within the unit, filtered and recirculated.

Clean room Applications: The greatest source of particulate contamination in a clean room is the operator. Air showers are installed between change areas and the clean room. The air shower enhances clean room operating protocol by serving as a reminder to all operators that they are entering a controlled environment. Personnel therefore develop the habit of Gowning up properly before entering the air shower.

Main Features:

- High velocity shower jets in excess of 20 m/s ensure efficient scrubbing action to remove particulate matter.
- Operating modes can be programmed in the field.
- Microprocessor controller supervises all functions.
- Mini-pleated HEPA filtration achieves > 99.99% typical efficiency at 0.3 micron particles.
- A disposable pre-filter with 85% arrestance extends the life of the main filter.
- An emergency stop button is mounted on both sides of the shower.
- Indicator lights mounted on both sides of the air shower exterior regulate traffic flow in and out of the clean room.
- Permanently lubricated direct drive centrifugal blowers are used in conjunction with stainless steel air nozzles.

BIO SAFETY CABINET CLASS II-A2

A.Design as defined by NSF Standard 49

- 1.Class II A2: shall be designed and constructed to function properly and operate in a safe manner, minimize contamination, provide personnel, product and environmental protection.Shall be capable of being cleaned and decontaminated.

2.2MATERIALS

- A. Work Surface:16 gauge, type 304 stainless steel with no. 4 finish
- B. Cabinet Interior:16 gauge, type 304 stainless steel with no. 4 finish
- C. Cabinet Exterior:16 gauge and 12 gauge Galvanised steel minimum, exterior coating shall be VOC free, acid resistance powder coat finish.
- D. Glass:¼" laminated safety glass with no frame.No permanent etchings on glass.
- E. Airfoil:16 gauge, type 304 stainless steel with no. 4 finish
- F. Armrest:Aluminium extruded oval comfort shaped armrest is standard

2.3 CONSTRUCTION

- A. Interior walls shall be single piece construction with coved corners for ease of cleaning
- B. Work surface shall be single piece construction, dished with coved corners, lift up handles and anchoring pins
- C. Exterior removable panels shall be made of 16 gauge Galvanisedsteel, and shall be removable for access to service connections.
- D. Each cabinet shall be fully welded. All gaskets shall be closed cell neoprene type providing a gas and soap bubble-tight seal.
- E. All ducts and side walls shall be constructed of 16 gauge Galvanisedsteel with double wall construction maintaining containment area under negative pressure.
- F. Drain Pan 16 gauge type 304 stainless steel, shall be capable of holding at least one gallon, all corners shall be radiused for ease of cleaning. Stainless steel ball valve shall be included for drainage
- G. Plenum shall be telescoping allowing unvarying airtight seal of HEPA filters. Gaskets shall be close cell neoprene type.
- H. Service fittings shall be offset. Primary service fittings forward positioned 3 ½" from front.
- I. Sash operation shall be of anti-racking design using notched steel reinforced nylon belt and sprocket system.
 1. "Wire Rope" is not acceptable.
 2. Sash shall be easily removable with simple tools
- J. Controls - Cabinet shall have Full Colour VGA Monitor, fully programmable to ensure operator safety. Monitor located on lower portion of front panel. Monitor will display continuous "Remaining Filter Capacity" and "Face Velocity" readouts at all times during operation. Cabinet shall have audible and visual alarms to alert user of unsafe sash height, unsafe filter loads, and unsafe face velocity, including pre-programmed user thresholds for warnings, alarms, and UV operation indicating remaining lamp life and UV use timers. Alarm mute feature shall be

provided to allow brief equipment loading. Audible alarm will resume after 5 minutes.

- K. Lighting - Cabinet shall have externally mounted T5 fluorescent lamp with solid state ballasts.
- L. Filters- Front loading, HEPA 99.99% efficient on all particles 0.3 micron by DOP test, (both exhaust and supply). Filters shall be metal framed with metal protective screen for additional filter protection. HEPA filters will be removable without disassembly of control panel or view screen assembly.
 - 1. Bag in Bag out filter replacement not acceptable.
- M. Calculated Air Velocity- 105 fpm nominal through 10" NSF certified sash opening with audible and visual alarms if sash is not in correct position
- N. Electrical Requirements- A dedicated 115v, 20 amp, 60 Hz single phase circuit shall be required. Two GFCI outlets in the work area protected by an independent self-resetting breaker
- O. Gaskets – Closed cell Neoprene gasket to form airtight seal at positive pressure plenum.
- P. Airfoil - 16 gauge, type 304 stainless steel with no. 4 finish
- Q. Armrest: Aluminium extruded oval comfort shaped armrest is standard
- R. Base stand - 16 gauge Galvanised steel minimum, fully welded assembly with modesty panel and levelling guides. Coating shall be VOC free, acid resistance powder coat finish.

CHAPTER-03 b

FUMEHOOD SPECIFICATION

DESCRIPTION OF WORK

1.00 SUMMARY AND SCOPE

- A. Section Includes:
Furnish and install all fume hoods, work tops, and understructures as shown on drawings.
- B. Accessorization:
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.
- C. Removal of all debris, dirt and rubbish accumulated as a result of the installation of the fume hoods to an on-site container provided by others, leaving the premises clean and orderly.
- D. Submittals: Individual items shop drawings to be in 1:50 scale floor plan and individual elevation in 1:25 scale and 3D Isometric format must be submitted as part of submittal
- E. Samples: Hardware, Colour and Finish Samples to be provided at time of evaluation

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:
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.

2.01 MATERIALS AND CONSTRUCTION

- A. Fume Hood Superstructure Frame:
A free-standing rigid frame structure of Galvanised steel frames 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 fascia 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 fascia to prevent eddy currents and back flow of air. These panels must be provided with chemical resistance grade HPL panels.
- 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 Galvanised steel to resist denting and flexing.

D. Fume Hood Top Panel:

Standard Grille Bypass Configuration:

The top front panel shall be of the same material as the exterior fascia. It shall have an integral grille stamped into the upper portion.

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 10" or 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

G. Fume Hood Lighting:

Energy-efficient, CFL or LED light with light fixture of the size given below shall be provided in the hood roof. Illumination at 13" above the worksurface shall be at least 500 lux. The light fixtures shall be isolated from the hood interior by a 1/4" thick tempered glass panel sealed from the hood cavity. Fixture shall be UL or CE labelled. For Hood length more than 6ft will have 2 Nos 2ft Length Light fixture.

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 coloured 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 aluminium track. Counterbalance weight mechanism to be provided at front for fume hood to have easy access from front. Fume hood sash must be equipped with motorised automatic closure, moment sensor and touch panel to operate.

I. Fume Hood Plumbing Service:

Utility services 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 colour coded plastic handles. Interior fitting for gases and water shall be nylon panel flanges and angle serrated hose connectors, colour coded. Interior fittings for distilled water shall consist of a bronze tin lined, white colour-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 will be of 3/8" OD SS304 shall have a single-point connection for each valve provided and carried to a point 150mm above the fume hood roof or 18" below the worktop. These services to be accessed from front side of fume hood. 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 colour coding. Wiring electrical services shall consist of two duplex

receptacles and a light switch. Sockets of 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. Wiring shall terminate in one 6" x 6" x 4" service junction box located on the fume hood roof. Electrical contractor will provide single phase power supply to the junction box.

K. Lattice Rod Assemblies:

1/2" dia Epoxy rods shall be clamped with the Epoxy clamps to form a lattice arrangement to hold the test samples and rotors within the fume hood.

L. 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 1" or more wide safety ledge across the front edge. A cup sink flush with the recessed worksurface shall be provided. The worksurface and cup sink shall be available in black.

M. Cup Sinks:

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

N. 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.

O. 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 solvent free polyurethane 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.

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

Q. 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 colour 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.	Dimethylformamide	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 Chloride	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.

R. 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.

S. 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.

T. 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 under 100 foot-candles of illumination. Note: This test is based on ASTM D2197-68, "Standard Method of Test for Adhesion of Organic Coatings".

U. 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.

V. Fume Hood Liners :

Interior liner panels shall be 1/4" thick made from a compression molded cellulose fibre reinforced phenolic resin core with integrally cured white melamine surfaces. 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 77degrees F. $\pm$ 3degrees 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.

3. Ratings/Legend:

- | | |
|---|--|
| 1. Stainless Steel 304 | A = No effect or slight change in gloss |
| 2. Stainless Steel 316 | B = Slight change in gloss or colour |
| 3. Reinforced Phenolic Resin (Chemical resistant) | C = Slight etching or severe staining |
| | D = Swelling, pitting, or severe etching |

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

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

Normal Base cabinet:

Base units under hoods shall be fabricated of GalvanisedSteel.Gauges of steel used in construction shall be 18 gauges except as follows: Corner gussets for levelling bolts and apron corner braces, 12 gauges.Hinge reinforcements, 14 gauges.Top and

intermediate front horizontal rails, apron rails and reinforcement Gussets, 16 gauge. Door assemblies and adjustable shelves, 20 gauge. Performance of the painted surfaces shall match that of the fume hood outer panels.

D-shaped metal handles, nickel-plated, with insert labelling facility. Aluminium die cast hinges with 270deg openable, integrated latches and 3D adjustable facility

2.0 MATERIAL OF CONSTRUCTION

Fume Hood superstructure	: 18 /20 gauge Galvanised Steel Sheets, Electrode position Powder coated 60-80 micron
Table top	:32 mm Jet Black Granite Table top
Electrical sockets	:PVC
Gas fixtures	: Brass Lacquer Coated
Gas piping	:SS304
Vacuum Fixtures	: Brass Lacquer Coated
Vacuum Piping	: Copper/SS/PP
Water fixtures	: Brass Lacquer Coated
Water Piping	: Brass Lacquer Coated
Electrical cables	: Copper wire with PVC Sheath

3.0 APPLICABLE CODES & STANDARDS:

NSF STD#49 - Photometric Method of Testing
 NIH03-112C - National Institute of Health Specification
 UL - Underwriters Laboratories
 NFPA-45 - National Fire Protection Association
 BGI/GUV-I 850-0 Laboratories
 TRGS 526 Laboratories
 DIN 12898 Laboratory fittings; hose nozzles
 DIN 12918 Laboratories - laboratory fittings – part 1:
 Water taps
 DIN 12918 Laboratories – laboratory fittings – part 2:
 Taps for combustion gases
 DIN 12918 Laboratories-laboratories fittings – part 3:
 Taps for industrial gases
 DIN/EN 13792 Labels for laboratory fittings
 DIN/EN 15154-1 Safety emergency showers – part 1:
 Body showers with water connection for laboratories
 DIN/EN 15154-2 Safety emergency showers – part 1:
 Eye showers with water connection
 DIN/EN 14470-1 Fire resistance storage cabinets – part 1:
 Safety cabinets for flammable liquids
 DIN/EN 14470-2 Fire resistance storage cabinets – part 2:
 Safety cabinets for pressurised gas cylinders
 DIN/EN 14175-2 Fume cupboards– part 2: requirements for safety and performance capacity
 DIN/EN 14175-2 Fume cupboards – part 3: design test procedures

CHAPTER-03 c

EXHAUST SYSTEM SPECIFICATION

1. CENTRIFUGAL PP EXHAUST FAN

The exhaust fans supplied and installed shall be of 'Centrifugal Corrosion Resistant' type and shall be capable of delivering the design flow rate against all duct losses.

The fans shall be robust in construction and suitable for continuous duty operation. It shall be mounted with ease of maintenance and shall be installed with proper vibration isolators to minimize vibration transmission to ductwork and support structure.

Fans selected shall be silent and vibration free when running and suitable for outdoor use and shall not exceed 3000rpm.

Aerodynamic performance of the fan shall be tested and comply 'ISO 5801' standards.

Sound level shall be tested and comply with 'ISO 5136.2' standards.

The casing shall be of self-supporting design, thermoformed welded by machine. The material of construction shall be polypropylene (PP) and suitable for use against corrosive 'medium' and a maximum allowable operating temperature of 70°C.

No metal parts shall be exposed and in contact with the airstream.

Impeller material of construction shall be polypropylene (PP) and suitable for use against corrosive.

Electro-galvanized stand shall be used to support the fan and the motor in view of the corrosive environment.

A standard hub seal shall be fitted onto the impeller hub to prevent the corrosive 'medium' from contacting the shaft.

MOTOR AND ACCESSORIES

The standard TEFC electric motor shall be with class 'F' insulation and class 'B' temperature rise. Motor shall be suitable for outdoor installation with IP55 protection and suitable for operation with 415V/3Ph/50Hz electrical supply. Motor shall be flange mounted (B5) or foot mounted (B3) based on the fan configuration.

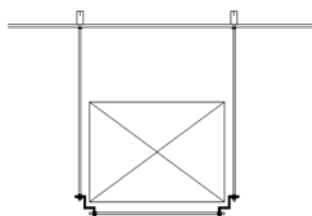
PP/FRP DUCTING:

- a. PP means PPGL: One side smooth & glassy finish and other end is mat finish.
 - The smooth surface should be the inner surface of the duct.
 - On mat side, FRP lining to be done.
 - 25 mm x 25 mm Stitch welding is done on inner surface and continuous welding on outer surface with 5 mm welding thickness.
- b. FRP Lining to be done on the outer surface of PPGL i.e. on mat side.
 - One layer FRP is one mm.
 - The final layer should be with fine mat to have smooth and good finish.
 - While making the lining, there should not be any air pockets or any sort of Uneven finish.
 - There should be time gap between the FRP layers, allowing each layer to be got dried.
- c. Isothelic resin to be used. (Fire resistant 20 Seconds).
- d. The flange thickness should be 1.5 times of the duct thickness up to 750 mm and 2 times above 750 mm ducting.
- e. All flanges are to be matched with M8, GI fasteners and flat washers on both the sides.

- f. All the flanges should have fasteners at the 4 corners.
- g. All the fasteners to be fixed at a pitch distance of between 125 mm to 150mm.
- h. All the flanges should be properly ground and dressed.
- i. Duct support distance should not be more than 2500 mm.
- j. Any duct length should not be more than 3600 mm.
- k. All square / rectangular ducts with more than 1800 mm length should have a brazing frame at the center on the external surface.
- l. Provide 40 x 40 flanges up 750 mm duct size and 50 x 50 above 750 mm.
- m. The finish paint should be admiral grey unless specified.
- n. 5 mm Thick Neoprene gasket shall be used between the flanges.

DUCT SUPPORT SYSTEM

A complete supporting system consisting of fully threaded rods, double L bottom brackets nuts, Washers, clamps for circular ducts and anchor bolts as supplied.



Sr. No.	Maximum Duct Size(mm)	Hanger Rod Diameter	Interval (mm)
1	Up to - 750	6 mm	2400
2	750 - 1500	8 mm	2400
3	1500 - 2000	10 mm	2400
4	Above 2000	12 mm	2400

To provide the required thermal brake effect, Neoprene or equivalent material of suitable thickness shall be used between duct joints.

PP DAMPERS

Volume control damper sets shall be provided where specified according to the specifications. Dampers shall be double thickness heavier than the thickness of the large duct & shall be rigid in construction.

The volume control dampers shall be of an approved type , lever operated & complete with locking devices which will permit the dampers to be adjusted & locked in any positions.

Construct blades of 3 mm thick PP MOC, provide heavy-duty molded self-lubricating nylon bearings, 13mm (1/2") diameter Plastic axles spaced on 225mm (9") centers. Construct frame of 300 mm diameter outer with Flange for fitting minimum 6 bolts and nuts.

ACTUATOR DAMPERS

- The fume hood VAV damper are high quality flanged units with clear PVC bodies, steel cored UPVC sleeved shafts, PTFE bearings and butyl rubber sealing rings.

- The fresh air bleed damper are UPVC high quality flanged units with steel cored UPVC sleeved shafts, PTFE bearings and high precision gears.

FLEXIBLE HOSE

Provide flexible duct connections wherever ductwork connects to vibration isolated equipment and on all exhaust final connections to fume hoods, spot extractor and canopy as indicated on the drawings. Construct flexible connections of PVC coated collapsible hose clipped into duct and equipment to make air-tight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse and torsional movement and also capable of absorbing vibrations of connected equipment.

Flexible connections shall be air tight and resistant to water and fire.

Flexible connections shall be fitted to isolate fans from equipments and/or ductwork. The connections shall be arranged to permit the renewal of the connection without disturbing the duct work or the plant.

4. SPECIFICATION FOR VARIABLE FREQUENCY DRIVES

The variable speed drives shall convert three-phase, 60 HZ utility power to adjustable voltage and frequency, three-phase, AC power for step less motor speed control from 10% to 100% of the motor's 60 Hz speed. Input voltage shall be as specified in the schedule.

The VFD output power shall vary frequency to the motor from 6 to 60 Hz with resultant motor speed varying at the motor nameplate rated speed, with output voltage variation from zero to motor rated voltage for optimum volts per hertz (V/Hz) ratio for fan and pump loads. Output current shall be rated 110% of motor full load amps (FLA) for 1 minute based upon VFD's variable torque FLA rating.

FEATURES

Hand/Off/Auto selector to start and stop the motor. In the auto position, the drive shall start/stop from a remote contact closure. In the auto position, motor speed shall be determined by the follower signal. In the manual position, motor speed shall be determined by manual adjustment.

Power on indication that the VFD is being supplied by the power line.

Fault indication that the VFD has tripped on a fault condition.

Display shall indicate load parameters such as load percent, frequency or running load amps.

Terminations for safety interlocks such as freeze and smoke shut-down.

Speed Reference Input: Shall accept both a manual speed signal and a 0-10 VDC speed reference analog input signal from the Building Automation System (BAS).

Feedback Signal: Provide 0-5 VDC or 0-20 mA analog output signal to indicate actual operating speed of VFD. Output signal shall be fed into the BAS.

CHAPTER-03 d

HVAC SYSTEM SPECIFICATION

Section: 1

STANDARDS AND CODES

1. ASHRAE Standards for System and Equipment
2. UL - Underwriters Laboratories.
3. Eurovent - Air Handling Units
4. ARI - Cooling Coil ratings
5. AMCA - Fans
6. NEMA - Enclosures for Electrical Equipment
7. NFPA - National Fire Protection Association
9. SMACNA – Sheet Metal and Air Conditioning Contractors National Association or Equivalent Indian Standards –1982 Edition or IS277/655 Standards

Section: 2

DESIGN PARAMETERS

DESIGN PARAMETERS		
OUTSIDE DESIGN DATA	As per weather conditions provided by ISHRAE for the specific location.	
INSIDE DESIGN CONDITIONS IN COMFORT CONDITIONED AREAS		
LABSPACE	Lab Area	
TEMPERATURE DB	73.4° F ±2° F	
RELATIVE HUMIDITY	No control on RH	

SECTION: 3

EQUIPMENT SPECIFICATION

Air cooled condensing outdoor units

General

The Air cooled DX condensing outdoor units shall be with high efficiency scroll compressors of minimum capacity and performance as indicated in the BOQ and /or as shown on the drawings.

Each unit shall be completely factory assembled, piped, wired and tested and shall comprise of multiple compressor, starter for compressors, condenser fans, Insulated cooler, air cooled condenser with microprocessor control panel.

The proposed plant layout must be considered as an outline of intent and the contractor shall ensure that the equipment offered do not significantly change the intended plant layout. Great importance is attached to good pipe work arrangement and installation to enable maintenance and repair works to be carried out properly and efficiently.

The manufacturer's standard equipment shall be used. This specification must only be considered as an outline form. All accessories, pipes, connections, wiring, thermometers, gauges, protective devices, and other apparatus that may be necessary for the complete operation of the air chiller shall be furnished the same as though specified.

Engineering data on which the tender is based shall be submitted in a manner to facilitate convenient review of the following factors.

The split shall utilize a non-chlorofluorocarbon (CFC) refrigerant, R-134A/R-410a/R-407c

CASINGS

The unit shall consist of galvanized steel cabinet mounted on a frame, the whole of which shall be rust proofed and finished with a scratched-resistant and wear-resistant baked on enamel so as to resist marine environment corrosion.

Removable panels shall be provided to enable all maintenance and repairs to be carried out without removal of the unit or structural alteration to prevent rattles and

looseness after prolonged period of operation.

The inside of the cabinet (where the compressor is located) shall be insulated with 2" (50 mm) thick high density fiberglass or rock wool or as per manufacturer's standard.

The nuts and bolts shall be treated with anti rust and coat with rust proof paint.

Mild Steel Bolts and Nuts are NOT ACCEPTABLE.

COMPRESSORS

The air cooled outdoor unit shall be fitted with two or more scroll compressors of the semi-hermetic type. In either case, the availability of spare parts shall be assured.

The compressors shall be driven by electric motors designed for operation on 400 $\pm 10\%$ volts, 50 cycle, three-phase. Compressor motors shall be cooled with suction gas or other approved means.

The compressors and motors shall be fully protected against abnormal operating conditions by high and low pressure switches, thermal relays, overload relays and safety controls and Phase Failure fuses.

The compressors shall be fitted with gauge connections for reading oil, suction and discharge pressures and shall be fitted with a sight glass, crankcase heater, muffler, discharge manifold and internal motor protection.

The capacity Control shall be step less control by use of a slide valve or step control by use of solenoid valves. The system should work in reverse cycle heat pump for winter heating

The compressors shall be mounted on spring vibration isolators.

Compressors should be provided with acoustic jacket for sound attenuation from the factory. Field assembly is not acceptable.

CONDENSERS

The condenser shall be of the air cooled cross-finned type with copper tube type to suit the capacity of the unit. Bonding of the fins to the tubes shall be by mechanical means to ensure a positive lasting bond.

The condenser fan shall be the propeller type Low noise fans. Please state noise criteria. This is a criteria that will not hold water as written and be statically and dynamically balanced and shall be mounted on a solid steel shaft running in self-aligning ball bearings, amply sized for quiet operation and long life. The condenser fan shall be driven directly by resiliently mounted squirrel cage induction motor with adequate horsepower for the duty.

Condenser Coil fins to be coated against corrosion.

Manufacturer has to ensure that all the pre commissioning checks are carried out as well as to ensure that the installation complies with accepted manufacturer's standard.

Calculate the deration of the equipment as per ambient & length of pipe. The max distance between indoor and outdoor unit is not more than 25mts.

VIBRATION ISOLATION MOUNTING

The unit shall be supplied with adequate number of level adjusting spring type

isolation provided by the manufacturer.

COPPER PIPING

Interconnecting refrigerant pipe work Copper piping (Hard drawn) with (19mm/13mm thick closed cell elastomeric nitrile rubber tubular insulation) between each set of indoor and outdoor units as per the specifications, The pipe sizes shall be selected according to the equipments capacities. all piping inside the room, within the shaft and on terrace shall be properly supported with suitable Zinc coated MS hanger & clamps. Provide factory made rubber sleeve between piping and clamps. The support hanger shall be grouted to the wall and roof structure using Anchor fasteners. The maximum spacing between the supports shall not exceed 1200-mm and provide support at each bend additionally.

Stands :

Galvanized stands for Outdoor units, frames to painted with two coats of primer and two coats of synthetic enamel paint. Serrated rubber pads, Vibration isolators, to be provided between the ODU base and ODU stand, ODU stand base and floor.

AIR HANDLING UNIT

CONSTRUCTION:

AHU shall be double skin construction provided by “ sandwich “ type 42+/-2 mm thick panels comprising 0.6mm thick plain GI outer sheet and 0.6 mm thick GI inner sheet with polymerized polyurethane foam of 40Kg/m³ density.

AHU sections shall be mounted on a 2.5 mm thick galvanized steel bolter Channel – 100 base frame, to assure entire stability and permit easy lifting, handling and positioning on site. Unit with sectional splits shall be provided with gaskets and sealing material as well as connection clamps, to permit quick and airtight site assembly.

The AHUs shall be included with coil section, filter section, Fan section, etc.,

FILTRATION

Filter sections are provided to house with following criteria:-

WaterWashable Prefilters, flat type synthetic fibre media, efficiency 65% gravimetric to be arranged in galvanized universal steel frames or on sliding rails for either front or side removal.

The filter section shall include pre-filter (MERV -8) to remove particles down to 10 Micron, 30-35 % dust spot efficiency (Equivalent to Eurovent Grade F5) on ASHRAE STD. 52.2. 1999. The micro-vee filters (MERV-11) to remove particles down to 1 - 5 Micron, 60-65% dust spot efficiency (Equivalent to Eurovent Grade F7), on ASHRAE STD. 52.2. 1999.

FAN MOTOR ASSEMBLY

Fan sections shall be fitted with one or two, double inlet, double width backward curved centrifugal fan, depending upon air volume and static pressure requirements. Fan inlets shall be aerodynamically designed and wheels statically and dynamically balanced to grade G6.3 ISO 1940/1. Bearings shall range from either sealed for life ball bearings for life ball bearings for smaller fans, block type with self aligning ball journals and split pillow blocks with grease points for larger fans.

Fan drives (V belt type) shall be factory selected and installed to meet the required performance. Motors shall be TEFC type, class F insulation, and IP55 protection.

Total fan – motor assembly will be installed on a separate base frame supported and isolated from the unit structure by anti-vibration spring isolators. Fan section shall be provided with access door. Fan sections are to be provided with bulkhead lights and switches will be water resistant with all connection wiring houses in metal conduit. Terminal blocks/ switches shall be externally mounted on the casing. Minimum service factor is 10%.

Flexible connections should be provided between fan discharge and casing.

COOLING COILS

All cooling coils shall be furnished to meet the performance requirements sets forth in the schedule.

All coils shall be installed on tracks for each removal from the air handling unit.

Dx Cooling coils shall be designed to operate at 250 PSIG design working pressure with no pressure drop over a period of 4 hours and shall be tested with 300 PSIG compressed air. Circuiting shall provide free and complete draining and venting when installed in the unit. All coils must have same end connections regardless of the number of rows deep.

Coil casing to be constructed of 16 gauges galvanized steel. Intermediate casing supports shall be supplied for finned lengths that exceed 60 “.

The primary surface shall be 5/8 “OD copper tube, staggered in direction of air flow. Tubes shall be mandrel expanded to form fin bond and provide burnished, work-hardened interior surface. The tubes shall have a minimum tube wall thickness of 0.025”.

Extended surface shall consist of die-formed, continuous, aluminium fins. The fins shall have fully drawn collars to accurately space fins, and to form a protective sheath for the primary surface. The fin thickness shall be 0.0075”.

Headers should be of heavy seamless copper / MS pipes, silver brazed to tubes. Connections shall be red brass, with male pipe threads, silver-brazed to the headers. A ½” FPT plugged, vent or drain tap should be provided on each connection, accessible without penetrating the unit casing.

Coil grommets should be provided on all coils to completely seal the area between the coil connection and the unit casing.

Cooling Coils should be minimum of 6 rows deep and the face velocity not to exceed 500 FPM detailed coil selection should be furnished along with offer.

All fan parts shall be given a bonding coat before painting. After the cleaning and surface conditioning process, but before final assembly, parts shall be spray painted with one coat of grey primer finisher. A second coat of the same paint shall be applied to the exterior and all accessible interior surfaces after the fan is assembled. Inlet screens are required for all SISW fans, constructed for easy removal, of 50mm (2”) wire mesh. Where inlet bearings are used, screens shall be mounted inside these bearings.

Access doors are required in all fans scrolls of fans over 910mm (36”) wheel diameter. Doors shall be of the quick opening type, secured to the frame by hand grip bolts and provided with lift handles. Raised type access doors shall be provided on all insulated fans (inner surface to be flush with the scroll)

Vibration isolation shall be as specified else where and herein:

- (i) In cases of fans where more than one speed is specified, isolators shall be selected for the lowest speed.

- (ii) The motor and fan base shall be welded or bolted to form a common base to prevent any uncommon physical motion of the fan and motor.

The fans shall be V – belt driven at 1.5 times the motor horsepower, Sheaves shall be adjustable ratio type and they shall be sized to give the required fan speed with motor sheave at about the middle of its range of adjustment.

Each drive over 1 HP shall have at least 2 belts, Below 1 HP, drive may be single belt, sized at 2.0 times the motor horse power. Belt guards with opening for RPM readings shall be provided for all sheaves and belts. Submit drive data for approval. For fans with motors 37 Kw (50 HP) and over, supply fixed rotation sheaves in lieu of the variable type.

Provided additional adjustable or fixed sheaves at no extra cost, if required for balancing.

Fan Speed shall not exceed 700 RPM.

SECTION: 4

SHEET METAL WORK

- All ducting shall be factory fabricated of LFQ (Lock Forming Quality) grade prime G.I.
- raw material.
- Galvanizing shall be of 120 gms/ sqm. (Total coating on both sides)
- G.I. raw material should be used in coil – form (instead of sheets) so as to limit the longitudinal joints at the edges only irrespective of cross-section dimensions.
- Duct Connectors and Accessories
- All transverse duct connectors (flanges /cleats) and accessories / related hardware are such as support system shall be zinc coated (galvanized).

All ductwork including straight sections, tapers, elbows, branches, shoe pieces, collars and other transformation pieces must factory – fabricated. Fabrication by utilizing the following machines and process to provide the requisite quality of ducts and speed of supply.

- Coil line to ensure location of longitudinal seams at corners / folded edges only to obtain the required duct rigidity and low leakage characteristics. No longitudinal seams permitted along any face side of the duct.
- All ducts, transformation pieces and fittings to be made on CNC profile cutters for required accuracy of dimensions, location and dimensions of notches at the folding lines.
- All edges to be machine treated using lock formers, flanges and roller for turning up edges.
- Sealant dispensing equipment for applying built – in sealant in Pittsburgh lock where sealing of longitudinal joints are specified.
- Duct Construction shall be in compliance with 1 “(250 Pa) w.g Static norms as per SMACNA.
- All transverse connectors shall be the Rolamate or equivalent – 4 bolt slip – on flange system makes of similar 4 – bolt system with built-in sealant.
- The specific class of transverse connector and duct gauge for a given duct dimension will be as per Table 1 below for 1” (250 Pa) pressure class.

- Non – toxic, AC – applications grade P.E. or PVC Gasketing is required between all mating Rolamate or equivalent flanged joints. Gasket sizes should conform to flange manufacturer's specification.

Gauge of sheet to be used	1mm to 750mm (24 G)
	751mm to 1500mm (22 G)
	1501mm to 2100mm (20 G)
	2101mm to Above (18 G)
Jointing	
1.1mm – 750mm (24 G)	TDF Flanges
2.751 mm – 1500mm (22 G)	TDF Flanges
3.1501mm – 2100mm (20 G)	TDF Flanges
4.2101mm – Above (18 G)	TDF Flanges
Gasket	Self Adhesive (width is 25mm & thickness is 3mm)

DUCT SUPPORT SYSTEM

A completely galvanized system consisting of fully threaded rods, slotted Angles or double L bottom brackets (made out of 3.0 mm M.S. sheet) nuts,Washers and anchor bolts as supplied by manufacture.

Sr. No.	Duct Maximum Size(mm)	Hanger Rod Diameter	Interval (mm)
1	Up to - 750	6 mm	2400
2	750 - 1500	8 mm	2400
3	1500 - 2000	10 mm	2400
4	Above 2000	12 mm	2400

As an alternative, slotted galvanized brackets attached to the top two bolts of the Rolamate or equivalent system may also be used as appropriate for the site condition.

- To provide the required thermal brake effect, Neoprene or equivalent material of suitable thickness shall be used between duct supports and duct profiles in all supply air ducts not enclosed by return air plenums

GSS DAMPERS

Volume damper sets shall be provided where specified and/or as shown on the drawings.

The GI volume control damper with Quadrant type and opposed blade construction shall be with matching flanges on both side. The space between the bolts on the matching flanges

should not be more than 100 mm.

The type of volume damper to be used for each application shall be as follows:

- Manually adjustable damper sets should be opposed blade type.
- Manually adjustable dampers at duct branch takeoffs should be opposed blade type.
- Manually adjustable dampers at air outlets and grilles should be opposed blade type.

All components of the damper set, including rod linkage and joints shall be rust-proof finished.

Bird screens

Galvanized woven mesh or weld mesh bird screens in rigid galvanized iron frames shall be installed behind all external louvers and over all relief and exhaust air openings to the outside of the building.

FIRE DAMPER

1. The fire dampers should be UL rated – UL555s Classified.
2. The highest temperature rating should be 350° F (177° C), is recommended as it provides a higher level of safety - 250° F or 350° F (121° C or 177° C)
3. Lowest leakage rating(Class I) is recommended as it provides a higher level of safety. Most codes require a minimum of Class II.
4. Maximum pressure across closed damper (4 or 6 in.wg)
5. Maximum air flow rate thorough the open damper (2000 or 3000 fpm)
6. Damper Construction should be with frame, blades, blade stops, seals, linkage, axles etc.
7. The sleeves should be single assembly with an integral factory sleeve of desired lengths and thickness.
8. Mounting can be vertical or horizontal mounting.

SECTION: 5 – INSULATION

DUCT INSULATION

CLOSED CELL ELASTOMERIC FOAM INSULATION –AIR DUCT

Material: The insulation used shall be flexible closed cell elastomeric foam with the following requirements:

1. Thermal conductivity (λ) BS 874 Part 2 – 86 (DIN 52613, 52612)
 - 20° C < 0.032 W/mK
 - 0° C < 0.034 W/mK
 - +20° C < 0.036 W/mKThermal conductivity values shall be governed by a third party supervisory control agreement which shall be for attestation of conformity purpose.
2. Water Vapour Diffusion Resistant (μ) DIN 53122 Part 2, DIN 52615 $\mu > 7000$
3. Water vapour permeability – 0.09 $\mu\text{gm} / \text{Nh}$, BS4370/2
4. Density – 45 to 65 Kg. m^3 or 3 lb / ft^3 to 4 lb / ft^3 .
5. Closed cell content > 90%
6. Fire Rating:
 - BS 476 Part 6 1989 (Fire Propagation): Class O rated.
 - BS 476 Part 7 1987 (Surface spread of flame): Class I rated.
7. Corrosion risk assessment DIN 1988 / 7 certified.
 - “Material should be nitrite free and can contain no more than 0.2 % of ammonia. Insulating material for stainless steel must contain no more than 0.05 % of water soluble chloride ions. “
 - Noise reduction DIN 4109 upto 32 dB(A)
 - Manufacturer should be certified in accordance with ISO 9002 / UNI EN 29002 which includes production control procedures and systems as a pre-requisite.
 - All tests should be conducted by independent, accredited institutes and the supervisory (third party) control agreements should be available for attestation of conformity purposes.
 - The insulation lagers shall be trained by the manufacturer’s local agents before commencement of works. The manufacturer’s local agents shall visit the site periodically to inspect the insulation work. The insulation thickness shall be as follows:
 - Supply air ducts, return air ducts, transfer duct etc. within the building and in the return air path (i.e all ducts in conditioned areas) to be 9 mm thickness. (thermal)
 - Supply, air ducts, return air ducts, transfer ducts within the building and in the return air path (ie. All ducts in conditioned areas) to be 15mm thickness (acoustical)
 - All ducts outside the building or not in return air path (i.e. all ducts in unconditioned areas and in vertical service shaft to be 25 mm thickness. (Exposed)
 - Note: In areas with non U.V. (inside the building) radiation no vapour barriers / coatings are required.
 - Protection against high U.V. light radiation, e.g area exposed to sunlight, two coats of Arm finish paint metal shall be used.

Method Statement for Application of Elastomeric Insulation on Ducts.

- i) Clean area of duct to be insulated to make it dust free, apply thinner / cleaner wherever necessary to make the area grease free.
- ii) Apply glue recommended by manufacturer with an even spread on complete surface of insulation sheet.

- iii) Once the glue on the sheet gets dry, apply glue on the G.I. duct and let it dry, then stick the sheet on one end and slowly press the sheet on the duct from one end to the other so as to ensure that the sheet sticks on the G.I. duct completely avoiding air bubbles between the insulation sheet and G.I duct.
- iv) In areas where the G.I. duct comes in contact with the duct hangers, rigid support is recommended such as section of wood. The wood piece should be glued on to the duct hanger and a layer of rubber to be glued on the wood, so that there is no direct contact between the duct insulation and the wooden piece thus preventing tearing of the duct insulation. In case the positioning of the support is available in advance, wood by itself can be used. In this case it has to be made sure that the insulation will be glued to the wood from both sides accordingly.

For proper wood thickness selection please contact manufacturer's representative.

Method statement of application for outdoor usage:

Avoid working under direct sunlight and exposure of glued joints to sunlight for at least 12 hrs after glue application as sunlight prevents proper curing. Prolonged exposure of elastomeric foam to direct sunlight is not recommended as this will eventually result in deterioration of the surface. Do not keep the glue under direct sunlight as this will result in rapid evaporation of the solvent and affects the performance of the glue.

CHAPTER-04

DRAWING

2.7 M WIDE CORRIDOR

M1X07

M1X06a

M1X06

M1X05

M1X04

M1X03

M1X02

M1X01

3802

12227

7201

6669

7877

4050

STORE 002

ANIMAL HOUSE 001

EXPERIMENT LAB 003

HISTOLOGY LAB

BIOCHEMICAL ROOM 004

HEMATOLOGY LAB 005

L.T- 1

M1X06a.1

G.T- 1

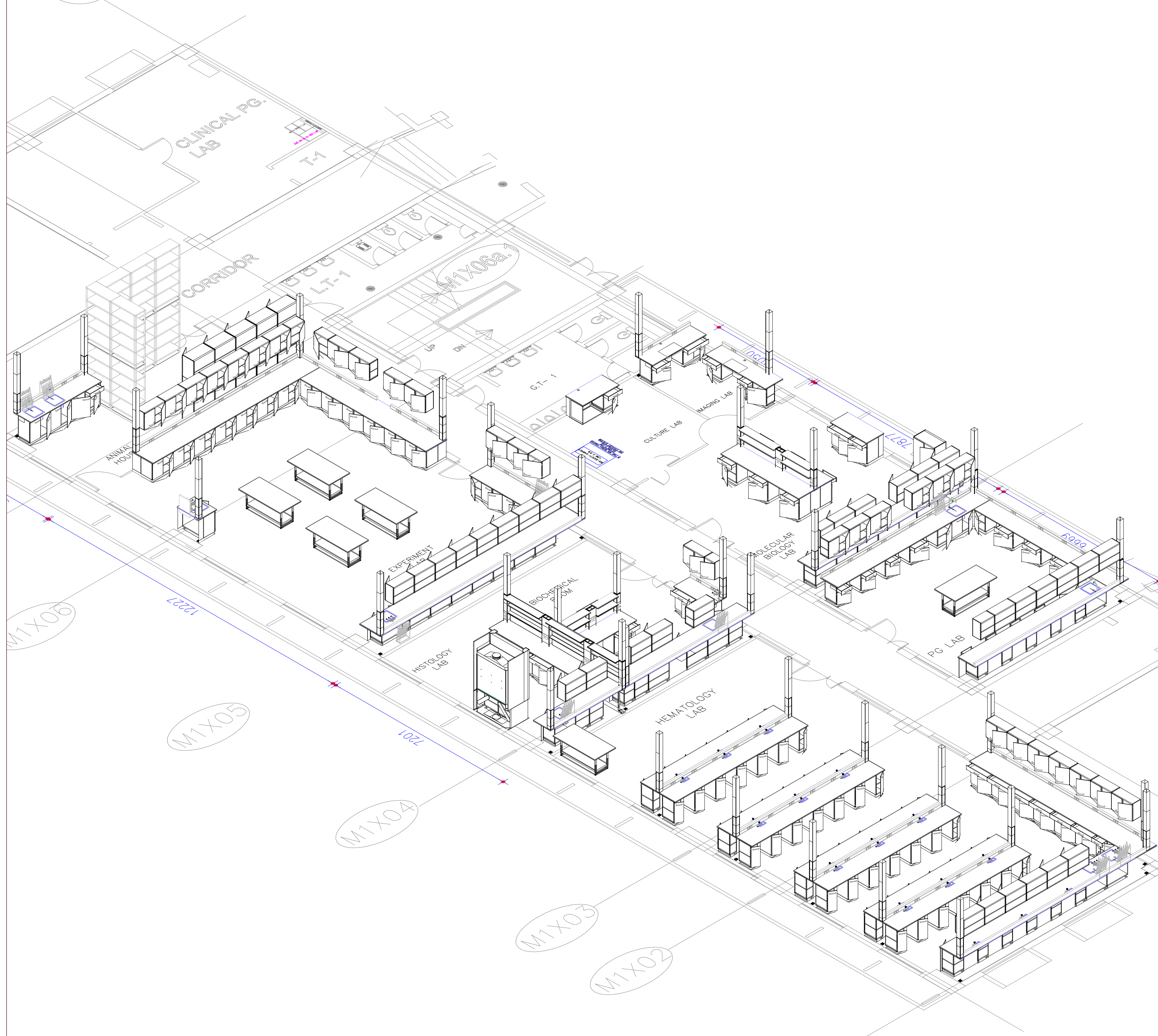
CULTURE LAB 008

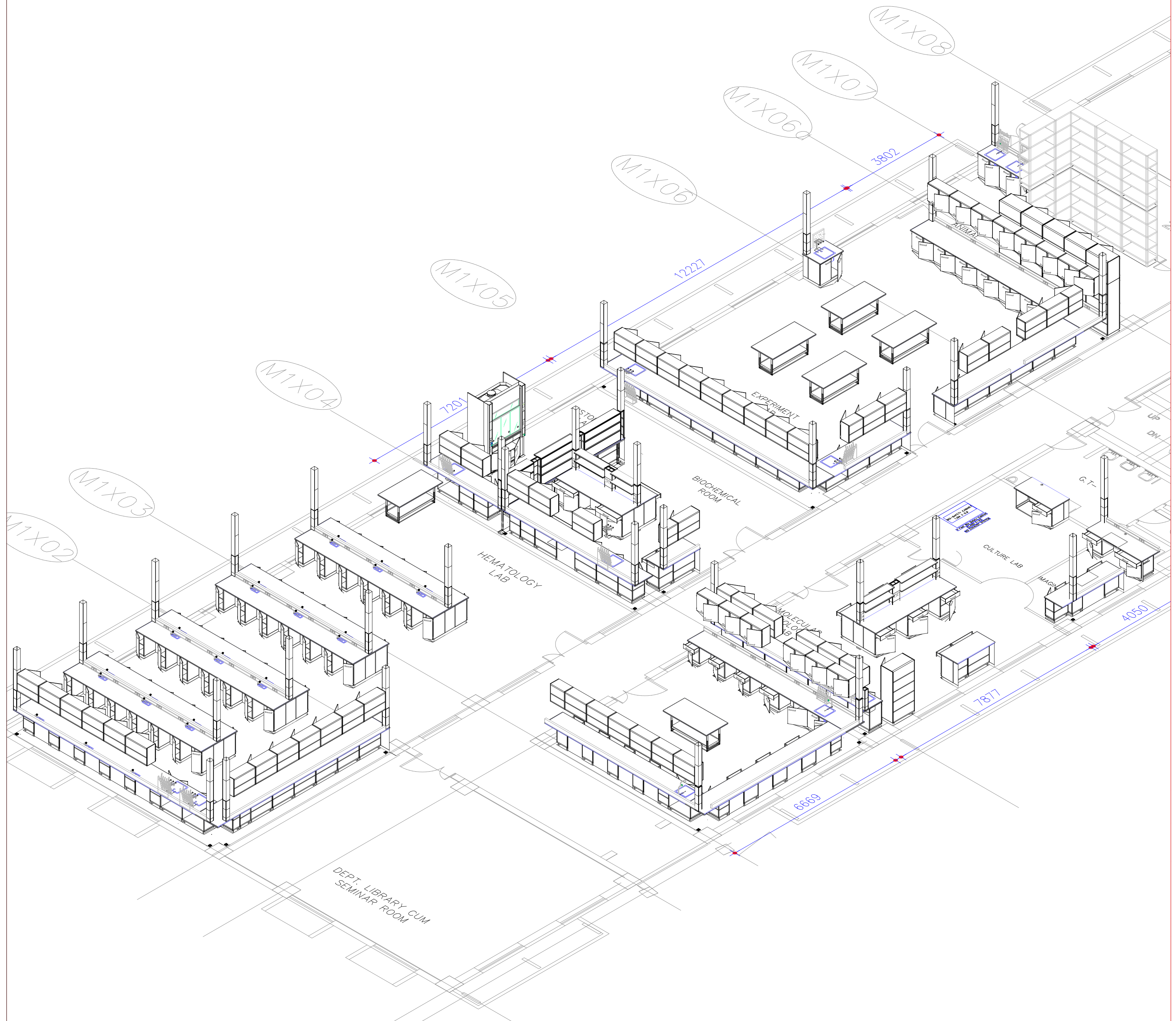
IMAGING LAB

MOLECULAR BIOLOGY LAB 007

PG LAB 006

DEPT. LIBRARY CUM SEMINAR ROOM





Chapter – 4

Bill of Quantities

A. Laboratory Furniture

SL NO	LAB	POSITION	PART DESCRIPTION	QNTY
1	1	1	BENCH MOUNTED COLUMN	2
2			BENCH MOUNTED SERVICE COLUMN, H710, FOR BENCH HEIGHT H900 FOR GRID HEIGHT 1620	2
3			BENCH MOUNTED TAP, BROEN COLD PROCESS WATER (WNC) U-SPOUT, PROJECTION: 90+200	2
4			BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	3.5
5			CASSETTE FOR SERVICE COLUMN W120, H110 BLANK	4
6			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	8
7			CASSETTE FOR SERVICE COLUMN W150, H110 BLANK	4
8			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	8
9			COVER FOR SERVICE COLUMN ABOVE	2
10			DRAINING RACK 420X170X610, BENCH MOUNTED, 24 RODS, 20 ARCHES WITH 2 BASE POLE CONNECTORS	2
11			PEDESTAL CABINET, W600, H870, D516, 1 DOOR L/H, 1 SHELF	1
12			PEDESTAL CABINET, W600, H870, D516, 1 DOOR R/H, 1 DRAWER H150, 1 SHELF,	1
13			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, FOR SINK INSTALLATION	2
14			SERVICE COLUMN W150, D150, H710 UNEQUIPPED	2
15			SINK BOWL, POLYPROPYLENE W400, D400, H250, BLACK, TOP MOUNTED BOWL WITH RIM: FOR GRANITWORK	2
16			SINK CUT-OUT 420X420XR45 GRANITE	2
17			TAP HOLE 1/2 30, GRANITE	2
18			TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	2
19			WALL INFILL PANEL, RIGHT, H870 W400, FOR PEDESTAL UNDERBENCH CABINETS.	1
20			WALL TRUNKING 2 SOCKETS 230V/16A (D)	2
21			WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	1
22			WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	2
23			WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	5
24			WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	3
25			WALL TRUNKING, STEEL END PLATE RAL 7035	2
26			WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	5
27	2	1	TALL STORAGE CABINET, W900 H1920, D516, 2 DOORS, 4 SHELVES, LOCKABLE	5
28			TOP-MOUNTED CABINET, W900 H780, D516, 2 DOORS, 1 SHELF, LOCKABLE	5
29		2	BASE UNIT RACKING SYSTEM, RAL 7035, W1060, D435, H3000, WITH 5 SHELVES	4
30		3	BASE UNIT RACKING SYSTEM, RAL 7035, W1060, D435, H3000, WITH 5 SHELVES	1
31	3	1	BENCH MOUNTED COLUMN	1

32			BENCH MOUNTED SERVICE COLUMN, H710, FOR BENCH HEIGHT H900 FOR GRID HEIGHT 1620	1
33			BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	1
34			CASSETTE FOR SERVICE COLUMN W120, H110 BLANK	2
35			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	4
36			CASSETTE FOR SERVICE COLUMN W150, H110 BLANK	2
37			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	4
38			COVER FOR SERVICE COLUMN ABOVE	1
39			DRAINING RACK 450X650 FOR WALL MOUNTING 72 RODS GREY, MATL: POLYSTYRYROL	1
40			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, FOR SINK INSTALLATION	1
41			SERVICE COLUMN W150, D150, H710 UNEQUIPPED	1
42			SIDE PANEL, UNDERBENCH CABINET H780+85, D500+200 FOR WORKTOP D750, FITTING: CABINET TO WALL/CELL	2
43			SINK BOWL, POLYPROPYLENE W400, D400, H250, BLACK, TOP MOUNTED BOWL WITH RIM: FOR GRANITWORK	1
44			SINK CUT-OUT 420X420XR45 GRANITE	1
45			STANDARMATUR, BROEN 3X BETRIEBSWASSER, KALT (WNC) AUSLADUNG: 180	1
46			TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	1
47		2	BENCH MOUNTED COLUMN	3
48			BENCH MOUNTED SERVICE COLUMN, H860, FOR BENCH HEIGHT H750 FOR GRID HEIGHT 1620	3
49			BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D900 FINISHED EDGE ALL ROUND COLOUR: BLACK	13
50			CASSETTE FOR SERVICE COLUMN W120, H260 BLANK	6
51			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	12
52			CASSETTE FOR SERVICE COLUMN W150, H260 BLANK	6
53			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	12
54			COVER FOR SERVICE COLUMN ABOVE	3
55			INNER CORNER PANEL, H720 FOR PEDESTAL CABINETS	1
56			PEDESTAL CABINET, W900, H720, D516, 2 DOORS, 1 SHELF	13
57			SERVICE COLUMN W150, D150, H860 UNEQUIPPED	3
58			SIDE PANEL H630, D350 WALL MOUNTED CABINET, SIDEBORD	4
59			SIDE PANEL, UNDERBENCH CABINET H630+85, D500+350 FOR WORKTOP D900, FITTING: CABINET TO WALL/CELL	2
60			TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	3
61			WALL MOUNTED CABINET, W600 H630, D366, 1 DOOR L/H, 1 SHELF, LOCKABLE	1
62			WALL MOUNTED CABINET, W600 H630, D366, 1 DOOR R/H, 1 SHELF, LOCKABLE	1
63			WALL MOUNTED CABINET, W900 H630, D366, 2 DOORS, 1 SHELF, LOCKABLE	11
64			WALL TRUNKING 2 SOCKETS 230V/16A (D)	13
65			WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	3
66			WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	8
67			WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	21
68			WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	11
69			WALL TRUNKING, STEEL END PLATE RAL 7035	6

70			WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	21
71		3	BENCH MOUNTED COLUMN	3
72			BENCH MOUNTED SERVICE COLUMN, H860, FOR BENCH HEIGHT H750 FOR GRID HEIGHT 1620	3
73			BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D900 FINISHED EDGE ALL ROUND COLOUR: BLACK	12.5
74			CASSETTE FOR SERVICE COLUMN W120, H260 BLANK	6
75			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	12
76			CASSETTE FOR SERVICE COLUMN W150, H260 BLANK	6
77			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	12
78			COVER FOR SERVICE COLUMN ABOVE	3
79			DRAINING RACK 420X170X610, BENCH MOUNTED, 24 RODS, 20 ARCHES WITH 2 BASE POLE CONNECTORS	2
80			INNER CORNER PANEL, H720 FOR PEDESTAL CABINETS	1
81			PEDESTAL CABINET, W300 H720, D500, DOOR L/H, 1 SHELF	1
82			PEDESTAL CABINET, W450, H720, D516, 1 DOOR L/H, 1 SHELF	1
83			PEDESTAL CABINET, W900, H720, D516, 2 DOORS, 1 SHELF	9
84			PEDESTAL CABINET, W900, H720, D516, 2 DOORS, FOR SINK INSTALLATION	2
85			SERVICE COLUMN W150, D150, H860 UNEQUIPPED	3
86			SIDE PANEL H630, D350 WALL MOUNTED CABINET,SIDEBBOARD	4
87			SIDE PANEL, UNDERBENCH CABINET H630+85, D500+350 FOR WORKTOP D900, FITTING: CABINET TO WALL/CELL	1
88			SINK BOWL, POLYPROPYLENE W400, D400, H250, BLACK, TOP MOUNTED BOWL WITH RIM: FOR GRANITEWORK	2
89			SINK CUT-OUT 420X420XR45 GRANITE	2
90			STANDARMATUR, BROEN 3X BETRIEBSWASSER, KALT (WNC) AUSLADUNG: 180	2
91			TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	3
92			WALL INFILL PANEL, RIGHT, H720 W400, FOR PEDESTAL UNDERBENCH CABINETS.	1
93			WALL MOUNTED CABINET, W600 H630, D366, 1 DOOR R/H, 1 SHELF, LOCKABLE	1
94			WALL MOUNTED CABINET, W900 H630, D366, 2 DOORS, 1 SHELF, LOCKABLE	11
95			WALL TRUNKING 2 SOCKETS 230V/16A (D)	9
96			WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	2
97			WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	7
98			WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	19
99			WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	9
100			WALL TRUNKING, STEEL END PLATE RAL 7035	4
101			WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	19
102		4	BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D900 FINISHED EDGE ALL ROUND COLOUR: BLACK	1.8
103			FREE STANDING TABLE FRAME, W1500, D600, 4 FEET HEIGHT ADJUSTABLE 1 SHELF	1
104		5	BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D900 FINISHED EDGE ALL ROUND COLOUR: BLACK	1.8
105			FREE STANDING TABLE FRAME, W1500, D600, 4 FEET HEIGHT ADJUSTABLE 1 SHELF	1
106		6	BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D900 FINISHED EDGE ALL ROUND COLOUR: BLACK	1.8

107			FREE STANDING TABLE FRAME, W1500, D600, 4 FEET HEIGHT ADJUSTABLE 1 SHELF	1
108		7	BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D900 FINISHED EDGE ALL ROUND COLOUR: BLACK	1.8
109			FREE STANDING TABLE FRAME, W1500, D600, 4 FEET HEIGHT ADJUSTABLE 1 SHELF	1
110	4	1	ANGLE SPOUT A53 TECHNICAL GAS THREADED HOSE FITTING	3
111			ANGLE SPOUT A90 MIXED WATER (WNC/WNH) THREADED HOSE FITTING	1
112			BENCH-TYPE FUME CUPBOARD, W1500, H2550, FOR CHAMBER H2250 DELIVERY STATE: PARTIAL ASSEM	1
113			BROEN ESCUTCHEON TRIM RING FOR LINED FUME CUPBOARDS WITH O- RING BRASS, COATED	4
114			BS AIRFLOW GROUP, FOR W1500 HIGH PERFORMANCE FC, PP/VIRTUON LINER, CHAMBER H=2250/2550	1
115			CASSETTE FOR FC COLUMN W100, H300 2 ELEC. SOCKETS 230V/16A (D)	2
116			CASSETTE FOR FC COLUMN W100, H300, 1 HOLE FOR BROEN VALVE	1
117			CASSETTE FOR FC COLUMN W100, H300, 3 HOLES FOR BROEN VALVES	1
118			CASSETTE FOR FC COLUMN W100, H300, BLANK	3
119			CASSETTE FOR FC COLUMN W100, H630, LEFT, BLANK	1
120			CASSETTE FOR FC COLUMN W100, H630, RIGHT, BLANK	1
121			CASSETTE W300, H150, BLANK	4
122			CEILING PANAL	1
123			CHAMBER FOR BENCH-TYPE FC, W1500, H2250, 250 DIA	1
124			CHEMICAL CABINET, W600, H720, D516, 1 DOOR L/H, 1 SHELF, LOCKABLE	1
125			CHEMICAL CABINET, W600, H720, D516, 1 DOOR R/H, 1 SHELF, LOCKABLE	1
126			COLUMN COVER, FC, LEFT, FOR CASSETTES H2550	1
127			COLUMN COVER, FC, RIGHT, FOR CASSETTES H2550	1
128			COMPOSITE GLASS WORKTOP, FOR W1500 BENCH-TYPE FC, DRIP CUP RIGHT, COLOUR: BLACK	1
129			EXPLORIS TOUCHTRONIC, BASIC VERSION, WITHOUT MCB DIFFERENTIAL PRESSURE TRANSM.	1
130			EXTRACT CONNECTION GROUP FOR VENTED CABINET BELOW FC, PP, OUTLET 1/2", INLET 1X 1/2"	2
131			FC WINDOW, ABOVE SASH, FUME CUPBOARDS W1500, H2250	1
132			FRAME FOR BENCH-TYPE FC, ALL WIDTHS	1
133			FRAME PANEL, MODULAR FOR FUME CUPBOARD, W1500	1
134			FRONT FOR BENCH-TYPE FC, W1500, H2550 CHAMBER HEIGHT 2250/2550	1
135			FUME CUPBOARD ID PLATE	1
136			FUME CUPBOARD LIGHT, W=1500	1
137			FUME CUPBOARD SIDE, LEFT UNEQUIPPED FOR CHAMBER H2250	1
138			FUME CUPBOARD SIDE, RIGHT UNEQUIPPED FOR CHAMBER H2250	1
139			FUME CUPBOARD TAP, BROEN COLD PROCESS WATER (WNC)	1
140			FUME CUPBOARD TAP, BROEN COMPRESSED AIR (CA)	1
141			FUME CUPBOARD TAP, BROEN LOW VACUUM (V)	1
142			FUME CUPBOARD TAP, BROEN NITROGEN (N2)	1
143			INSTALLATION SPACE SCREEN FOR FUME CUPBS	1
144			SCAFFOLD RAIL, W1200, 1/2" FOR FUME CUPBOARD W1500 OR W1200 SERVICE SPINE WITH 2 CONNECTORS	2
145			SCAFFOLD SYSTEM FOR FUME CUPBOARD 2 MOUNTING BLOCKS, 4 RODS, 4 BRACKETS	1
146			SIDE PANEL FOR FUME CUPBOARD H2550, UNEQUIPPED	2
147			SINGLE-PIECE FC SASH, W1500, TABLE H900 3 SLIDING PANELS, LAMINATED SAFETY GLASS (VSG)	1

148			TRESPA TOPLAB VERTICAL LINER, WIDTH=1500, FOR BENCH-TYPE FUME CUPBOARD	1
149			UNDERBENCH PANEL, FOR BENCH-TYPE FUME CUPBOARD, W101	2
150		2	1200MM X 900MM HPL INFILL PANEL	3
151			1500MM X 900MM HPL INFILL PANEL	1
152			BENCH MOUNTED COLUMN	1
153			BENCH MOUNTED SERVICE COLUMN, H710, FOR BENCH HEIGHT H900 FOR GRID HEIGHT 1620	1
154			BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	8
155			BRIDGE FOR SERVICE CELL, WITH COLUMN MOUNT W1500, D150, UNEQUIPPED	1
156			BRIDGE FOR SERVICE CELL, WITH COLUMN MOUNT W1800, D150, UNEQUIPPED	2
157			CASSETTE FOR SERVICE COLUMN W120, H110 BLANK	10
158			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	28
159			CASSETTE FOR SERVICE COLUMN W150, H110 BLANK	4
160			CASSETTE FOR SERVICE COLUMN W150, H300, 2 SOCKETS 400V/16A CEE	2
161			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	8
162			CASSETTE FOR SERVICE COLUMN W300, H110 BLANK	2
163			CASSETTE FOR SERVICE COLUMN W300, H300 2 SOCKETS 400V/16A CEE	2
164			CASSETTE FOR SERVICE COLUMN W300, H300, BLANK	4
165			COVER FOR SERVICE COLUMN ABOVE	7
166			CUT-OUT, ROUND, SMALL, WITH MARINE EDGING UP TO 300X300 MELAMINE	1
167			DRAINING RACK 420X170X610, BENCH MOUNTED, 24 RODS, 20 ARCHES WITH 2 BASE POLE CONNECTORS	1
168			HPL PANEL, PER M ² , CUT TO SIZE MAX. 1500X1300X6 LAMINATED BOTH SIDES ARCTIC WHITE	6
169			INNER CORNER PANEL, H870 FOR PEDESTAL CABINETS	1
170			KNEE SPACE PANEL, H780+85, W750 FOR TABLE H900	1
171			PEDESTAL CABINET, W600, H870, D516, 1 DOOR L/H, 1 SHELF	1
172			PEDESTAL CABINET, W600, H870, D516, 1 DOOR R/H, 1 SHELF	1
173			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, 1 DRAWER H150, 1 SHELF	1
174			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, 1 SHELF	3
175			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, FOR SINK INSTALLATION	1
176			SERVICE CELL W1500, H1920 WALL-MOUNTED, W/OUT PIPEWORK	1
177			SERVICE CELL W1800, H1920 WALL-MOUNTED, W/OUT PIPEWORK	2
178			SERVICE COLUMN W150, D150, H1010 UNEQUIPPED	2
179			SERVICE COLUMN W150, D150, H710 UNEQUIPPED	1
180			SERVICE COLUMN W300, D150, H1010 UNEQUIPPED	2
181			SHELF FOR SERVICE CELL W1200, D150, HPL INSERT FOR WALL ISLAND BENCHES HPL	2
182			SHELF FOR SERVICE CELL W1200, D300, HPL INSERT FOR WALL BENCHES HPL	1
183			SHELF FOR SERVICE CELL W1500, D150, HPL INSERT FOR WALL ISLAND BENCHES HPL	4
184			SHELF FOR SERVICE CELL W1500, D300, HPL INSERT FOR WALL BENCHES HPL	2
185			SIDE PANEL H630, D350 WALL MOUNTED CABINET,SIDEBBOARD	2

186			SIDE PANEL, UNDERBENCH CABINET H780+85, D500+200 FOR WORKTOP D750, FITTING: CABINET TO WALL/CELL	1
187			SINK BOWL, POLYPROPYLENE W400, D400, H250, BLACK, TOP MOUNTED BOWL WITH RIM: FOR GRANITEWORK	1
188			SINK CUT-OUT 420X420XR45 GRANITE	1
189			SPLASH SCREEN FOR SERVICE CELL W1200, H340 STEEL	1
190			SPLASH SCREEN FOR SERVICE CELL W1500, H340 STEEL	2
191			SPLASHBACK FOR SERVICE CELL W1200, H270 STEEL	2
192			SPLASHBACK FOR SERVICE CELL W1500, H270 STEEL	4
193			STANDARMATUR, BROEN 3X BETRIEBSWASSER, KALT (WNC) AUSLADUNG: 180	1
194			SUPPORT FOR SERVICE CELL H900, FOR SINGLE-SIDED BENCH	3
195			TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	3
196			WALL ATTACHMENT PROFILE, LAMINATED, ARCTIC WHITE	4
197			WALL INFILL PANEL, RIGHT, H870 W400, FOR PEDESTAL UNDERBENCH CABINETS.	1
198			WALL MOUNTED CABINET, W900 H630, D366, 2 DOORS, 1 SHELF, LOCKABLE	2
199			WALL TRUNKING 2 SOCKETS 230V/16A (D)	1
200			WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	1
201			WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	2
202			WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	10
203			WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	3
204			WALL TRUNKING, STEEL END PLATE RAL 7035	2
205			WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	10
206		3	BENCH MOUNTED COLUMN	2
207			BENCH MOUNTED SERVICE COLUMN, H710, FOR BENCH HEIGHT H900 FOR GRID HEIGHT 1620	2
208			BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	6
209			CASSETTE FOR SERVICE COLUMN W120, H110 BLANK	4
210			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	8
211			CASSETTE FOR SERVICE COLUMN W150, H110 BLANK	4
212			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	8
213			COVER FOR SERVICE COLUMN ABOVE	2
214			CUT-OUT, ROUND, SMALL, WITH MARINE EDGING UP TO 300X300 MELAMINE	1
215			DRAINING RACK 420X170X610, BENCH MOUNTED, 24 RODS, 20 ARCHES WITH 2 BASE POLE CONNECTORS	1
216			KNEE SPACE PANEL, H780+85, W750 FOR TABLE H900	1
217			PEDESTAL CABINET, W450, H870, D516, 1 DOOR R/H, 1 DRAWER H150, 1 SHELF	1
218			PEDESTAL CABINET, W600, H870, D516, 1 DOOR L/H, 1 DRAWER H150, 1 SHELF	1
219			PEDESTAL CABINET, W600, H870, D516, 1 DOOR L/H, 1 SHELF	1
220			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, 1 DRAWER H150, 1 SHELF	1
221			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, 1 SHELF	2
222			SERVICE COLUMN W150, D150, H710 UNEQUIPPED	2
223			SIDE PANEL H630, D350 WALL MOUNTED CABINET,SIDEBORD	4
224			SINK BOWL, POLYPROPYLENE W400, D400, H250, BLACK, TOP MOUNTED BOWL WITH RIM: FOR GRANITEWORK	1

225			SINK CUT-OUT 420X420XR45 GRANITE	1
226			STANDARMATUR, BROEN 3X BETRIEBSWASSER, KALT (WNC) AUSLADUNG: 180	1
227			TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	2
228			WALL INFILL PANEL, RIGHT, H870 W400, FOR PEDESTAL UNDERBENCH CABINETS.	1
229			WALL MOUNTED CABINET, W900 H630, D366, 2 DOORS, 1 SHELF, LOCKABLE	3
230			WALL TRUNKING 2 SOCKETS 230V/16A (D)	3
231			WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	1
232			WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	3
233			WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	9
234			WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	4
235			WALL TRUNKING, STEEL END PLATE RAL 7035	2
236			WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	9
237		4	BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	6
238			BRIDGE FOR SERVICE CELL, WITH COLUMN MOUNT W1200, D150, UNEQUIPPED	1
239			BRIDGE FOR SERVICE CELL, WITH COLUMN MOUNT W1500, D150, UNEQUIPPED	1
240			CASSETTE FOR SERVICE COLUMN W120, H110 BLANK	6
241			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	12
242			CASSETTE FOR SERVICE COLUMN W150, H110 BLANK	4
243			CASSETTE FOR SERVICE COLUMN W150, H300, 2 SOCKETS 400V/16A CEE	4
244			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	4
245			CASSETTE FOR SERVICE COLUMN W300, H110 BLANK	2
246			CASSETTE FOR SERVICE COLUMN W300, H300 2 SOCKETS 400V/16A CEE	2
247			CASSETTE FOR SERVICE COLUMN W300, H300, BLANK	2
248			COVER FOR SERVICE COLUMN ABOVE	4
249			FRONT PANEL ISLAND BENCH H780+85 FOR TABLE D1500	1
250			KNEE SPACE PANEL, H780+85, W900 FOR TABLE H900	2
251			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, 1 DRAWER H150, 1 SHELF	4
252			SERVICE CELL W1200, H1620 FREE STANDING, W/OUT PIPEWORK	1
253			SERVICE CELL W1500, H1620 FREE STANDING, W/OUT PIPEWORK	1
254			SERVICE COLUMN W150, D150, H710 UNEQUIPPED	2
255			SERVICE COLUMN W300, D150, H710 UNEQUIPPED	1
256			SHELF FOR SERVICE CELL W1200, D300, HPL INSERT FOR ISLAND/PENINSULA BENCHES HPL	2
257			SHELF FOR SERVICE CELL W900, D300, HPL INSERT FOR ISLAND/PENINSULA BENCHES HPL	2
258			SUPPORT FOR DOUBLE CELL H900, FOR DOUBLE-SIDED BENCH	2
259			TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	2
260		5	BENCH MOUNTED COLUMN	1
261			BENCH MOUNTED SERVICE COLUMN, H710, FOR BENCH HEIGHT H900 FOR GRID HEIGHT 1620	1
262			BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	2
263			CASSETTE FOR SERVICE COLUMN W120, H110 BLANK	2
264			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	4

265			CASSETTE FOR SERVICE COLUMN W150, H110 BLANK	2
266			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	4
267			COVER FOR SERVICE COLUMN ABOVE	1
268			PEDESTAL CABINET, W600, H870, D516, 1 DOOR R/H, 1 DRAWER H150, 1 SHELF,	1
269			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, 1 DRAWER H150, 1 SHELF	1
270			SERVICE COLUMN W150, D150, H710 UNEQUIPPED	1
271			SIDE PANEL H630, D350 WALL MOUNTED CABINET,SIDEBOARD	2
272			SIDE PANEL, UNDERBENCH CABINET H780+85, D500+200 FOR WORKTOP D750, FITTING: CABINET TO WALL/CELL	1
273			TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	1
274			WALL MOUNTED CABINET, W450 H630, D366, 1 DOOR R/H, 1 SHELF, LOCKABLE	1
275			WALL MOUNTED CABINET, W900 H630, D366, 2 DOORS, 1 SHELF, LOCKABLE	1
276			WALL TRUNKING 2 SOCKETS 230V/16A (D)	2
277			WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	1
278			WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	1
279			WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	3
280			WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	2
281			WALL TRUNKING, STEEL END PLATE RAL 7035	2
282			WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	3
283	5	1	BENCH MOUNTED COLUMN	4
284			BENCH MOUNTED SERVICE COLUMN, H710, FOR BENCH HEIGHT H900 FOR GRID HEIGHT 1620	4
285			BENCH MOUNTED TAP, BROEN NATURAL GAS (G) PROJECTION: 137	3
286			BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D900 FINISHED EDGE ALL ROUND COLOUR: BLACK	15.5
287			CASSETTE FOR SERVICE COLUMN W120, H110 BLANK	8
288			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	16
289			CASSETTE FOR SERVICE COLUMN W150, H110 BLANK	8
290			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	16
291			COVER FOR SERVICE COLUMN ABOVE	4
292			DRAINING RACK 420X170X610, BENCH MOUNTED, 24 RODS, 20 ARCHES WITH 2 BASE POLE CONNECTORS	2
293			DRIP CUP, POLYPROPYLENE, W290, D126, H165, WHITE TOP MOUNTED BOWL WITH RIM: FOR GRANITEWORKTOPS	3
294			INNER CORNER PANEL, H870 FOR PEDESTAL CABINETS	1
295			INSTEAD OF GAS WATER TAP PLEASE CONSIDER LOCVAL WATER TAP	3
296			KNEE SPACE PANEL, H780+85, W600 FOR TABLE H900	5
297			PEDESTAL CABINET, W300 H870, D500, DOOR R/H, 1 SHELF	1
298			PEDESTAL CABINET, W450, H870, D516, 1 DOOR L/H, 1 DRAWER H150, 1 SHELF	1
299			PEDESTAL CABINET, W450, H870, D516, 1 DOOR L/H, 1 SHELF	5
300			PEDESTAL CABINET, W450, H870, D516, 1 DOOR R/H, 1 SHELF 1 SHELF	1
301			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, 1 DRAWER H150, 1 SHELF	6
302			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, FOR SINK INSTALLATION	2
303			SERVICE COLUMN W150, D150, H710 UNEQUIPPED	4
304			SIDE PANEL H630, D350 WALL MOUNTED CABINET,SIDEBOARD	4

305		SIDE PANEL, UNDERBENCH CABINET H780+85, D500+350 FOR WORKTOP D900, FITTING: CABINET TO WALL/CELL	1
306		SINK BOWL, POLYPROPYLENE W400, D400, H250, BLACK, TOP MOUNTED BOWL WITH RIM: FOR GRANITEWORK	2
307		SINK CUT OUT, 260X112, GRANITE	3
308		SINK CUT-OUT 420X420XR45 GRANITE	2
309		STANDARMATUR, BROEN 3X BETRIEBSWASSER, KALT (WNC) AUSLADUNG: 180	2
310		TAP HOLE 'J' 30, GRANITE	3
311		TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	4
312		WALL INFILL PANEL, RIGHT, H870 W400, FOR PEDESTAL UNDERBENCH CABINETS.	2
313		WALL MOUNTED CABINET, W900 H630, D366, 2 DOORS, 1 SHELF, LOCKABLE	13
314		WALL TRUNKING 2 SOCKETS 230V/16A (D)	13
315		WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	2
316		WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	8
317		WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	23
318		WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	10
319		WALL TRUNKING, STEEL END PLATE RAL 7035	4
320		WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	23
321	2	BENCH MOUNTED COLUMN	2
322		BENCH MOUNTED SERVICE COLUMN, H710, FOR BENCH HEIGHT H900 FOR GRID HEIGHT 1620	2
323		BENCH MOUNTED TAP, BROEN NATURAL GAS (G) PROJECTION: 137	6
324		BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	12
325		CASSETTE FOR SERVICE COLUMN W120, H110 BLANK	4
326		CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	8
327		CASSETTE FOR SERVICE COLUMN W150, H110 BLANK	4
328		CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	8
329		COVER FOR SERVICE COLUMN ABOVE	2
330		DRIP CUP, POLYPROPYLENE, W290, D126, H165, WHITE TOP MOUNTED BOWL WITH RIM: FOR GRANITEWORKTOPS	6
331		FRONT PANEL ISLAND BENCH H780+85 FOR TABLE D1500	1
332		INSTEAD OF GAS WATER TAP PLEASE CONSIDER LOCVAL WATER TAP	6
333		KNEE SPACE PANEL, H780+85, W600 FOR TABLE H900	12
334		PEDESTAL CABINET, W300 H870, D500, DOOR L/H, 1 SHELF	7
335		PEDESTAL CABINET, W300 H870, D500, DOOR R/H, 1 SHELF	7
336		SERVICE COLUMN W150, D150, H710 UNEQUIPPED	2
337		SINK CUT OUT, 260X112, GRANITE	6
338		TAP HOLE 'J' 30, GRANITE	6
339		TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	2
340		WALL TRUNKING 2 SOCKETS 230V/16A (D)	12
341		WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	2
342		WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	6
343		WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	18
344		WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	8
345		WALL TRUNKING, STEEL END PLATE RAL 7035	4
346		WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	18
347	3	BENCH MOUNTED COLUMN	2

348		BENCH MOUNTED SERVICE COLUMN, H710, FOR BENCH HEIGHT H900 FOR GRID HEIGHT 1620	2
349		BENCH MOUNTED TAP, BROEN NATURAL GAS (G) PROJECTION: 137	6
350		BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	12
351		CASSETTE FOR SERVICE COLUMN W120, H110 BLANK	4
352		CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	8
353		CASSETTE FOR SERVICE COLUMN W150, H110 BLANK	4
354		CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	8
355		COVER FOR SERVICE COLUMN ABOVE	2
356		DRIP CUP, POLYPROPYLENE, W290, D126, H165, WHITE TOP MOUNTED BOWL WITH RIM: FOR GRANITEWORKTOPS	6
357		FRONT PANEL ISLAND BENCH H780+85 FOR TABLE D1500	1
358		INSTEAD OF GAS WATER TAP PLEASE CONSIDER LOCVAL WATER TAP	6
359		KNEE SPACE PANEL, H780+85, W600 FOR TABLE H900	12
360		PEDESTAL CABINET, W300 H870, D500, DOOR L/H, 1 SHELF	7
361		PEDESTAL CABINET, W300 H870, D500, DOOR R/H, 1 SHELF	7
362		SERVICE COLUMN W150, D150, H710 UNEQUIPPED	2
363		SINK CUT OUT, 260X112, GRANITE	6
364		TAP HOLE 'J' 30, GRANITE	6
365		TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	2
366		WALL TRUNKING 2 SOCKETS 230V/16A (D)	12
367		WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	2
368		WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	6
369		WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	18
370		WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	8
371		WALL TRUNKING, STEEL END PLATE RAL 7035	4
372		WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	18
373	4	BENCH MOUNTED COLUMN	2
374		BENCH MOUNTED SERVICE COLUMN, H710, FOR BENCH HEIGHT H900 FOR GRID HEIGHT 1620	2
375		BENCH MOUNTED TAP, BROEN NATURAL GAS (G) PROJECTION: 137	6
376		BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	12
377		CASSETTE FOR SERVICE COLUMN W120, H110 BLANK	4
378		CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	8
379		CASSETTE FOR SERVICE COLUMN W150, H110 BLANK	4
380		CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	8
381		COVER FOR SERVICE COLUMN ABOVE	2
382		DRIP CUP, POLYPROPYLENE, W290, D126, H165, WHITE TOP MOUNTED BOWL WITH RIM: FOR GRANITEWORKTOPS	6
383		FRONT PANEL ISLAND BENCH H780+85 FOR TABLE D1500	1
384		INSTEAD OF GAS WATER TAP PLEASE CONSIDER LOCVAL WATER TAP	6
385		KNEE SPACE PANEL, H780+85, W600 FOR TABLE H900	12
386		PEDESTAL CABINET, W300 H870, D500, DOOR L/H, 1 SHELF	7
387		PEDESTAL CABINET, W300 H870, D500, DOOR R/H, 1 SHELF	7
388		SERVICE COLUMN W150, D150, H710 UNEQUIPPED	2
389		SINK CUT OUT, 260X112, GRANITE	6
390		TAP HOLE 'J' 30, GRANITE	6
391		TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	2

392			WALL TRUNKING 2 SOCKETS 230V/16A (D)	12
393			WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	2
394			WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	6
395			WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	18
396			WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	8
397			WALL TRUNKING, STEEL END PLATE RAL 7035	4
398			WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	18
399		5	BENCH MOUNTED COLUMN	2
400			BENCH MOUNTED SERVICE COLUMN, H710, FOR BENCH HEIGHT H900 FOR GRID HEIGHT 1620	2
401			BENCH MOUNTED TAP, BROEN NATURAL GAS (G) PROJECTION: 137	6
402			BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	12
403			CASSETTE FOR SERVICE COLUMN W120, H110 BLANK	4
404			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	8
405			CASSETTE FOR SERVICE COLUMN W150, H110 BLANK	4
406			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	8
407			COVER FOR SERVICE COLUMN ABOVE	2
408			DRIP CUP, POLYPROPYLENE, W290, D126, H165, WHITE TOP MOUNTED BOWL WITH RIM: FOR GRANITEWORKTOPS	6
409			FRONT PANEL ISLAND BENCH H780+85 FOR TABLE D1500	1
410			INSTEAD OF GAS WATER TAP PLEASE CONSIDER LOCVAL WATER TAP	6
411			KNEE SPACE PANEL, H780+85, W600 FOR TABLE H900	12
412			PEDESTAL CABINET, W300 H870, D500, DOOR L/H, 1 SHELF	7
413			PEDESTAL CABINET, W300 H870, D500, DOOR R/H, 1 SHELF	7
414			SERVICE COLUMN W150, D150, H710 UNEQUIPPED	2
415			SINK CUT OUT, 260X112, GRANITE	6
416			TAP HOLE 'J' 30, GRANITE	6
417			TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	2
418			WALL TRUNKING 2 SOCKETS 230V/16A (D)	12
419			WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	2
420			WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	6
421			WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	18
422			WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	8
423			WALL TRUNKING, STEEL END PLATE RAL 7035	4
424			WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	18
425		6	BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D900 FINISHED EDGE ALL ROUND COLOUR: BLACK	1.8
426			FREE STANDING TABLE FRAME, W1500, D600, 4 FEET HEIGHT ADJUSTABLE 1 SHELF	1
427	6	1	BENCH MOUNTED COLUMN	2
428			BENCH MOUNTED SERVICE COLUMN, H860, FOR BENCH HEIGHT H750 FOR GRID HEIGHT 1620	2
429			BENCH MOUNTED TAP, BROEN COLD PROCESS WATER (WNC) U-SPOUT, PROJECTION: 90+200	2
430			BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	19
431			CASSETTE FOR SERVICE COLUMN W120, H260 BLANK	4
432			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	8
433			CASSETTE FOR SERVICE COLUMN W150, H260 BLANK	4
434			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	8

435			COVER FOR SERVICE COLUMN ABOVE	2
436			DRAINING RACK 420X170X610, BENCH MOUNTED, 24 RODS, 20 ARCHES WITH 2 BASE POLE CONNECTORS	1
437			INNER CORNER PANEL, H720 FOR PEDESTAL CABINETS	2
438			KNEE SPACE PANEL, H630+85, W600 FOR TABLE H750	12
439			PEDESTAL CABINET, W450, H720, D516, 1 DOOR L/H, 1 DRAWER H150	3
440			PEDESTAL CABINET, W450, H720, D516, 1 DOOR L/H, 1 SHELF	2
441			PEDESTAL CABINET, W450, H720, D516, 1 DOOR R/H, 1 DRAWER H150	4
442			PEDESTAL CABINET, W450, H720, D516, 1 DOOR R/H, 1 SHELF	1
443			PEDESTAL CABINET, W600, H720, D516, 1 DOOR L/H, 1 DRAWER H150	1
444			PEDESTAL CABINET, W600, H720, D516, 1 DOOR R/H, 1 DRAWER H150	3
445			PEDESTAL CABINET, W600, H720, D516, 1 DOOR R/H, 1 SHELF	1
446			PEDESTAL CABINET, W900, H720, D516, 2 DOORS, FOR SINK INSTALLATION	2
447			SERVICE COLUMN W150, D150, H860 UNEQUIPPED	2
448			SIDE PANEL H630, D350 WALL MOUNTED CABINET,SIDEBBOARD	5
449			SINK BOWL, POLYPROPYLENE W400, D400, H250, BLACK, TOP MOUNTED BOWL WITH RIM: FOR GRANITEWORK	2
450			SINK CUT-OUT 420X420XR45 GRANITE	2
451			TAP HOLE 'J' 30, GRANITE	2
452			TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	2
453			WALL INFILL PANEL, RIGHT, H720 W400, FOR PEDESTAL UNDERBENCH CABINETS.	2
454			WALL MOUNTED CABINET, W600 H630, D350, OPEN FRONT, 1 SHELF	1
455			WALL MOUNTED CABINET, W900 H630, D350, OPEN FRONT, 1 SHELF	6
456			WALL MOUNTED CABINET, W900 H630, D366, 2 DOORS, 1 SHELF, LOCKABLE	6
457			WALL TRUNKING 2 SOCKETS 230V/16A (D)	18
458			WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	3
459			WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	12
460			WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	30
461			WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	15
462			WALL TRUNKING, STEEL END PLATE RAL 7035	6
463			WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	30
464		2	BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D900 FINISHED EDGE ALL ROUND COLOUR: BLACK	2
465			FREE STANDING TABLE FRAME, W1500, D600, 4 FEET HEIGHT ADJUSTABLE 1 SHELF	1
466	7	1	CEILING PANAL	1
467			TALL STORAGE CABINET, W900 H1920, D516, 2 DOORS, 4 SHELVES, LOCKABLE	1
468		2	BENCH MOUNTED COLUMN	2
469			BENCH MOUNTED SERVICE COLUMN, H710, FOR BENCH HEIGHT H900 FOR GRID HEIGHT 1620	2
470			BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	7
471			CASSETTE FOR SERVICE COLUMN W120, H110 BLANK	4
472			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	8
473			CASSETTE FOR SERVICE COLUMN W150, H110 BLANK	4
474			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	8
475			COVER FOR SERVICE COLUMN ABOVE	2
476			CUT-OUT, ROUND, SMALL, WITH MARINE EDGING UP TO 300X300	1

			MELAMINE	
477			DRAINING RACK 420X170X610, BENCH MOUNTED, 24 RODS, 20 ARCHES WITH 2 BASE POLE CONNECTORS	1
478			KNEE SPACE PANEL, H780+85, W750 FOR TABLE H900	1
479			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, 1 DRAWER H150, 1 SHELF	1
480			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, 1 SHELF	4
481			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, FOR SINK INSTALLATION	1
482			SERVICE COLUMN W150, D150, H710 UNEQUIPPED	2
483			SIDE PANEL H630, D350 WALL MOUNTED CABINET, SIDEBBOARD	4
484			SINK BOWL, POLYPROPYLENE W400, D400, H250, BLACK, TOP MOUNTED BOWL WITH RIM: FOR GRANITWORK	1
485			SINK CUT-OUT 420X420XR45 GRANITE	1
486			STANDARMATUR, BROEN 3X BETRIEBSWASSER, KALT (WNC) AUSLADUNG: 180	1
487			TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	1
488			WALL INFILL PANEL, RIGHT, H870 W400, FOR PEDESTAL UNDERBENCH CABINETS.	1
489			WALL MOUNTED CABINET, W600 H630, D366, 1 DOOR R/H, 1 SHELF, LOCKABLE	1
490			WALL MOUNTED CABINET, W900 H630, D366, 2 DOORS, 1 SHELF, LOCKABLE	5
491			WALL TRUNKING 2 SOCKETS 230V/16A (D)	5
492			WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	1
493			WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	4
494			WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	11
495			WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	5
496			WALL TRUNKING, STEEL END PLATE RAL 7035	2
497			WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	11
498		3	BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	7
499			BRIDGE FOR SERVICE CELL, WITH COLUMN MOUNT W1500, D150, UNEQUIPPED	1
500			BRIDGE FOR SERVICE CELL, WITH COLUMN MOUNT W1800, D150, UNEQUIPPED	1
501			CASSETTE FOR SERVICE COLUMN W120, H110 BLANK	6
502			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	12
503			CASSETTE FOR SERVICE COLUMN W150, H110 BLANK	4
504			CASSETTE FOR SERVICE COLUMN W150, H300, 2 SOCKETS 400V/16A CEE	4
505			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	4
506			CASSETTE FOR SERVICE COLUMN W300, H110 BLANK	2
507			CASSETTE FOR SERVICE COLUMN W300, H300 2 SOCKETS 400V/16A CEE	2
508			CASSETTE FOR SERVICE COLUMN W300, H300, BLANK	2
509			COVER FOR SERVICE COLUMN ABOVE	4
510			FRONT PANEL ISLAND BENCH H780+85 FOR TABLE D1500	2
511			KNEE SPACE PANEL, H780+85, W750 FOR TABLE H900	4
512			PEDESTAL CABINET, W600, H870, D516, 1 DOOR L/H, 1 DRAWER H150, 1 SHELF	3
513			PEDESTAL CABINET, W600, H870, D516, 1 DOOR R/H, 1 DRAWER H150, 1 SHELF,	3
514			SERVICE CELL W1500, H1620 FREE STANDING, W/OUT PIPEWORK	1

515			SERVICE CELL W1800, H1620 FREE STANDING, W/OUT PIPEWORK	1
516			SERVICE COLUMN W150, D150, H710 UNEQUIPPED	2
517			SERVICE COLUMN W300, D150, H710 UNEQUIPPED	1
518			SHELF FOR SERVICE CELL W1200, D300, HPL INSERT FOR ISLAND/PENINSULA BENCHES HPL	2
519			SHELF FOR SERVICE CELL W1500, D300, HPL INSERT FOR ISLAND/PENINSULA BENCHES HPL	2
520			SUPPORT FOR DOUBLE CELL H900, FOR DOUBLE-SIDED BENCH	2
521			TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	2
522		4	BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	2
523			PEDESTAL CABINET, W600, H870, D516, 1 DOOR R/H, 1 DRAWER H150, 1 SHELF,	1
524			PEDESTAL CABINET, W900, H870, D516, 2 DOORS, 1 DRAWER H150, 1 SHELF	1
525			SIDE PANEL, UNDERBENCH CABINET H780+85, D500+200 FOR WORKTOP D750, FITTING: CABINET TO WALL/CELL	2
526	8	1	BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	2
527			C FRAME, BASIC UNIT, W900, H750	1
528			CABLE PASSTHROUGH FITTING IJ60, GRANITE	1
529			PEDESTAL CABINET, W600, H720, D516, 1 DOOR R/H, 1 DRAWER H150	1
530			PP REAR COVER PANEL, W900, H750 TWO PART, SLIDING FITTING: BETWEEN CROSS RAILS	1
531			SIDE PANEL, UNDERBENCH CABINET H630+85, D500+200 FOR WORKTOP D750, FITTING: CABINET TO WALL/CELL	1
532			STEEL END COVER PANEL, C FRAME, H750 FITTING: ON SIDE OF FRAME	1
533			STEEL END COVER PANEL, C/A FRAME, W150, H750 FITTING: SIDE TO WALL	1
534			STEEL REAR COVER PANEL, LOWER, C/A FRAME, W900 1 PART, FIXED FITTING: FLOOR TO CROSS RAIL	1
535			IJ60 CABLE PASS-THROUGH, ABS, RAL	1
536		2	BENCH MOUNTED COLUMN	1
537			BENCH MOUNTED SERVICE COLUMN, H860, FOR BENCH HEIGHT H750 FOR GRID HEIGHT 1620	1
538			BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	2.5
539			CABLE PASSTHROUGH FITTING IJ60, GRANITE	1
540			CASSETTE FOR SERVICE COLUMN W120, H260 BLANK	2
541			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	4
542			CASSETTE FOR SERVICE COLUMN W150, H260 BLANK	2
543			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	4
544			COVER FOR SERVICE COLUMN ABOVE	1
545			KEYBOARD SHELF, LARGE	1
546			KNEE SPACE PANEL, H630+85, W750 FOR TABLE H750	1
547			PEDESTAL CABINET, W600, H720, D516, 1 DOOR L/H, 1 DRAWER H150	1
548			PEDESTAL CABINET, W900, H720, D516, 2 DOORS, 1 DRAWER H150	1
549			SERVICE COLUMN W150, D150, H860 UNEQUIPPED	1
550			TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	1
551			WALL INFILL PANEL, RIGHT, H720 W400, FOR PEDESTAL UNDERBENCH CABINETS.	1

552			WALL TRUNKING 2 SOCKETS 230V/16A (D)	2
553			WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	1
554			WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	2
555			WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	5
556			WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	3
557			WALL TRUNKING, STEEL END PLATE RAL 7035	2
558			WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	5
559			1/60 CABLE PASS-THROUGH, ABS, RAL	1
560		3	BENCH MOUNTED COLUMN	1
561			BENCH MOUNTED SERVICE COLUMN, H860, FOR BENCH HEIGHT H750 FOR GRID HEIGHT 1620	1
562			BLACK GRANITE WORKTOP, RECTANGULAR, PER METRE, D750 FINISHED EDGE ALL ROUND COLOUR: BLACK	3
563			CABLE PASSTHROUGH FITTING 1/60, GRANITE	1
564			CASSETTE FOR SERVICE COLUMN W120, H260 BLANK	2
565			CASSETTE FOR SERVICE COLUMN W120, H300 BLANK	4
566			CASSETTE FOR SERVICE COLUMN W150, H260 BLANK	2
567			CASSETTE FOR SERVICE COLUMN W150, H300, BLANK	4
568			COVER FOR SERVICE COLUMN ABOVE	1
569			KEYBOARD SHELF, LARGE	1
570			KNEE SPACE PANEL, H630+85, W900 FOR TABLE H750	1
571			PEDESTAL CABINET, W450, H720, D516, 1 DOOR L/H, 1 DRAWER H150	1
572			PEDESTAL CABINET, W600, H720, D366, SHALLOW 1 DOOR R/H, 1 SHELF	1
573			PEDESTAL CABINET, W600, H720, D516, 1 DOOR L/H, 1 DRAWER H150	1
574			SERVICE COLUMN W150, D150, H860 UNEQUIPPED	1
575			SIDE PANEL, UNDERBENCH CABINET H630+85, D500+200 FOR WORKTOP D750, FITTING: CABINET TO WALL/CELL	1
576			TELESCOPIC EXTENSION, W150, H750-1450 FROM SERVICE COLUMN TO CEILING	1
577			WALL TRUNKING 2 SOCKETS 230V/16A (D)	2
578			WALL TRUNKING KIT WITHOUT INSTALLATION MATERIAL	1
579			WALL TRUNKING, PC/ABS PARTITION, L=2000 HALOGEN-FREE	1
580			WALL TRUNKING, STEEL BOTTOM PART, , L=2000 RAL 7035	4
581			WALL TRUNKING, STEEL COUPLING SET ONLY FOR SWD	2
582			WALL TRUNKING, STEEL END PLATE RAL 7035	2
583			WALL TRUNKING, STEEL TOP PART, , L=2000 RAL 7035	4
584			1/60 CABLE PASS-THROUGH, ABS, RAL	1
585	9	3	STAINLESS STEEL AIR SHOWER	1
586			BIO SAFETY CABINET	1

B. SCRUBBER EXHAUST SYSTEM

S.N..	DESCRIPTION	UNIT	QTY
1	Centrifugal Blower & Accessories		
	Supply, installation, testing and commissioning of low noise level SISW centrifugal PP exhaust blower. The blower shall be belt driven / Direct driven with high efficiency motor suitable for VFD (VFD In electrical scope), Motor shall be TEFC Foot mounted, 3phase, 50Hz, 415Volts, IP-55 Protection, Class F & Class B Temperature rise. Mounted on common base frame for outdoor application with necessary accessories like Belt guard, shaft guard, slide rail, motor cover with electrical starter. Nylon support stool for B3/B5 motors. Stainless steel assembly external fittings with SS fasteners like bolts, nuts and washers to be provided.		
1.1	Centrifugal Blower CL- 02,03,04 - 1200 CMH (Exhaust blower CMH), 1000 mmwg (Static pressure in mm wg), 3 kw (Max motor rating in Kw)	No.	1
Note:	The Scrubber P&ID & GFC drawings have to be submitted as per site condition. The Scrubber ESP has to be calculated and submitted for approval before ordering scrubber & blower.		
2	PP FRP Ducting		
	Supply, Installation, Testing & commissioning of Circular Exhaust PP-FRP ducting with glass lined (GL) finish, FRP lining shall be of fire resistant Bisphenol resin. Duct pricing is inclusive of all necessary flanges, bends, entry branches, tapers, inspection door, gaskets for flanges, bolt & nuts, washers, Wall bores / cutting through walls, support angle, hanger threaded rods with anchor bolts for fixing. Rate is inclusive of enamel painting for exposed surfaces. Mode of measurement shall be in sqm, measured as circumference x running length, extra will not be paid for accessories such as flanges, entry doors, Bends, Tapers, Reducers, Y-joints, inspection doors, gaskets etc.		
2.1	Ducting upto 500mm Dia - wall thickness shall be 3 mm PP and 3 mm FRP with Flanges made of 6 mm PP & 3 mm FRP.	Sq.Mts.	25
2.2	Ducting below 200mm Dia (PP PIPE) - wall thickness shall be 4 mm for PP and Flanges made of 8 mm PP.	RMT	25
Note:	ALL DUCTS OF SIZE >180mm OD (166mm ID) SHALL BE OF PN 4 / SDR 26 PP / PPH PIPES (FACTORY FABRICATED)		
	DUCT / PIPE SIZES ABOVE 200mm OD (188mm ID) SHALL BE OF PPGL / PPH MATERIAL WITH FRP LINING (FABRICATED DUCTS)		
3	Volume Control Damper		
	Supply, Installation, Testing & commissioning of Fabricated PP FRP circular Volume control damper shall be as follows outer casing 3mmPP + 3mmFRP, flanges with 6mmPP + 3mmFRP, Disc of 5mmPP, center shaft of 20mm Dia PP with brass bush, lock & graduation arrangement with SS wing nut & bolts for circular ducts. (Mode of Measurement = cross sectional Area / Internal face area of the damper)	Sq.Mts.	2
4	Supply, Installation, Testing & commissioning of PVC Braided Flexible connecting hose with Necessary Hose Clamps on both the ends. (Each Flexible length Not exceeding 1M Length)		
4.1	50 mm ID	Mts.	RO

4.2	75 mm ID	Mts.	RO
4.3	90 mm ID	Mts.	RO
4.4	125 mm ID	Mts.	RO
4.5	250 mm ID	Mts.	2
5	Supply, fabrication, erection of Blower Outlet duct support works including Testing platform, safety railing, ladder etc., including Cutting, Welding & Painting (2 coat of red oxide with one coat of epoxy enamel paint).	Kgs.	100
6	Commissioning of total job with validation reports comprising of	Lot	1
	Duct Smoke Test		
	Duct Leak Test		
	Velocity check with flow hood meter		
	Air Balancing readings to be taken for 72Hours		
	One set of DQ, IQ and PQ with maintenance manual		
	Providing compliance Certificate from KSPCB		
Note:	All Drawings, submittals & installation should be as per Good engineering practices. Drawings & material approval must be obtained before fabrication.		

Chapter – 5 (a)

Technical Compliance Sheet

S.N.	Specifications	Compliance Description
A	FUME HOOD	
1	DIMENSION	
2	MATERIAL OF CONSTRUCTION	
3	BASE CONSTRUCTION	
4	TYPE OF JOINTS (RIVITED / WELDED)	
5	INTERNAL LINING / THICKNESS	
6	WORKTOP AND SINK MOC	
7	POWDER COATING THICKNESS	
8	TESTING STANDARDS	
9	PERFORMANCE TEST	
10	ROBUSTNESS TEST	
11	INTERNAL CLEAR DEPTH	
12	INTERNAL CLEAR LENGTH	
13	WORKING SASH HEIGHT	
14	SASH MOVEMENT TYPE / MECHANISM (AUTOMATIC / MANUAL)	
15	SASH GLASS AND THICKNESS (LAMINATED / TOUGHENED)	
16	SASH OPENING TYPE (VERTICAL / HORIZONTAL / BOTH)	
17	SERVICES ARE MOUNTED ON	
18	SASH WT. MECHANISM MOUNTING (FRONT / REAR)	
19	EXHAUST VOLUME (CMH)	
20	PHARMACY HOODS MOC	
21	PHARMACY HOOD SASH MOC	
22	IN CASE OF EXPLOSION SAFETY FUSE (YES / NO)	
23	FUME HOODS BASE CABINETS	
24	ENERGY SAVING CREATIRIA	
25	COUNTRY OF ORIGIN	
	UTILITIES VALVES	
26	MOC / MAKE	
27	VALVE TYPE (NEEDLE / BALL)	
28	VALVE COUNTRY OF ORIGIN	
29	TESTING STANDARDS	
30	SCAFOLDING RODS MOC AND Ø	
31	AIR FLOW MONITOR (DIGITAL / ANOLOG)	
32	PRODUCT CERTICATE	
33	ELECTRICAL SOCKET 16A/6A WITH 16A TRIP (YES/ NO, MAKE)	
34	CABLES FRLS / STANDARD	

B	LAB FURNITURE & ACCESSORIES	
1	FURNITURE TYPE (C-FRAME / H-FRAME/ PEDASTAL)	
2	MATERIAL OF CONSTRUCTION	
3	POWDER SPECIFICATION	
4	POWDER COATING THICKNESS	
5	TYPE OF JOINTS (RIVITED / WELDED)	
6	HINGE OPENING ANGLE	
7	HINGED DOORS (YES / NO)	
8	DRAWER RAILS OPERATION (AIR SUSPENSION / STANDARD)	
9	DRAWER OPENING (FULL / HALF)	
10	LOAD CAPACITY OF DRAWER	
11	WORKTOP MOC WITH THICKNESS	
12	DOOR & DRAWER TOP SURFACE (FLAT / ANGLED)	
13	DOOR & DRAWER CONSTRUCTION (FLUSH / OVERLAY)	
14	LOAD CAPACITY OF SHELVES	
15	D-HANDLE CONSTRUCTION	
16	SERVICES SYSTEMS WALL / CEILING/ FLOOR	
17	CASSETTE TYPE / FIXED TYPE SERVICE SYSTEM	
18	SINK MOC (PP / EPOXY / CERAMIC / STAINLESS STEEL) & THICKNESS	
19	CABINETS TESTING STANDARDS	
20	CABINETS COLOR CODE	
21	UTILITIES VALVES MOC / MAKE	
22	UTILITIES VALVE TYPE (NEEDLE / BALL)	
23	UTILITIES VALVE COUNTRY OF ORIGIN	
24	FIELD TESTS	
25	UTILITIES VALVES TESTING STANDARDS	
26	FACILITY & PROCESS CERTIFICATION / ISO	
27	PLANNING, PRODUCTION & DISTRIBUTION CERTIFICATION / OSHAS	
28	SAFETY CABINETS WITH CERTIFICATION AND FIRE RATING	
29	SAFETY CABINETS MATERIAL OF CONSTRUCTION	
30	CHEMICAL STORAGE CABINET CONSTRUCTION	
31	CHEMICAL STORAGE CABINET DRAWERS CONSTRUCTION	
32	CHEMICAL STORAGE CABINETS TEST STANDAREDS AND COLOR	

Chapter – 5 (b)

Inviting of sealed Tender(s) for supply and installation of Laboratory Furniture Fume hood and Exhaust System at AIIMS, Bhubaneswar

S.N.	Details / Particulars	Submitted (Yes/No)	Page No
A	Name & Address of Tenderer with phone number, email, name and telephone/mobile(Mention in Letter head)		
B	Specify you are Company /Proprietorship / Partnership firm(Mention in Letter head)		
C	Name of Proprietor /Partner/Managing Director/Director.		
D	Name, Address & designation of the authorized person for signing the bid documents. (Authorization should be made in Letter head of the Organisation)		
E	Name, Address, Phone & Fax No. of Service Centre at Bhubaneswar or nearby.		
F	Whether the firm is a Registered firm 'yes/no'(attached copy of certificate)		
G	PAN No. (enclose the attested copy of PAN Card)		
H	Please Provide last 02 year IT Return copy (2013-14, 14-15)		
I	Service Tax No. (enclose the attested copy of Service Tax Certificate)		
J	Sales Tax /VAT No. (enclose the attested copy of Sales Tax / VAT Certificate)		
K	Details of the Earnest Money Deposit (EMD) Rs. 3,00,000/- (Rupees Three lakh only) , FDR/BG No. / dt.		
L	Details of the Tender Fee worth Rs.2,000/-(Rupees Two thousand only), Non refundable. (DD No. , dt.)		
M	Whether the Firm/Agency has signed each and every page of Tender/NIT		
N	Whether the firm is a registered firm under MSEs, SSI or NSIC (attached copy of certificate). And also to be mentioned it is owned by SC/ST Entrepreneurs		
O	Have you previously supplied these items to any government /reputed private organization? If yes, attach the relevant poof. <i>Please provide a notarized affidavit on Indian Non Judicial stamp paper of Rs.10/- that you have not quoted the price higher than previously supplied to any Government Institute / Organisation / reputed Private Organisation or DGS&D rate in recent past. If you don't fulfil these criteria, your tender will be</i>		

	<i>out rightly rejected.</i>		
P	Please submit a notarised affidavit on Indian Non judicial stamp paper of Rs.10/- that (i) no case is pending the police against the Proprietor / partner or the Company (Agency).Indicate any convictions if any against the Company/firm/partner. (ii) proprietor/firm has never blacklisted by any organization.		
Q	List of Major Customer may be given on a separate sheet and proof of previous satisfactory supply, if any		
R	The name of items with specification and makes/brands of the items, indigenous or imported with name of manufacturer & address must be enclosed		
S	Please provide full list of consumables & Catalogue of Equipment		
T	Whether the items quoted is as per specification, if not the statement of deviation (Parameter wise) from the tender technical specification must be enclosed.		
U	Undertaking for providing CMC for 5 years after 3 years Warranty		
V	Undertaking by manufacturer of equipment for servicing the equipment & supply of spare parts whenever required at least for 5 years after completion of warranty/Guaranty.		
W	Any other information, if necessary		

Note:

- Page number/serial number may be given to each and every page of Tender Documents and photocopies of the attested documents attached. Mention Page number, wherever the copy (ies) of the document(s) is kept.
- The tenderer should furnish specific answers to all the questions/issues mentioned in the Checklist. In case a question/issue does not apply to a tenderer, the same should be answered with the remark “Not Applicable”.
- Wherever necessary and applicable, the tenderer shall enclose certified copy as documentary proof/ evidence to substantiate the corresponding statement. In case a tenderer furnishes a wrong or evasive answer against any of the question/issues mentioned in the Checklist, its tender will be liable to be rejected.
- In case of non-fulfilment of any of the above information/ document(s), the Tender will be summarily rejected without giving any notice.

Date:

Place:

(Signature of the bidder with seal)

Chapter-6- Financial Bid

(To be submitted on the letterhead of the company / firm)

S.N.	Name of Item	Quantity	Rate Per Unit	Vat/Taxes etc.	Amount (including all Taxes)
1	Laboratory Furniture				

1. I/We have gone through the Terms & Conditions as stipulated in the Tender enquiry document and confirm to accept and abide the same.
2. No other charges would be payable by the Institute.
3. That I/We shall supply the items of requisite quality.
4. That I/We undertake that the information given in this tender are true and correct in all respects.

Date:

Place:

(Signature of the bidder with seal)

Chapter – 7

CONTRACT AGREEMENT

Contract Agreement No. :-

This agreement is made at **Bhubaneswar** on _____ 2015 between **Director, AIIMS Bhubaneswar**, having its office at **Sijua, Patrapada, Bhubaneswar- 751019** (hereinafter called “Client” which expression shall, unless repugnant to the context or meaning thereof be deemed to mean and include its successors, legal representatives and assigns) of the **First Party**.

Between

M/s _____ (hereinafter called the “Supplier/Contractor” which expression unless repugnant to the context shall mean and include its successors-in- interest assigns etc.) of the **Second Party**.

Whereas AIIMS, Bhubaneswar is desirous that certain Supplies to be made/ installed for use by AIIMS, BBSR i.e. _____ hereinafter called the “The Supply” and has accepted a Bid submitted by the Supplier/contractor for the execution and completion of such Supply/Installation as well as guarantee of such works and the remedying of defects therein.

Now this agreement witnesses as follows:-

1. In this agreement words and expression shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents shall be deemed to form and be read and construed as part of this agreement Viz.
 - (a) Notice Inviting Tender, Eligibility Criteria & Instruction to Bidders (NIT, Eligibility Criteria & ITB).
 - (b) General Conditions of Contract (GCC).
 - (c) Special Condition of Contract.
 - (d) Technical Specification.
 - (e) Technical and Financial Bid.
 - (f) Clarifications of Pre Bid queries during first call and amendment/ corrigendum during first call, if any
 - (g) Financial Bid amendment / corrigendum on technical specifications.
 - (h) All the correspondence till award of contracts i.e. Notification of Award, Performance Bank Guarantee etc.
 - (i) Supply order
 - (j) Payment Term : as per Terms & Condition of the Tender document clause No.13
 - (k) Uptime guarantee & Downtime penalty Clause :as per Terms & Condition of the Tender document clause No.07 &08
3. In consideration of the payment to be made by AIIMS, Bhubaneswar to the Contractor as hereinafter mentioned, the Contractor hereby covenants with AIIMS, Bhubaneswar to

execute and complete the Work by _____ from the date of commencement i.e. _____ and remedying any defects therein in conformity in all respects with the provisions of the Contract.

4. AIIMS, Bhubaneswar hereby covenants to pay the Contractor in consideration of the execution and completion of the Work and remedying of defects therein, the total Contract Price of Rs. _____ (Rupees _____ only) being the sum stated in the Supply Order subject to such additions thereto or deductions there from as may be made under the provisions of the Contract at the time and in the manner prescribed by the Contract.

5. **Obligation of the Contractor.**

- (a) The Contractor shall ensure full compliance with tax laws of India with regard to this Contract and shall be solely responsible for the same. The contractor shall keep AIIMS, Bhubaneswar fully indemnified against liability of tax, interest, penalty etc. of the Contractor in respect thereof, which may arise.
- (b) In witness of whereof the parties hereto have caused their respective common seals to be hereunto affixed / (or have hereunto set their respective hands and seals) the day and year first above written.

For and on behalf of
the Contractor

For and on behalf of
Director, AIIMS, Bhubaneswar

Signature of the
Authorized Official

Signature of the
Authorized Official

Name of the Contractor
Stamp / Seal of the Contractor

Name of the official
Stamp / Seal

SIGNED, SEALED AND DELIVERED
By the said

By the said

On behalf of the Contractor
in the Presence of

On behalf of the Director AIIMS,
Bhubaneswar in the presence of

Witness _____
Name _____
Address _____

Witness _____
Name _____
Address _____