

JAMIA HAMDARD

(Deemed to be University)

Hamdard Nagar New Delhi - 110062

TENDER DOCUMENT

FOR

Laboratory set up and its allied Miscellaneous works including Interiors, civil, electrical, Hvac etc.

For

Development of Centre of Excellence in Unani Medicine at JamiaHamdard New Delhi

CLIENT:

Registrar

JamiaHamdard

Contact Details:

Executive Engineer

Engg. Department

Jamia Hamdard,

Hamdard Nagar New delhi-110062

ARCHITECT:

THE GRID

E-326, GREATER KAILESH-II

NEW DELHI -110048

**JAMIA HAMDARD
HAMDARD NAGAR
NEW DELHI-110062**

NOTICE INVITING TENDER

NIT No. JH/Civil/CoE/96/22/02

Date: 10.03.2023

Jamia Hamdard invites sealed items rate Tenders in two bids system (Technical & Financial Bid) from Registered/Working Contractors at Govt./Semi Govt./State Govt. Departments/Higher Educational Institutions or Working Agencies at Jamia Hamdard for the below mentioned work. The Tender documents and other details are available on the website: www.jamiahamdard.edu. Last date of submission of the Tender is 24.03.2023 up to 3.00 pm.

The bidders are also advised to visit site to satisfy themselves before submitting the bids. Bidders not fulfilling the eligibility criteria may be rejected.

NAME OF WORK:	Development of Centre of Excellence in Unani Medicine.
ESTIMATED COST:	Rs. 3,73,72,008.57 Cr.
EARNEST MONEY:	Rs. 3.70 Lakhs
TENDER COST:	Rs. 10,000.00 only (Non- Refundable)
TIME PERIOD:	120 Days
Date of Pre-Bid Meeting:	16.03.2023 at 11:00 A.M.

The Tender duly filled should be dropped in the Tender Box kept in Purchase Section, Admin. Block on or before 24.03.2023 upto 03.00 PM along with demand draft of Earnest money & Tender fee in sealed envelope clearly specifying the name of work. The D.Ds shall be in favour of "Jamia Hamdard" payable at New Delhi. The Tender shall be opened on 24.03.2023 at 03.30 PM by the tender opening committee in the presence of available interested parties in the Office of Executive Engineer and the Financial bid of the eligible parties will be opened after due information to eligible parties.

In case, the required procedure is not followed, the tender can be rejected. Jamia Hamdard reserves the right to reject any or all tenders or split the tenders without assigning any reason whatsoever.

REGISTRAR

Copy to:

1. System Analyst, Computer Center, to kindly upload the NIT with tender documents on the University's website.
2. PA to Finance Officer for kind information
3. Executive Engineer for kind information
4. Concerned AE (Civil) for necessary action

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Mode of Submission of Tender:

The tender shall be submitted in **physical** in the **Tender Box at Purchase Section, Administrative Block, Jamia Hamdard, New Delhi** in two cover system in accordance with the procedure detailed herein below. Specified documents shall be sealed in envelopes of appropriate size each of which shall be sealed.

- 1) First Envelope marked **Cover 1** shall contain Tender Fee, Earnest Money Deposit along with Covering Letter along.
- 2) Envelope marked **Cover 2** shall be of adequate size and shall contain envelopes marked **Cover 1 & tender documents** duly filled and shall be properly sealed & signed. This envelope shall be endorsed on the outside face as under:

"Laboratory set up and its allied Miscellaneous works including Interiors, civil, electrical, Hvac etc." For Development of Centre of Excellence in Unani Medicine at 3rd Floor Nano Building JamiaHamdard New Delhi-110062."

The envelope marked Cover 2 containing the tender documents as per instructions mentioned above shall be submitted in the office of Purchase Section, Administrative Block, JamiaHamdard, New Delhi by 24.03.2023 upto 03:00 PM.

Envelope marked Cover 1 & Cover 2 containing Tender fee, Earnest Money Deposit along with Covering Letter tender document/Undertaking as in Annexure- I will be opened and if the Tender Fee & Earnest Money Deposit, tender document/Undertaking as in Annexure- I is not found as prescribed, the tender shall be rejected out rightly out rightly.

APPLICATION FROM BIDDER
(Forwarding letter)

From: M/s-----

To
The Executive Engineer
JamiaHamdard
Hamdard Nagar
New Delhi –110062.

Subject:*Laboratory set up and its allied Miscellaneous works including Interiors, civil, electrical, Hvac etc."*For Development of Centre of Excellence in Unani Medicine at 3rd Floor Nano Building JamiaHamdard New Delhi-110062.

Dear Sir,

With reference to the tenders invited by you for the above work, I / We do hereby offer to perform, provide execute & complete the above work in conformity with the drawings, items & conditions and specifications for the amount as shown in the Schedule attached hereto.

I / We have satisfied myself / ourselves to the location and conditions of the site & read the article of agreement conditions of contract & specification etc.

I/We understand that the works are to be completed within the specified period & fully understood that the time will be the essence of this contract.

I/We enclose herewith the Earnest Money by demand draft of Rs.(Rupees) in favour of Jamia Hamdard, Hamdard Nagar, New Delhi-62, which amount is not to bear any interest, even if this tender is accepted in whole or in part thereof. I / We hereby agree to abide by and fulfill all the terms and conditions of the tender, N.I.T etc. as far as possible, and if found default against the said condition thereof the Registrar Jamia Hamdard have the right to forfeit the sum of money mentioned in the conditions.

I/We agree that the said Executive Engineer Jamia Hamdard or his successors in office shall without prejudice or any other right or remedy be at liberty to forfeit the said Earnest Money absolutely, if we fail to commence the work as specified above. Otherwise he will retain the said earnest money towards security deposit mentioned in general conditions of the contract.

Name of the partner (s)

- 1.
- 2.
- 3.

Yours faithfully,
Signature of contractor with seal
Dated
Address

PRE QUALIFICATION CRITERIA (PQC)

1. TECHNICAL CRITERIA:

Bidder or its OEM (enclosing the Manufacturer's Authorization) should meet the following Technical Criteria of BEC, failing which the offer shall not be considered for further evaluation:

- A.** The Bidder must have experience of successfully completed **SIMILAR WORKS** during last 7 years ending last day of month previous to the one in which this application has been invited should be either of the following: -
- i. Three (3) **SIMILAR WORKS** completed during last seven (7) years having executed value of not less than INR 148.00 lacs.
 - ii. Two (2) **SIMILAR WORKS** completed during last seven (7) years having executed value of not less than INR 185.00 lacs.
 - iii. One (1) **SIMILAR WORKS** completed during last seven (7) years having executed value of not less than INR 295.00 lacs.

SIMILAR WORKS here defined as:

Composite contract for laboratory set up including civil, Electrical, AC/HVAC and Audio Video works for any reputed educational institutes or research laboratories. Residential Interior works shall not be considered in the criteria of similar works.

Above work should have been awarded to them by Central/State Government Department / Public Sector Undertaking / Statutory Bodies/ educational universities or reputed organization during the preceding 7 years.

B. DOCUMENTS REQUIRED TO MEET THE TECHNICAL CRITERIA

The bidders are required to submit following documents in support of their meeting the experience criteria during preceding 07 years as detailed above.

- i. Copies of work/service orders issued by their client, duly attested by Notary Public.
- ii. The completion certificate / client certificate in respect of work/service order mentioned above.

The Completion Certificate / Client Certificate must clearly indicate the following:

- i. Reference to relevant work order
- ii. Actual value of executed work, and
- iii. Actual date of completion.

Original Client certificate should be available for verification of the same.

The bidder or manufacturer should meet the following criteria :-

1. Laboratory Furniture supplier should have the SEFA membership from last 7 years with SEFA 8M-2016 third party test certificates for laboratory furniture.
2. Furniture supplier should have the BIFMA HCF 8.1 certificate
3. Bidder or manufacturer should have at least one person ASHRAE membership to understand the code of ethics of the ASHRAE.
4. Bidder or manufacturer should have ISO 9001,14001 and 45001 certificates.
5. Bidder should have the experience in establishing the Bio safety Class 2 level facility in any reputed organization, should provide the PO copy along with the work completion certificate of the same.

C. Jobs executed by subsidiary/fellow subsidiary/Holding company:

A job executed by a bidder for its own plant/projects and subsidiaries, sister concern shall not be considered as experience for the purpose of meeting the requirements of BEC of the tender as experience for the purpose of meeting BEC.

2. FINANCIAL CRITERIA:

A. Bidder should meet the following Financial Criteria of BEC;

The following documents to be submitted with CA certification with their membership Number & UDIN number on their letterhead.

- i. The Average Annual Turnover of the Bidder should be equal to or more than Rs. 1,11,00,000.00 (Rupees one CroreElevenLakhs) in the 3 preceding financial years (i.e. 2019-20, 2020-21, 2021-22).
- ii. The Net worth of the Bidder should be positive as per last audited financial statement i.e. for FY 2021-22.

B. DOCUMENTS REQUIRED TO MEET THE FINANCIAL CRITERIA

Annual Turnover, Net Worth : - Copies of Audited Balance Sheets, Trading and P/L A/c, duly attested by Notary Public.

3. DOCUMENTS REQUIRED TO MEET TECHNO-COMMERCIAL CRITERIA

- a) Tender Fee - As given in NIT
- b) Earnest Money Deposit (EMD) - As given in NIT

- c) Attested copy of Work/Service Order of as per the criteria mentioned in technical criteria. Attested copy of Completion Certificate showing the required information in respect of work order submitted with the bid.
- d) Attested copies of Audited Balance Sheets of F.Y. 2019-20, 2020-21, 2021-22.
- e) Attested copy of Trading & P/L accounts for F.Y. 2019-20, 2020-21, 2021-22.
- f) Various Forms & Formats, duly filled in and signed by the bidder.
- g) Duly signed Tender document, as an acceptance of Terms & Conditions of the tender.
- h) Duly signed Blank Schedule of Rates (SOR).
- i) Undertaking by the bidder that the tender document read and understand by the bidder and has not been modified or tempered in any manner.

GENERAL INSTRUCTION TO BIDDERS

1. COMPARISON OF BIDS

Prices shall be opened in respect of only the techno-commercially acceptable bidders whose bids have been found to be substantially responsive.

A substantially responsive bid is one that meets the terms and conditions of the Tender and / or the acceptance of which bid will not result in indeterminate liability on JAMIA HAMDARD. After establishing the eligibility of the bidders and bringing the offer of all the bidders technically and commercially at par, recommendation shall be made for opening of price bids.

The discrepancies in rate filled for various items shall be resolved in the following manner:-

- (i) When there is a difference between the rates in figures and words, the rate which corresponds to the amount worked out by the contractor (by multiplying the quantity and rate) shall be taken as correct.
- (ii) When the rate quoted by the contractor in figures and words tallies but the amount is incorrect, the rate quoted by the contractor shall be taken as correct and not the amount.
- (iii) When it is not possible to ascertain the correct rate, in the manner prescribed above, the rate as quoted in words shall be adopted and the amount worked out, for comparison purposes.
- (iv) When the quoted rates and amount are given only in figures, if a discrepancy is observed in rates and amount (by multiplying the quantity and rate), unit rate as quoted by the bidder shall be taken as correct.
- (v) Bidders are required to quote for all the items as per SOR. In case it is observed that any bidder has not quoted for any item in the Schedule of Rates (such unquoted item not being in large numbers), the quoted price for the purpose of evaluation shall be considered as the maximum rate quoted by the remaining bidder for such items. If after evaluation, such bidder is found to be the lowest evaluated bidder, the rates for the missing item shall be considered as included in quoted bid price.
- (vi) If the estimated price impact of the unquoted items is more than 10% of the bidder's quoted price, the above provision shall not be applicable and such bid shall be rejected.

2. PRICE EVALUATION METHODOLOGY OF BID

Based on the evaluation of techno-commercially qualified bidders, Price Bids for "**Laboratory set up and its allied Miscellaneous works including Interiors, civil, electrical, Hvac etc.**" For Development of Centre of Excellence in Unani **Medicine** will be evaluated on overall lowest cost basis to JAMIA HAMDARD (L-1 offer) i.e. considering total quoted price for all items of SOR including Service Tax and all other taxes & duties etc. as per "Schedule of Rates".

The evaluated Contract Value of the bidders shall include total value including material and services, inclusive of all taxes, duties, levies etc. as applicable under this contract.

Based on the evaluation of techno-commercially qualified bidders, the job will be awarded to L-1 bidder.

The bidders are advised not to offer any discount/rebate separately and to offer their prices in the SOR after considering discount/rebate, if any.

If any unconditional rebate has been offered in the quoted rates, the same shall be considered in arriving at the net tendered amount. No cognizance shall be taken for any conditional discount for the purpose of evaluation of the bids.

If any bidder offers sub-moto discount after opening of un-priced bids but before opening of price bids, such reduction / discounts shall not be considered for evaluation. However, if the bidder happens to be the lowest evaluated bidder without considering such discount then the benefit of discount will be availed at the time of award of work.

In the event as a result of techno-commercial discussions or pursuant to seeking clarifications / confirmations from bidders, while evaluating the un-priced part of the bid, any of the bidders submits a sealed envelope stating that it contains revised prices; such bidder(s) will be requested to withdraw the revised prices failing which the bid will not be considered for further evaluation.

SCOPE OF WORK

I. GENERAL:-

Centre of Excellence in Unani Medicine Jamia Hamdard (Deemed to be university) Hamdard Nagar New Delhi - 110062

II. BACKGROUND:-

The proposed renovation for developing centre of excellence are to be carried out at 3rd floor Nano Building Jamia Hamdard ,Hamdard nagar New Delhi.

1. Facilities Required: BSL Lab, cold room, Zebra Fish Aquatic housing, Seminar hall, dining, pantry and additional amenities etc. complete for the smooth functioning of centre along with necessary furniture, fittings, lighting, power, air conditioning, finishes etc.
2. The layout for the floor along with other drawings like false ceiling, lighting etc. are enclosed with the tender to understand the requirements.

III. SCOPE OF WORK:-

The scope of work covers all Dismantling, laboratory set up, Interior, civil, electrical, HVAC works etc. at 3rd floor Nano Building Jamia Hamdard, New Delhi.

1. Broad scope of work -
 - Civil Works including removing of existing walls, making of new wall, plastering the walls / Ceiling wherever necessary, flooring and cladding.
 - New flooring (Marble, Granite, Vitrified tiles, Carpet, epoxy etc.), using Cement Mortar / tile pasting adhesive on the existing flooring.
 - New dado work in tiles/ Puff panels/ wall papers/ laminate/ back-painted glass/ mirror/ fabric/ acoustic panels/ decorative films/ texture paint etc.
 - New False ceiling, as per approved elevation and of required type, including trap doors, under-deck insulation etc. It is suggested that the false ceiling be restricted to minimum area without compromising on acoustics and aesthetics.
 - Door works, as per the specifications as approved.
 - Painting/ polishing/ finishing as per specifications as approved.
 - Providing Aluminium partitions/wooden partition/cupboards/shelves in plywood/Gyproc board/Habitto board& laminate/veneer etc. as approved.
 - Providing frameless glass partitions, Aluminium glazed partition, doors, UPVC Window etc. as approved.
 - Tables & chairs (customized or ready-made, as per the requirement) including Seminar chairs, laboratory tables, storage units, sofas, high back chairs, mid back chairs, Social Furniture like high table, sit out etc. as approved.

- HVAC and Electrical system including mechanical ventilation, low side ducting, electrical works, power distribution, suitable illumination and other associated services works as approved including integration with existing system.
 - Vendor has to remove the existing Access Control system and Fire Alarm system and re-fixing the same ensuring smooth working of the system before handing over of site.
 - Internal signage of approved type and art-work
 - Furnishing work, blinds of approved types, curtains, re-upholstery of existing sofa and chair etc.
2. The Scope of Work (SOW) described above is indicative. The items or part of work which are not clearly defined in this document but are required to be carried out for successful completion and commission of the proposed structure shall be deemed to have been included in the scope of work and the bidder shall have to carry out such jobs as per the best industrial practice with due approval from HAMDARD at no extra cost.
 3. As the new infrastructure is to be developed in an existing building, the planning and execution should include developing of a proper plan including integration of existing with proposed Air Conditioning, Lighting, Power distribution, etc. complete without disturbing the essential services to the rest of the building.
 4. Obtaining the approval for Drawings finally from HAMDARD/ Architect before execution.
 5. Project Management and quality control by deploying Competent Technical Personnel without any additional cost to HAMDARD.
 6. Materials used shall be as per the approved makes. No materials shall be used without the prior approval of Officer- In-Charge / Architect.
 7. Sufficient number of samples/ display boards shall be submitted to facilitate approval of finishing and other items.
 8. Site is situated on 3rd floor of the building and material is to be taken up by service stairs only and labour/ workers not to use lifts for material lifting and travelling.
 9. All ancillary items/equipments required to complete the job shall be responsibility of the contractor.

IV.FACILITIES TO BE DEVELOPED:-

For the office space complete with furniture and systems/services:

- BSL Lab
- Cold Room
- Zebra Fiswh Aquatic Housing

- Seminar hall
- Dining & Pantry Area
- Toilets
- Lobby area
-

VI. DISMANTLED MATERIALS:

The dismantled material (unserviceable) retrieved from the site during execution of renovation works in existing area will be the property of the contractor and same to be removed from site on regular basis. **All serviceable material will be property of HAMDARD and to be deposited/stacked properly in building or in the campus near by the building as per instructions of EIC.**

VII. SAFETY / SITE CONDITIONS- HEALTH & SAFETY STANDARDS TO BE ADHERED TO:-

As part of its proposal, the bidder must take full responsibility for the adequacy, stability and safety of all site operations and ensure that the methods of carrying out the work and the project by the bidder including his workers, employees, sub-contractors and vendors meet all the necessary safety standards and requirements of the HSSE standards of HAMDARD.

Bidder must follow covid appropriate behaviour at the site according to guidelines of HAMDARD and the government (state/centre) that may change time to time and bidder should be well aware about it. All materials/ equipments required to follow safety guidelines, covid-19 appropriate behaviour etc. must be supplied to the workers, employees, sub-contractors and vendors of the executing agency by the bidder only like safety belt, helmet, safety shoes, PPE kit, gloves, sanitizer, mask, face shield etc.

SPECIAL CONDITIONS OF CONTRACT

GENERAL INTRODUCTION

Proposed site is located at 3rd floor Nano building Jamia Hamdard, hamdard Nagar New Delhi.

Where the provisions of these Special Conditions are at variance with the provisions of the General Conditions of the Contract (GCC) the provisions of these Special Conditions of Contract shall take precedence. The copy of the GCC is kept in the office of for ready reference, all bidders must go through the documents before quoting the bid, it will be assumed that the bidders have read the same.

The following special terms and conditions of contract shall supplement the general conditions of contract. Whenever, there is a conflict, the provisions herein shall prevail over those in the General Conditions.

SPECIFICATIONS:

- (i) The specifications of the various items of the works will be as per enclosed technical specifications, technical specifications provided to contractor during execution of contract, latest editions of CPWD specifications for work with all correction slips. In absence of any detailed specifications, latest Indian Standard specifications and code of practice shall become applicable. Wherever, these codes are silent, the same shall be governed by sound engineering practice and the decision of EIC in matters of interpretations etc. shall be final and binding on the contractor.
- (ii) As detailed in the description of the item of work and relevant drawing.
- (iii) Make of materials: The contractor shall use the material of makes given in the BOQ/tender. In case the make of the material not available in the approved list, the contractor has to use the material as approved by EIC. Samples of all materials to be used must be submitted and got approved from EIC.

ORDER OF PRECEDENCE:

In case of ambiguity in Schedule of rates, General Conditions, Specifications, Drawings, the following orders of precedence will prevail:

- (i) Telex/Telegram/Fax of Intent, detailed Letter of Intent along with Statement of agreed variation and its enclosures and any Corrigendum/Addendum/ special note to bidders.
- (ii) Schedule of Rates.
- (iii) Special Conditions of Contract
- (iv) Specifications
- (v) Drawings in conjunction with each other.

(vi) General Conditions of Contract

EFFECTIVE DATE OF CONTRACT

The effective date of start of contract shall be reckoned from the **7th day** of issue of Letter of Intent/ FOI/LOA.

TIME SCHEDULE

Total period of contract for completion of this work will be for **4 MONTHS**, to be reckoned from the **7th day of issue of letter of award/FOI** or the day of handing over the site, which ever will be later.

Time is the essence of the contract and as such as every effort should be made to complete the work within prescribed time period for the execution of the work as contemplated under this contract.

In case of any hindrance, govt. orders etc. that may effect the work execution, the same to be notified to the EIC through proper channel. Applicability of the same shall be validated by Engineer In-charge as per JAMIA HAMDARD guidelines.

ARCHITECTS/CONSULTANTS

JAMIA HAMDARD has appointed **M/S THE GRID, E-326, GREATER KAILESH PART-II NEW DELHI-110048**, PH-011-29221089, 29221090, as the architectural consultant for the Construction Management & Supervision. For any clarification, bidder can contact the architectural consultant under intimation to JAMIA HAMDARD.

1.0 NAME OF THE WORK

"Laboratory set up and its allied Miscellaneous works including Interiors, civil, electrical, Hvac etc." For Development of Centre of Excellence in Unani Medicineat 3rd floor Nano building Jamia Hamdard New Delhi shall be carried out as described in Schedule of Rates (SOR). Any other item not specifically mentioned but required for completing the work shall also be executed.

All works shall be operated as per items given in Schedule of Rates (SOR) and those items which are not available in Schedule of Rates (SOR) and required to be operated as per requirement, will be carried out as an Extra item and rates will be derived for extra items as per the provision made in the tender. The jobs of specialized in nature shall be got executed through the specialized agencies only, by the contractor. Before getting executed such jobs the contractor is required to get the agency approved from the EIC. In case, an item has got a guarantee period, then the same is to be passed on to JAMIA HAMDARD. If such item fails before its guarantee period is over, then contractor has to rectify/ replace it at his own cost.

The above gives the general scope of work, however tenderer is supposed to acquaint himself of various items as detailed in SOR. The bidder is advised to see the site conditions and nature of job before quoting his rates. It shall be taken that bidder has seen the site conditions and no claim on this account shall be entertained at a later date. Job shall be done in strict compliance with tender specifications. The various items to be operated have been dealt in schedule of rates attached with tender documents. The rates should include supply of all materials, man power, equipments,

consumables, taxes, duties, royalties, profits and overheads like Labour License, Insurance etc. required for the job as per specifications and BOQ.

2.0 TERMS OF PAYMENT:

RUNNING/FINAL BILL PAYMENT PROCEDURE

(A) PAYMENT OF RUNNING BILL:

90% of SOR shall be paid after execution of works & balance 10 % shall be paid along with Final Bill on site clearance and handing over of works complete in all respect as certified by Engineer In Charge in the RA bill.

The contractor shall submit computerized bill in three copies along with joint measurements and all supporting documents. Contractor shall submit the soft copy containing the details of the bill with their supporting documents for the checking of the E.I.C. The contractor shall inform the EIC or his representative well in advance for recording the joint measurement and shall submit the bills after joint measurement.

(B) PAYMENT OF FINAL BILL:

- (i) Contractor must submit his final bill within sixty days of completion of the work and payment of the final bill shall be made to the contractor within 60 days of the submission of the final bill based on the joint measurement with EIC/AC or his authorized representative along with all requisite documents including "**No Claim Certificate**"& all obligations under the contract, site clearance, certificate, as built drawings etc.
- (ii) **No Claim Certificate:** The contractor shall submit final bill along with No Claim Certificate. No Claim Certificate shall be on the contractor's letter head and indemnity Bond in prescribed Performa in the contract on non- judicial stamp paper of Rs. 100/- duly notarized from Notary public indemnifying JAMIA HAMDARD from all liabilities w.r.t persons engaged by the contractor regarding payment of wages, PF/ESI contribution, insurance & other liabilities. The final bill shall be processed only on submission of No Claim Certificate, otherwise final bill will be paid only after one year of submission of the same, as per JAMIA HAMDARD records.

2.1 The quoted rates shall include all costs, transportation of material at all heights and floors to and from the premises as and when required. Nothing extra is payable on this account. Transportation of any wastage, exchange of rejected or defective material, surplus material etc. shall have to be arranged by the contractor at his own risk and costs. Also any material brought inside or taken out of the premises shall have necessary prior permission to do so.

2.2 Contractor has to make all the arrangements for tests / inspection either at site or elsewhere at his own cost and expenses. The contractor shall arrange for the necessary quality tests at his own cost from the reputed laboratory, if required to be done for such items which are not ISI marked or if there is any doubt on the quality of ISI marked material. Contractor has to bring the material at site as per the approved make and for the material for which approved make is not stipulated in the tender same shall be brought of ISI marked as per direction of EIC. The

material required for sampling for testing as per the CPWD specification. Material not found conforming to any of such tests shall have to be unconditionally replaced by the tenderer/contractor and any damage caused by its use be made good by him.

- 2.3 The drawings, conditions, specifications and schedule of quantities forming contract document are explanatory and are complementary to one another representing together with the work/installation to be carried out. In case of doubt, the matter shall be discussed with EIC and necessary clarifications obtained. If neither the drawing nor the specifications, the schedule of quantities include any provisions which are absolutely necessary to complete the work as per drawings, the contractor shall provide the same, contained in any one viz (i) the drawings, (ii) the specifications and (iii) the schedule of quantities but not specifically appearing in the other all such parts of the contract document and the work shall be executed accordingly.
- 2.4 The contract shall be carried out in workmen like manner and the workers will abide by all JAMIA HAMDARD rule and norms while inside the premises. They shall also restrict movement to their place of work only. The workmen shall work in close co-ordination of any other agencies working at site. This shall be adhered to at no extra cost.
- 2.5 The bidder/contractor shall be responsible for any injury caused to persons, animals or things (fittings/fixtures/furnishings etc.) any damage caused to any property of JAMIA HAMDARD etc. which may arise from the operations or neglect of any person of the bidder/contractors or any person engaged by him for any purpose related to the execution of this contract. This clause shall include inter alia, any damaged to buildings, roads, streets, footpaths etc. adjacent to or otherwise to the premises. The bidder/contractor shall indemnify JAMIA HAMDARD of all liabilities arising out of his operations in any way under any acts of the Government and also in award of any compensation or damaged consequent upon any claim arising out of the above. The bidder/contractor shall further make good all damaged caused thus either to JAMIA HAMDARD or to any third party.
- 2.6 The Bidder shall indemnify JAMIA HAMDARD under Workmen's Compensation Act, Fatal Accident Act, Personal Injuries Act, Insurance Act etc. and or their Industrial Legislation in force from time to time. The contractor / bidder shall indemnify JAMIA HAMDARD for comply the labour laws.
- 2.7 In the event of any accident occurring during the course of work, which may result in any injury to a person, the responsibility of their medical treatment will fully rest with the bidder/contractor and expenditure incurred thereon will be borne entirely by the bidder/contractor. JAMIA HAMDARD shall be totally indemnified of any liability whatsoever.

3.0 CONTRACTOR PERSONNEL AT SITE:

- 3.1 Contractor shall appoint a qualified site engineer/site supervisor to execute the work as per drawings/boq and shall be the coordinating person between the contractor's labour and EIC/Architect. Site engineer shall also be responsible for safety of labourers working at the site. **The site engineer/site supervisor shall have degree in civil engineering with experience of minimum 3 years OR Diploma holder with 5 years experience in the field of civil & interior execution works.**

Contractor shall have to appoint suitable qualified electrical/mechanical engineer at the time of execution of electrical/mechanical works, **if required** or as per condition mentioned in supervision of works

- 3.2 Contractor shall appoint/deploy a qualified & experienced person as a project manager having experience of execution of similar projects who shall be responsible for billing, measurements, documentation works, etc. and coordination between client, contractor & consultant.
- 3.3 List of persons employed by Contractor for the subject work mentioning their residential address (id proof) shall be submitted to JAMIA HAMDARD. If required necessary verification from Police / Gram Pradhan shall have to be submitted by the contractor.
- 3.4 The Contractor shall be directly responsible for any/all disputes arising between him and his personnel and keep JAMIA HAMDARD indemnified against all losses, damage and claims arising thereof.
- 3.5 The personnel engaged by the Contractor shall be subject to security check by the JAMIA HAMDARD's security staff while entering/leaving the premises. The contractor & his personnel shall be required to follow the rules and regulations of JAMIA HAMDARD in force from time-to-time. The contractor may also be required to provide photo passes to the personnel required by him for security and safety reasons and furnish the details of the same when asked for.
- 3.6 No other person except Contractor's authorized representative shall be allowed to enter JAMIA HAMDARD premises. Contractor shall also not entertain any outsider or extend any service beyond JAMIA HAMDARD'S premises. Entry of Contractor's persons shall be regulated with proper identity/gate pass.
- 3.7 Contractor shall be fully responsible for theft, burglary, fire or any mischievous deeds by his staff and any loss to JAMIA HAMDARD shall be recovered from the Bills/ Final bill of the Contractor.
- 3.8 Contractor shall provide all necessary tools and tackles, equipments, safety belt, safety net, wheel burrow, scaffolding, ladders, drilling m/c & safety equipment etc. required to carry out job at his cost and material used by Contractor shall be of standard make and approval of Engineer-In-Charge shall be taken for the same.
- 3.9 JAMIA HAMDARD also reserves the right to ask the Contractor to remove particular person(s) from site with immediate effect if in the opinion of JAMIA HAMDARD, his behavior/performance is not up to the mark and/or found indulging in unlawful activities, Contractor shall immediately comply with such instructions.
- 3.10 It will be the responsibility of contractor to ensure that their personnel behave in a proper manners and behavior.

4.0 NUISANCE:

The contractor shall at any time not do or permit any nuisance in area of work in JAMIA HAMDARD premises, or do anything which shall cause unnecessary disturbance or inconvenience to JAMIA HAMDARD officials or occupants of other properties near the work area and to the public in general.

5.0 SCOPE OF SUPPLY

All materials, manpower, equipments and consumables shall be in the scope of supply of contractor and the quoted rates shall be inclusive of all necessary input to complete the job. Working drawings/Approved for Construction Drawings will be supplied to the contractor by the EIC after award of the contract. If for any item, specific drawing/shop drawing is required, the contractor has to make arrangement at his own cost to provide the same within 03 (three)days for approval of EIC, necessary changes/suggestions in the drawings as deemed fit by EIC is to be made by the contractor. No extra cost will be paid to the contractor on this account.

6.0 WATER & POWER SUPPLY

Water and power shall be provided by JAMIA HAMDARD, free of cost. The contractor shall not tap any fire hydrant /water point/ electrical point before obtaining prior approval of the EIC. Water and electricity shall be made available at specified locations as per the decision of EIC and the contractor shall make his own arrangement for distribution of water and power by use of pipes / cables etc.

7.0 EXTRA ITEMS/SUBSTITUTED ITEMS

The rates for extra items/substituted items of work, ordered to be operated/executed shall be derived as under:

- a) If the item of work is similar to the item for which, the bidder has quoted rates in schedule of rates the quoted rate shall be applicable.
- b) If the rate for the item does not appear in the schedule of rates quoted by the bidder, the rate shall be derived from similar items of work.
- c) If the rate for the item does not appear in the schedule of rates quoted by the bidder, EIC may derive the rate from JAMIA HAMDARD's standard SOR and payment shall be done accordingly.
- d) The rates for those items of work which cannot be derived from quoted rates in the schedule of rates or from standard SOR of JAMIA HAMDARD, shall be derived from the prevailing market rates of material and labour plus 10% towards contractor's overheads and profits. The opinion of the Engineer in charge as to the current market rates for materials and the quantum of labour and material involved per unit shall be final and binding on the contractor. For this purpose and for the purpose of sub-clause (c) above, the coefficient of labour, material and wastage shall be adopted from the CPWD analysis of rates/standard schedule of rates as decided by the Engineer in charge. The contractor shall submit vouchers /quotations in proof of rates paid /likely to be paid for material and labour.

Above provisions for derivation of rates of extra items/substituted items shall supersede the provisions indicated in GCC.

8.0 VALIDITY

Validity of quotation shall remain valid for acceptance for a period of 4 (four) months from the date of opening of the tender.

9.0 DEFECT LIABILITY PERIOD

The bidder shall guarantee all the work executed by him for a period of **12 months** from the date of completion of work. If during this period any defect occur, the same shall be made good by the contractor at his own cost. Failure to comply with this requirement may result in the forfeiture of security deposit.

However, in case of critical items, if the guarantee period is beyond defect liability period, then guarantee shall applicable for that period also.

10.0 INSPECTION OF THE WORK

The work is subject to inspection at all times by the Engineer-In-Charge. The Contractor shall carry out all instructions given during inspection and shall ensure that the work is being carried out according to the technical specifications of this tender. The technical documents, specifications, work procedure, working drawings, relevant codes of practice etc shall also be provided to the contractor as and when required during the execution/performance of the work. The contractor is bound to follow all the technical documents, specifications, work procedure, working drawings, relevant codes of practice etc provided by Engineer In Charge.

The contractor shall take the prior approval of all the materials to be used in this contract.

The contractor shall engage approved expert agencies for carrying take the job of furniture, storage, curtains etc., necessary approval for the same is to be obtained from EIC before carrying out the job. If any approved agency engaged by the contractor is felt unfit for carrying out the quality job at a later stage by the EIC, the same is to be immediately removed from the site and new agency is to be deployed by the contractor after getting the approval for the same.

11.0 SECURITY

The contractor shall have total responsibility for all equipment and materials in his custody, stores, loose, semi-assembled and/or erected by him at site. All materials of the contract shall enter or leave the site only with the written permission of Engineer-in-Charge.

12.0 VARIATION:

During execution of item/work variation in individual quantities may be up to any limit (plus and minus) as per the site requirement.

Nothing extra will be paid to the contractor on this account.

13.0 MOBILISATION ADVANCE

No payment for mobilization advance shall be made in this contract.

14.0 SECURED ADVANCE ON MATERIALS

No payment for secured advance against the supply of the material to be used at site for this work shall be made in this contract.

15.0 PRICE REDUCTION SCHEDULE

15.1 Time is the essence of the CONTRACT. In case the CONTRACTOR fails to complete the entire WORK within the stipulated period, then, unless such failure is due to Force Majeure as defined in GCC or due to Employer's defaults, the Total Contract price shall be reduced by 0.5% of the total Contract Price per complete week of delay or part thereof subject to a maximum of 5% of the Total Contract Price, by way of reduction in price for delay and not as penalty. The said amount will be recovered from amount due to the Contractor/Contractor's Contract Performance Security payable on demand. The decision of the ENGINEER-IN-CHARGE in regard to applicability of Price Reduction Schedule shall be final and binding on the CONTRACTOR.

15.2 All sums payable under this clause is the reduction in price due to delay in completion period at the above agreed rate.

16.0 ARBITRATION

All disputes or difference, whatsoever, arising between the parties hereto pertaining to any part of the contract including its execution or concerning the WORKS or maintenance thereof this CONTRACT or to the rights or to liabilities or the construction meaning operation or effect thereof or to the rights or liabilities of the parties or arising out or in relation thereto whether during or after completion of the CONTRACT or whether before or after determination, foreclosure or breach of the CONTRACT (other than those in respect of which the decision of any person is by the CONTRACT expressed to be final and binding) shall after written notice by either party to the CONTRACT to the other of them and to the Appointing Authority hereinafter be referred for adjudication to a sole arbitrator to be appointed as herein after provided. For the purpose of appointing the Sole Arbitrator referred to above, the appointing authority will send within thirty days of receipt of the notice, to the CONTRACTOR a panel of three name persons who shall all the presently unconnected with the organization for which the WORK is executed. The CONTRACTOR shall on receipt of the names as aforesaid, select any one of the persons named to be appointed as a sole Arbitrator and communicate his name to the Appointing Authority within thirty days of receipt of names. The Appointing Authority shall thereupon without any delay appoint the said person as the sole Arbitrator. If the CONTRACTOR fails to communicate such selection and appoint the selected person as the Sole Arbitrator.

If the Appointing Authority fails to send to the CONTRACTOR the panel of three names of persons who shall all be unconnected with either party, the Appointing Authority shall on receipt of the names as aforesaid select any one of the persons named and appoint him as the sole arbitrator. If the Appointing Authority fails to select the person and appoint him as the sole Arbitrator within 30 days of receipt of the panel and inform the CONTRACTOR accordingly, the CONTRACTOR shall be entitled to appoint one of the persons from the panel as the sole Arbitrator and communicate his

name to the appointing Authority. If the Arbitrator so appointed is unable to or unwilling to act or resigns his appointment vacates his office due to any reason whatsoever, another sole Arbitrator shall be appointed as aforesaid. The WORK under the CONTRACT shall, however continue during the arbitration proceedings and no payment due or payable to the CONTRACTOR shall be withheld on account of such proceedings. The Arbitrator may, from time to time, with the consent of the parties, enlarge the time for making and publishing the award.

The venue of arbitration shall be New Delhi.

The fees, if any, of the Arbitrator shall, if required to be paid before the award is made and published, be paid half and half by each of the parties. The costs of the reference and of the award including the fees if any, of the Arbitrator shall be in the discretion of the Arbitrator who may direct to and by whom and in what manner, such costs or any part thereof shall be paid and may fix or settle the amount of costs to be so paid. Subject to aforesaid the provisions of the Indian Arbitration and Conciliation Act, 1996 or any statutory modification or re-enactment thereof and the rules made there under, and for the time being in force, shall apply to the arbitration proceeding under this clause.

17.0 JURISDICTION

The CONTRACT shall be governed by and constructed according to the laws in force in INDIA. The CONTRACTOR hereby submits to the jurisdiction of the courts situated at DELHI for the purpose of disputes, actions and proceedings arising out of the CONTRACT, the court at Delhi only will have the jurisdiction to hear and decide such disputes, actions and proceeding

18.0 CONFIDENTIALITY

18.1 Confidential information shall mean and include all data, documents, papers, data base, correspondence and any other information relating to JAMIA HAMDARD, its business, operation etc.

18.2 The Service Provider shall maintain the confidentiality of all other orders/information and shall neither disclose to anyone nor use the same for any purpose, what so ever without prior written approval of Consultant /JAMIA HAMDARD.

19.0 MONITORING AND REPORTING

Contractor shall submit progress report periodically.

20.0 FAILURE AND TERMINATION CLAUSE

Time and date of delivery shall be the essence of the contract. If the vendor/contractor fail to deliver the entire quantity of materials ordered/ complete the work or a part thereof within the contractual delivery/ completion period agreed to for such part or total quantity as per the delivery / time schedule or at any time repudiates the contract before the expiry of such period, JAMIA HAMDARD

may without prejudice to any other right or remedy available to it recover damages for breach of the contract in any manner stipulated hereunder:-

- a) Recover from the vendor/ contractor an agreed amount towards Price Reduction Schedule and not by way of penalty a sum equivalent to 1/2% (half per cent) of the contract price of the whole unit per week for such delay or part thereof (this is a genuine pre-estimate of damages duly agreed by the parties) which the vendor/contractor has failed to deliver within the period fixed for delivery in the schedule, where delivery thereof is accepted after expiry of the aforesaid period. It may be noted that such recovery of PRS may be up to 5% of the contract price / of the total quantity of items of materials / equipment which the contractor has failed to deliver within the period fixed for delivery;

Or

- b) Purchase or authorise the purchase elsewhere on the account and at the risk of the contractor, of the materials not so delivered or others of a similar description, by serving prior notice to the contractor / supplier without canceling the contract in respect of the installment not yet due for delivery;

Or

- c) Cancel the contract or a portion thereof by serving prior notice to the contractor and if so desired, purchase or authorise the purchase of the materials not so delivered or others of a similar description (where such materials exactly complying with particulars are not, in the opinion of the purchaser, which shall be final, readily procurable) at the risk and cost of the contractor. If the contractor had defaulted in the performance of the original contract, the purchaser shall have the right to ignore his tender for risk purchases even through the lowest. Where the contract is terminated at the risk and cost of the firm under the provisions of this clause, it shall be solely up to the purchaser to exercise his discretion to collect or not, the security deposit from the firm, on whom the contract is placed, at the risk and expense of the defaulting firm.
- d) Where action is taken under sub-clause (b) or sub-clause(c) above, the contractor shall be liable for any loss which the purchaser may sustain on that account, provided the purchase or if there is an agreement to purchase, such agreement is made, in case of failure to deliver the materials within six months from the date of such failure and in case repudiation of the contract within six months from the date of cancellation of contract. The contractor shall not be entitled to any gain on such purchase and the manner and method of such purchase shall be at the entire discretion of the purchaser. It shall be necessary for the purchaser to give a notice of such purchase on the contractor.
- e) It may further be noted that clause (a) above provides for recovery of PRS on the cost of contract price of delayed supplies (whole unit) at the rate of 1/2% (half per cent) of the contract price of the whole unit per week for such delay or part thereof up to a ceiling of 5% of the contract price of delayed supplies thus accrued will be recovered by the paying authorities of the purchaser specified in the supply order, from the bill for payment of the cost of the material submitted by the vendor/ contractor in accordance with terms of supply order, or otherwise.]

- f) Notwithstanding any thing stated above equipment and materials will be deemed to have been delivered only when all its components, parts are also delivered. If certain components are not delivered in time the equipment and material will be considered as delayed until such time all the missing parts are also delivered.

21.0 SUPERVISION OF WORK

Contractor or his authorized representative shall be available at site all the times, during the progress of the work. The contractor shall deploy One (01) Project Manager/Overall Coordinator at site for proper handling of contract, overall job coordination & supervision at his own end. In addition to that, contractor has to deploy minimum One(01) Experienced Engineer as a Resident Engineers for day to day work (Engineer shall be degree in Civil Engg. With min 3 years of exp. OR Diploma holder with min 5 years of exp. in civil & interior works) for Civil works & one Experienced Engineer (Engineer shall be Minimum Diploma in Electrical Engg.) for Electrical jobs & the same for HVAC jobs at site and at least two (02) supervisory staff for job supervision at his own end.

22.0 DELETION OF WORK

If during the execution of work it is decided to omit/ delete any or part of items wholly or partly or both, the financial implication shall be worked out by the contractor as per stipulations in the tender document elsewhere & to be approved by JAMIA HAMDARD.

23.0 ESCALATION:

The prices offered by the bidder shall be firm throughout the currency of the Contract and are not subject to escalation due to any reason whatsoever may be.

24.0 JOB TO BE DONE ON RISK AND COST

Failing to comply with the specified jobs by the contractor as per the scope of the work. EIC shall be empowered to get the same completed through another party on risk and cost of the contractor, after necessary notice to the contractor in writing. The amount incurred on this account shall be recovered from the due payments/ bills of the contractor.

25.0 PERMISSION FOR WORKING IN NIGHT/HOLIDAY

Since proposed site is situated in a running office, contractor shall have to take prior permission from the JAMIA HAMDARD to work in night and/or on govt. holiday/Sunday. Without prior permission contractor's labourers will not be allowed to work in night/holiday.

While execution it should be taken care that no noise or hindrance effect working of persons at other floors. In case of some hindrance deemed to be happen then prior permission of the same shall be taken from JAMIA HAMDARD and it should be intimated to persons/floor with proper channel.

26.0 COMPLIANCE WITH LABOUR/INDUSTRIAL LAWS

The contractor is responsible for compliance of the points given below under this contract:

- a) The contractor is required to obtain labor license under the provisions of Contract Labor (R &A) Act, 1970.
- b) The contractor shall have its own PF code no. with the RPFC as required under employee PF & Miscellaneous Provisions Act, 1952.
- c) The contractor shall submit the proof of depositing the employee's as well as Employer's PF contribution with RPFC.
- d) The contractor shall have an independent ESIC code
- e) The contractor shall ensure the regular supervision and control by the contractor himself or by his authorized representative on the personnel deployed by him for JAMIA HAMDARD's work and necessary direction should flow from the contractor to his workforce for undertaking the contractual obligations.
- f) It shall be the sole liability of the contractor (including the contracting firm/ company) to obtain and to abide by all necessary licenses/ permissions from the concerned authorities as provided under the various labour legislations including the labour license obtained as per the provisions of the contract labour (Regulation & Abolition) Act 1970.
- g) The contractor shall discharge obligations as provided under various statutory enactments including the employees provident fund and Miscellaneous Provisions Act, 1952., the employees state Insurance (ESI) Act, 1948, the Contract Labor (R&A) Act, 1970, the inter-state Migrant workmen (Regulation of employment & conditions of service) Act, 1979, Minimum Wages Act, 1948, Payment of Wages Act, 1936, Workman Compensation Act, 1923 and other relevant acts, rules and regulations enforced from time to time.
- h) The contractor shall be responsible for required contributions towards P.F. pension, ESI or any other statutory payments to be made in respect of the contract and the personnel employed for rendering service to JAMIA HAMDARD and shall deposit these amounts on or before the prescribed dates. The contractor shall submit the proof of depositing the employee's and Employer's contributions. The contractor shall also be responsible to pay

any administrative/ inspection charges thereof, wherever applicable, in respect of the personnel employed by him for the work of JAMIA HAMDARD.

- i) The contractor shall regularly submit all relevant records/ documents to JAMIA HAMDARD representative for verification and upon such satisfaction only, JAMIA HAMDARD will allow reimbursement of the amounts paid.
- j) The contractor shall be solely responsible for the payment of wages and other dues to the personnel deployed by him latest by 7th day of the subsequent month. The contractor shall be directly responsible and indemnify the company against all charges, dues, claims, etc, arising out of the disputes relating to the dues and employment of personnel deployed by him.
- k) The contractor shall indemnify JAMIA HAMDARD against all losses or damages, if any, caused to it on account of acts of the personnel, if any, deployed by him.
- l) The contractor shall ensure regular and effective supervision and control of the personnel, if any, deployed by him and gives suitable direction for undertaking the contractual obligations.

27.0 SPECIAL NOTE TO TENDERERS

While quoting the rates in the tender by the bidder they should consider all the provisions of the tender including statutory requirement prevailing during the course of the contract

TECHNICAL SPECIFICATIONS:

Dismantling, Laboratory works, Interior, Civil, furniture, fittings, finishes, electrical, HVAC etc.

In case of any arbitration, disputes or difference whatsoever arises related to scope of work, specifications, mode of measurements or any other information that may not be available in this scope of work then CPWD specifications and/or relevant Indian Standards (IS codes) shall be referred.

General Conditions:

1. All Materials brought on site of works and meant to be used in the same shall be the best of their respective kinds and to the approval to the EIC.
2. Samples of all materials shall be got approved by the EIC and shall be deposited with him before the order for the material is placed with the suppliers. The material brought on the works shall confirm in every respects with approved samples.
3. The contractors shall check each fresh consignment of materials as it is brought on the site of the works, to see that they confirm in all respects to the satisfactions and/or samples approved by the EIC.
4. The EIC will have the option to have any of, the materials tested to find whether they are in accordance with the satisfaction and the contractor will bear all expenses in that connection. All bills, vouchers and test certificates which, in the opinion of the EIC or the representative, as necessary to convince him as to the quality of the materials of their suitability shall be produced for his inspection on requisition Testing charges, if any shall have to be borne by the contractor.
5. Any material that have not been found to confirm to the specification will be rejected forthwith and shall be removed from the site by the contractors within 48 hours at their own cost.
6. The EIC shall have power to cause the contractors to purchase and use such materials, from any particular source, as may in his opinion be necessary for the proper execution of the work.
7. Workmanship: All works shall be to level plumb and square comers, edges and arises in all cases shall be unbroken and finished neat.
8. Skilled labour for the respective trades shall employed by the contractors to check to the work in progress and to instruct and extract the right kind of workmanship from the men employed on the works, Instructions given to such miseries by the architect or his representative shall be carried out with a view to get the work executed in a neat and workman like manner according to these specification.
9. The EIC may order the inspection of any finished work as he chooses and in a manner he decides, and the contractors shall bear all expenses in the connection. If the results of such inspection prove that the workmanship is not of the standard required, the work will be rejected and removed forthwith and he replaced by works of the accepted standard of quality.

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.

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 Cold Rolled Steel.

2.01 DRAWER AND DOORSTYLE:

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, 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:

Cold Rolled Steel:

Cold rolled sheet steel shall be prime grade 12, 14, 16, 18 and 20 gauge U.S. Standard; roller leveled, 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, and be securely fastened to doors and drawers with screws. All pulls shall be satin finish aluminum, 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:

Hinges shall be made of Type 304 stainless steel .089 thick, 2-1/2" high, with brushed satin finish, and shall be the institutional type with a five-knuckle

bullet-type barrel. Hinges shall be attached to both door and case with two

screws through each leaf. Welding of hinges to door or case will not be accepted. Doors under 36" in height shall be hung on one pair of hinges, and doors over 36" high shall be hung on 3 hinges.

F. PositiveCatch:

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. ElbowCatches:

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 aluminum, with bright brass finish.

H. Shelf AdjustmentClips:

Shelf adjustment clips shall be nickel-plated steel.

I. BaseMolding:

Base Molding shall be provided on all table legs, unless otherwise specified, to conceal leveling 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 leveling device, will not be acceptable

J. SinkSupports:

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 CabinetConstruction:

1. General:

- a. The steel furniture shall be of modern design and shall be constructed in accordance with the best practices of the Scientific Laboratory

Equipment 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 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.
2. Steel Gauges:
- Gauges of steel used in construction of cases shall be 18 gauge, except as follows:
- a. Corner gussets for leveling 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 casemembers.
- 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 duststop.
- f. Toe space rail shall extend up and forward to engage bottom rail to form a smooth surfaced fully enclosed toe space, 3" deep x 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 leveling bolt, 3" long, and shall engage a clinch nut in each gusset. Access to the leveling bolts shall be through plug buttons in the bottom pan. Each leveling bolt and gusset shall be capable of supporting 500 lbs. Access to leveling bolts through toe space or leveling 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.

- j. Drawer bodies shall be made in one-piece construction including the bottom, two sides, back and front. They shall be fully covered at interior bottom on all four sides for easy cleaning. The top front of the inner drawer body shall be offset to interlock with the channel formation in drawer head providing a 3/4" thick drawerhead.
- k. Drawer suspension assembly shall consist of 2 sections providing quiet, smooth operation on ball bearing nylon rollers. 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. Case suspension channels shall be Galvanized Steel, drawer suspension channels shall be Cold Rolled Steel. Drawer suspension channels on Stainless Steel Cabinets shall be zinc plated after they are formed.
- l. Steel Door assembly (two-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.
- m. 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.
- n. 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.
- o. 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 leveling bolts shall support 500 lbs. per corner, at 1-1/2" projection of the leveling bolt below the gusset.
3. Each adjustable and fixed shelf 4 ft. or shorter in length shall support an evenly distributed load of 40 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 10,000 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 Cold Rolled 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 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 colors shall meet the performance test requirements specified under PERFORMANCE TEST RESULTS.

1. Performance Test Results (Chemical SpotTests):

d. 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 papertowels.

e. TestEvaluation:

Evaluation shall be based on the following rating system. Level 0 – No detectable change.

Level 1 – Slight change in color or gloss.

Level 2 – Slight surface etching or severe staining.

Level 3 – Pitting, cratering, swelling, or erosion of coating. Obvious and significant deterioration.

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

f. TestReagents

TestNo.	ChemicalReagent	TestMethod
1.	Acetate,Amyl	Cotton ball &bottle
2.	Acetate,Ethyl	Cotton ball &bottle
3.	AceticAcid,98%	Watchglass
4.	Acetone	Cotton ball &bottle
5.	Acid Dichromate,5%	Watchglass

6.	Alcohol,Butyl	Cotton ball &bottle
7.	Alcohol,Ethyl	Cotton ball &bottle
8.	Alcohol,Methyl	Cotton ball &bottle
9.	AmmoniumHydroxide,28%	Watchglass
10.	Benzene	Cotton ball &bottle
11.	CarbonTetrachloride	Cotton ball &bottle
12.	Chloroform	Cotton ball &bottle
13.	ChromicAcid,60%	Watchglass
14.	Cresol	Cotton ball &bottle
15.	DichlorAceticAcid	Cotton ball &bottle
16.	Dimethylformamide	Cotton ball &bottle
17.	Dioxane	Cotton ball &bottle
18.	EthylEther	Cotton ball &bottle
19.	Formaldehyde,37%	Cotton ball &bottle
20.	FormicAcid,90%	Watchglass
21.	Furfural	Cotton ball &bottle
22.	Gasoline	Cotton ball &bottle
23.	HydrochloricAcid,37%	Watchglass
24.	HydrofluoricAcid,48%	Watchglass
25.	HydrogenPeroxide,3%	Watchglass
26.	Iodine,Tincture of	Watchglass
27.	MethylEthylKetone	Cotton ball &bottle
28.	MethyleneCloride	Cotton ball &bottle
29.	MonoChlorobenzene	Cotton ball &bottle
30.	Naphthalene	Cotton ball &bottle
31.	NitricAcid,20%	Watchglass
32.	NitricAcid,30%	Watchglass
33.	NitricAcid,70%	Watchglass
34.	Phenol,90%	Cotton ball &bottle
35.	PhosphoricAcid,85%	Watchglass
36.	SilverNitrate,Saturated	Watchglass
37.	SodiumHydroxide, 10%	Watchglass
38.	SodiumHydroxide, 20%	Watchglass
39.	SodiumHydroxide, 40%	Watchglass
40.	SodiumHydroxide, Flake	Watchglass
41.	SodiumSulfide,Saturated	Watchglass
42.	SulfuricAcid,33%	Watchglass
43.	SulfuricAcid,77%	Watchglass
44.	SulfuricAcid,96%	Watchglass
45.	Sulfuric Acid, 77%and Nitric Acid, 70%,equalparts	Watchglass
46.	Toluene	Cotton ball &bottle
47.	Trichloroethylene	Cotton ball &bottle
48.	Xylene	Cotton ball &bottle
49.	ZincChloride,Saturated	Watchglass

* Where concentrations are indicated, percentages are by weight.

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

5. 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".

6. 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 smoothed. The back splash for the wall bench shall be granite 18/19mm thick material for an height of 4" from the finished table toplevel.

5. Polypropylene MoldedSinks:

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 O- rings are made fromNitrile.

Specifications for Flexible Extraction Arms:

1. Extraction Arms shall be of modern design with 3 sections suitable for ceiling, wall or tablemounting.
2. Flow rate of arms shall be between 35cmh to 80cmh for dia.50mm arms or 80cmh to 180cmh for dia.75mmarms.
3. All extraction arms shall be designed to have a large friction diameter joint and the "One-Hand-Operation" of the adjustment knob to provide a very flexible function with a stable joint that stays in position without sagging. No great force needed to be applied and no tools are required.
4. The joint shall have a reinforced indentation which prevents deformation. A design that use "O-Ring" which may cause slip or the joint to crack shall not be permitted.
5. The adjustment knob joint shall have ball bearings insulate the set frictions, which facilitates the arms movements without jamming the joint or losing stability and function.
6. Material of the arms shall be white colour polypropylene or anodized aluminum surface.
7. The arms shall come with a integral air tight throttle damper clearly indicating the flow for open or shut off positions.
8. The arms shall come with suitable connection to tubes (suction nozzles), round high impact Plexiglass (PPMA) hood or epoxy coated aluminum roundhoods.

Specifications for SS316 Spot Extractor:

The SS Spot extractor is especially designed to take care of populated air at a high temperature (Eg: From a atomic absorption unit). The hood and all components that are at risk of coming into contact with hot air are made from Stainless steel (316L). The wall bracket is made from powder coated mild sheet steel. The vertical

telescopic movement is 440mm

The extractor is standard designed from wall mounting. The wall bracket is also adjustable horizontally.

For connection to the ventilation duct a 1.5m long flexible hose, with a maximum temperature resistance of 250 deg C, is delivered with the extractor.

The telescopic movement is created by two sliding rings made of Teflon for heat resistance and a locking device to ensure that the hood stays in the intended vertical position.

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.

D. 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.

E. Except as otherwise indicated, faucet and valve handles shall be forged brass Nylon type and shall have a color coded screw-on index disc. Color code requirements for indexing service fixtures shall follow DIN Standard 12920:1995.

II. Finish

1. General

1. 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.

2. Fittings inside fume hoods shall have an epoxy finish color-coded to match the fixture service index color. Coating material shall be free flowing epoxy powder with a particle size of 35-70 microns.

2. Mar and AbrasionResistance

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 color, 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. SEFA 3 – Scientific Equipment and Furniture Association
- b. SEFA 8 - Scientific Equipment and Furniture Association
- c. NFPA 30 - National Fire Protection Association
- d. NFPA-45 - National Fire Protection Association
- e. UL - Underwriters Laboratories
- f. ASTM D552 – Bending Test

A. DISMANTLING WORK

The term 'Dismantling' implies carefully separating the parts without damage and removing. This may consist of dismantling one or more parts of the building as specified in BOQ or shown on the drawings.

1. Necessary propping, shoring and or under pinning shall be provided to ensure the safety of the adjoining work or property before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining work or property. Wherever specified, temporary enclosures or partitions and necessary scaffolding with suitable double scaffolding and proper cloth covering shall also be provided, as directed by the Engineer-in-Charge. It shall be ensured that no dust is generated while demolishing. Demolition Rules – 2016 shall be followed.

2. Necessary steps shall be taken to keep noise and dust nuisance to the minimum. All work needs to be done under the direction of Engineer-in-Charge. Helmets, goggles, safety belts etc., should be used whenever required and as directed by the Engineer-in-Charge. The demolition work shall be proceeded with in such a way that it causes the least damage and nuisance to the adjoining building and the public. Barricading shall be provided as per NGT guidelines
3. Dismantling work to be done at all heights including all tools and scaffolding.
4. It shall be carried out with proper safety measures and without hampering other activities and services running on other part of the building or the floor.
5. Area considered is a part of running office building and it is on the intermediate floor so all dismantling/ shifting work to be done in phased manner for different floors/areas & in day/night or holiday as per client's requirement and direction of the Engineer In-charge.
6. All dismantled mortar & rubbish etc. shall be disposed off within 24 hours from its dismantling promptly as directed by the Engineer-in-Charge.
7. **Making opening in the masonry construction and fixing chowkhats for doors, windows and clerestory windows**

Before making opening it is necessary to examine that the wall exclusive of opening is adequate to take the load coming on the structure. All the structural members supported on the walls which have direct bearing over the area in which opening is to be made, shall be properly supported with props to relieve the load from masonry wall till the lintel over the opening is strong enough to take the load. Care should also be taken not to disturb the adjoining masonry. All precautions as explained and/or safety guidelines of HAMDARD should be followed in case of dismantling the external walls. The portion to be dismantled may be clearly marked on both sides of the wall. Dismantling shall be carried out from top to bottom within the marked area. The sides of the opening shall be as far as possible, parallel and perpendicular to the plane of wall.
8. Where existing fixing is done by nails, screws, bolts, rivets, etc., dismantling shall be done by taking out the fixing with proper tools and not by tearing or ripping off.
9. The contractor shall maintain/disconnect existing services, whether temporary or permanent, wherever required by the Engineer-in-Charge.
10. Safety belts shall be used by labourers while working at higher level to prevent falling from the structure. Wherever, possible mechanized working platform shall be used.
11. First-aid equipment shall be made available at all demolition works of any magnitude.
12. **The rate shall include** the cost of all labour involved and tools used in demolishing and dismantling including scaffolding. The rate shall also include the charges for separating out and stacking the serviceable material properly and disposing off unserviceable material within a distance of 50 meters. The rate shall also include for temporary shoring for the safety of portions

not required to be pulled down, or of adjoining property, and providing temporary enclosures or partitions, where considered necessary.

B. PARTITION WORK

1. All internal woodwork / Plywood shall be treated with anti-termite preservative. All internal frame work shall be of Aluminum unless otherwise specified as Teakwood. All exposed edges of Plywood shall be fixed with C.P. Teak Lipping of size as directed by Architect. The skinning shall be in BWR Plywood unless otherwise specified.
2. **Frame Work**

First of all the shop drawings for each type of partitions/doors/windows/ventilators etc. shall be prepared by using suitable sections based on architectural drawings, adequate to meet the requirement/ specifications and by taking into consideration varying profiles of aluminum sections being extruded by approved manufacturers. The shop drawings shall show full size sections of glazed doors, partitions, windows, ventilators etc. The shop drawings shall also show the details of fittings and joints. Before start of the work, all the shop drawings shall be got approved from the Engineer-in-Charge.
3. **Fixing of Frames**

The holes in concrete/masonry/wood/any other members for fixing anchor bolts/fasteners/screws shall be drilled with an appropriate electric drill. Partitions/Windows/doors/ventilators etc. shall be placed in correct final position in the opening and fixed to Sal wood backing using stainless steel screws of star headed, counter sunk and matching size groove. of required size at spacing not more than 250 mm c/c or dash fastener. All joints shall be sealed with approved silicone sealants.

Where aluminum comes into contact with stone masonry, brick work, concrete, plaster or dissimilar metal, it shall be coated with an approved insulation lacquer, paint or plastic tape to ensure that electrochemical corrosion is avoided. Insulation material shall be trimmed off to a clean flush line on completion.

The contractor shall be responsible for the doors, windows, partitions etc. being set straight, plumb, level and for their satisfactory operation after fixing is complete.
4. The Partitions & Paneling shall be inclusive of providing & fixing in between the aluminum frames, 50mm thick Rock insul Slabs of Rockwool India Ltd of density 96 kgs / cumt of standard width as per the available clear distances between the existing frames as directed wherever required & instructed including above false ceiling framework (paid in separate items).
5. Measurement of Partition & Paneling shall be limited upto the False Ceiling level. However the cost towards any additional support for frameworks to be fixed to the main ceiling shall be deemed to have been considered in the quoted rates and no separate payment shall be made for supporting elements of partitions / paneling items, above the false ceiling level.
6. The rate shall be all inclusive of the necessary hardware, fittings, and fixtures & including glass & finishing for the same. The rate shall be also inclusive of pattas& bands, grooves at any level, any

design in veneer, textures etc. including the necessary framing/ openings for Electrical, Telephone & AC outlets. Further it is important to note that the Glasses wherever specified for the items of Partitions & Paneling if any shall have beveled edges as per the direction & thickness as indicated by the Architect or Engineer in charge.

7. The rates quoted for the Items of Partitions & Paneling of any / all types shall include the cost towards providing and fixing additional 75mm wide Patta raised over and above the given ply for design including designer grooves etc. complete as per the instructions and to the complete satisfaction. Nothing additional would be paid on account of any pattas / bands provided for the said items.
8. **Measurement of height** shall be taken from finished floor level up to the level of False ceiling, in case of varying heights on either side of partition, average height shall considered. The rate to include Provision of extra frame work as necessary for skirting and making cutouts for electrical switch plates, switch boxes, light fittings light etc. making provision for laying conduit; as per drawings & directions. In case of wood framework to be applied with 1 coat of anti-termite wood preservative.
9. Gypsum/ Gyproc/ Habito Board Partitions
50 X 50 Al sections can be used for framework having vertical members at 600mm c/c fixed with horizontal noggins at floor and soffit and the centers, wherever required in line and level, 12.5mm tapered edge. Gyp board (Conforming to IS –2095-1982) is then screw fixed to either side of aluminum frame with 25mm long drywall screws at 300mm c/c with joints staggered to avoid through joints. Finally, the face layer of the boards to be jointed and finished so as to have a flush look which includes filling and finishing with jointing compound, paper tape and two coats of primer suitable for Gypboard (as per recommended practices of India gypsum or equivalent.)
10. Full Height Half- GlazedPartition
Same as in full height partition but partly glazed partition with 12mm thick toughened clear glass /as per BOQ and detailed drawings & with Gypsum partition below as per Gypsum partition specifications etc., Complete as directed with infill and also 12 mm aluminum channel to be provided at the intersection of twomaterials.
11. Partly Height Double GlazedPartition
Same as in full height double gypsum partition but partly Double glazed partition of 136mm thick. with (12mm thick toughened clear glass) above 2100 mm from floor till 3000mm ht. &with Gypsum partitionbelowasperGypsumpartitionspecificationsetc.,Complete as directed with infill and also 12 mm AL channel to be provided at the intersection of twomaterials.
12. Full Height GlazedPartition
Full Height Double Glazed Partitions to be provided with 12mm thick toughened glass using 54mm x 25mm x 2mm thick modular section as per BOQ and approved by EIC channel on top and bottom, including cutting groove in the floor to fit C channel and the gap is filled with GE silicone gel and top with MS framework to fix the C channel and painting the MS framework with enamel paint, complete as per drawing and directions of engineer in charge

13. Partition Above False Ceiling

Partition above false ceiling with AL frame of 25mm x50 mm or 50mmx50mm as per specs at 600mm x 600mm c/c. Frame to be fixed to the ceiling. All internal frame members to be screw fixed. Internal voids to be glass wool in filled for soundproofing. No finishing required. Provide required cutout for Return Air passage.

C. FLOORING WORKS

When tile flooring is to be laid over the existing flooring without dismantling old flooring it can be laid with adhesive. The old flooring shall be thoroughly cleaned and checked for undulations, if any shall be rectified with cement mortar 1:3 (1 cement: 3 coarse sand). Old cement concrete surface shall be hacked and cleaned off to have proper bond with the old surface.

The surface of the flooring shall be frequently checked during laying with straight edge of above 2m long so as to attain a true surface with required slope.

1. **Marble Stone Flooring**

Dressing of Slabs

Every Stone shall be cut to the required size and shape, fine chisel dressed on all sides to the full depth so that a straight edge laid along the side of the stone shall be fully in contact with it. The Sides and Top surface of slabs shall be machine rubbed or table rubbed with coarse sand before paving. Thickness of the slabs shall be 18 mm as specified in the description of the Item. Tolerance of +3% shall be allowed for the thickness. In respect of Length and Breadth of slabs a tolerance of +2% shall be allowed

Polishing and Finishing

Slight unevenness at the meeting edges of slabs shall then be removed by fine chiseling and finished in the same manner as specified in except that cement slurry with or without pigments shall not be applied on the surface before each polishing.

Measurement

Marble/ Granite stone flooring with different kind of marble shall be measured separately and in square meter correct to two places of decimal. Length and breadth shall be measured correct to a cm before laying skirting, dado or wall plaster. Deductions for ends of dissimilar materials or other articles embedded shall not be made for areas not exceeding 0.10 square meters.

IMPORTED MARBLE

Before Installation The Floor surface should be scrubbed clean with PH neutral water and wiped dry so as to ensure that no dirt, dust , grime or chemical residue remains, otherwise bonding will be ineffective Blend well the cement mortar for even distribution. Well blended mortar should have high structural strength and a high bonding force, so that heavy load will not damage the marble Installation Evenly spread cement paste on the surface followed by spreading the well blended cement mortar to a height of ADHESIVE Product Detail Gray

- Polymer modified, Cement based the adhesive should be suitable for fixing ceramic wall & floor tiles, Vitrified Tiles, Glass Mosaics.
- Surface Preparation Surface to be tiled must be dry, clean and free from all contamination, and should be suitable surfaces
- Mixing And Application Add clean water adhesive and mix thoroughly until a slump- free mortar is obtained A20 Kg. bag will require approximately 6-8 liters of water. The adhesive should be left for 30 minutes. Spread no more than 1 sq.mt at a time, apply the adhesive to the wall or floor surface. Comb the adhesive to the required depth (between 3-5mm) using a suitable trowel. Stones shall be press firmly into position with a slight twisting action, checking periodically that good contact is maintained with the back of each piece. Leave no voids behind stones when solid-bed fixing, leaving adequate joints between individual wall and floor tiles unless self spacing tiles are used. Clean off surplus adhesive from the tile face and between joints.
- All finished Floorings tiles or marble/ granite etc. are to be covered with suitable thick polythene sheets and a layer of P.O.P spread evenly on top, for saving the finished surfaces from scratch and breakages. Nothing extra will be paid and will be considered included in the item rates.

Pre polished/ Flamed Granite slab in flooring

The granite/stones shall be of approved COLOR & shall be of sufficient lot to cover the particular area to avoid lot/shade variation. Granite slab shall be quarried stones, hard, sound, durable and free from weathering and decay and defects like cavities, cracks, holes in joints, veins, patches of soft materials and such other defects adversely affecting its strength and its appearance.

Mortar shall be composed of cement and sand unless otherwise specified. All mortar shall be prepared in accordance with IS 2250. The proportions of mortar measured by volume shall be as specified. A layer of mortar shall be spread on full width over a suitable length of the lower course. Each slab shall be properly bedded and set in position by gently tapping with handle or trowel or wooden mallet. The inside faces shall be buttered with mortar before the next slab is laid and pressed against it. The joints may be either paper cut or with spacing width.

GRANITE LAYING IN STAIRCASE TREADS / LIFT LOBBY DADO WORK, LANDING AND RISERS

The laying of granite in Staircase treads, Lift lobby dado, landing and Risers shall be similar to laying of granite flooring as above, except that.

- The slabs cut shall be from one single piece, joints shall be paper joint, the edges shall be treated as shown in drawings.
- Anti-skid grooves shall be provided for every Tread and Landing as per detail drawing. The treads and Landings shall be projecting a minimum of 20mm from the top face of the riser.

- The cut is to be polished either on-site or at factory.
- The edge of the treads shall be fully bull-nosed / chamfered & polished to gloss as per detail drawing or approved by Engineer-In charge.

GRANITE SKIRTING

The pre-polished granite shall conform to the specification or requirement as that of Granite used in flooring/staircase. The thickness of the Granite used shall be 18-20mm thick and it is fixed over a backing coat of cement mortar of 1:4 of 12mm thick with a cement paste backed on the back of the granite tile. The height of the skirting shall be 100mm or as specified the top edge of the skirting shall be treated as shown in the drawing. The joints of the granite strip used in skirting are to be less in numbers and it shall be paper cut joint. The paste oozing out is wiped in a cloth and washed with water. The curing is to be for a minimum period of 7 days.

2. Italian Marble Stone Flooring

Italian marbles Quarried and processed in Italy and these marble raw stones are imported from Italy to India. Italian marble is famous for rendering a high sheen and visual appeal to the ambiance in which it is installed. It is available all over world.

Italian Marble gives the rich appearance to the house floor, walls, Kitchen, rooms and bathroom with its beautiful colour and special lusters. Because of its elegant visual it is commonly used for the decorative purpose in buildings.+

Other details such as dressing of slabs, laying, polishing, finishing, measurements and rates shall be as specified in the place of Indian marble stone.

3. Flamed Finished Granite Stone Flooring

The process is often referred to as a “flamed” or “thermal” finish and can be best described as creating a textured look. To achieve the style, an intense flame is held at the stone’s wet surface. While firing it, the surface becomes so hot it bursts and a layer flakes away to reveal a rough, even texture.

It is especially used at a location of high importance to have a great finish for designs requiring a modern aesthetic.

Other details such as dressing of slabs, laying, polishing, finishing, measurements and rates shall be as specified in the place of Indian marble stone.

4. Flooring Ceramic Tile / Vitrified Tile Flooring / Dado / Skirting

The ceramic tile shall be of approved quality, make, color, size and shape or as specified in drawings. On the approval of the sample by the Engineer In-charge, the order for the tiles shall be placed from one source and procurement done preferably from one batch/consignment to prevent any shape/shade variation. Tiles to be sorted out at site before laying.

The floor surface over which the tiles are to be laid shall be properly cleaned and wetted. 3 to 6 mm Solid bed of BALCEM GOLDSTAR or equivalent (POLYMER MODIFIED CEMENTITIOUS ADHESIVE) & in conjunction with BAL-ADMIX

AD1(POLYMERMODIFIEDLIQUID)shallbeappliedoveranareaadequate to accommodate about 20 tiles at a time. Tiles shall be washed clean and pressed on to the grout and gently tapped in its proper position. The tiles shall be placed perfectly side by side so as to have fine joints truly vertical and horizontal and in level with adjoining tiles.

The joints shall be as specified in the drawing, if grooves are to be provided, it shall not exceed 1.5mm or as specified in the drawing, and shall be done using spacers of approved quality. The excess contents slurry bulging/oozing out in joints shall be removed by wiping immediately. Joints between the tiles to be filled with BAL GROUT to match the COLOR of tiles as per the manufacturers' specifications (COLOR as approved by EIC).

Thereafter, the joints shall be raked out to the required depth and loose cement/mortar shall be revved and joints shall be cleaned.

In the case of the dado, the wall surfaces shall be cleaned and plastered with Cement mortar 1:4 to a thickness of not less than 10 mm to form a uniform backing surface and finished rough and allowed to harden.

The tiles, which have been soaked in water, shall be cleaned and cement paste of butter-like consistency applied to the backside of tiles and the tiles shall be pressed on the wall face and gently tapped in its position. In this way, tiles shall be placed one after another starting from the bottom line and lay upwards.

The joints shall be truly vertical and horizontal, where required spacers – glass strips or ceramic strips – are used to achieve spacing between tiles of width as specified in the drawing, and the tile surface shall be of infirm level in all directions without any depressions and dulling which shall be tested by a straight edge as directed by EIC/CONSULTANT.

Curing and pointing of tiles in Dado shall be carried out as specified for flooring and as directed by Engineer In charge.

D. HARDWARE & METALS:

- Tables side units back units consoles or other articles as per schedule of quantities shall be deemed to be inclusive of all the hardware required e.g. locks, sliding channels handles / knobs, bolts screws PVC buffers for the legs of sofas chairs tables etc. as per instructions of engineer in charge.
- Screws are to match the finish of the articles to be fixed and to be round or flat headed or counter sunk as required.
- The contractor should cover up and protect the brass and bronze surfaces with thick transparent grease or other suitable protective materials renew as necessary and subsequently clean off and clear away join completion.
- Aluminum and stainless steel shall be of approved manufacturer and suitable for its particular application. Generally, surface of aluminum shall have an iodized finish or powder coated finish

and both shall comply with the samples approved by the EIC All stainless steel sheets shall be 304 S.S. Japan or equivalent with gauge as specified but not thinner than 16 gauge. All exposed steel surfaces shall also have powder coated finish and shall completed with samples approved by EIC.

- All steel, brass, bronze, aluminum and stainless steel articles shall be subjected to a reasonable test for strength if so required by the EIC at the contractor's expense.
- All branching and welding are to be executed in a clean and smooth manner rubbed down and left in the flattest and tidiest way, particularly where exposed.
- Chromium plating shall be in accordance with IS standard or as per approved specification for normal outdoor conditions and shall be on a base material of copper brass or as specified.

E. PAINT AND POLISHES:

- All materials required for the works shall be of specified and approved manufacturer, delivered to the site in the manufacturer's containers with the seals, etc., unbroken and clearly marked with the manufacturer's name or trade mark with a description of the contents and color. All materials are to be stored on the site of the work.
- Spray painting with the approved machines will be permitted only if written approval has been obtained from the Engineer In charge. The paint used for sparing is to be specially prepared by the manufacturer for spray Thinning of paint made for brushing will not be allowed.
- Wood preservative shall be Ascu Green Saver or any other equal and approved impregnating wood preservative at all concealed wood work shall be treated with wood preservative.
- All brushes, tools pots, kettles, etc. used in carrying out the work shall be clean and free from foreign matter and at to be thoroughly cleaned out before being used with a different type of class of material.
- All iron or steel surfaces shall be thoroughly scraped and rubbed with wire brushes and shall be entity free from rusting mill scale etc. before applying the priming coat.
- Surfaces of new wood work which are to be painted are to be rubbed down and cleaned to the approval of the EIC.
- All exposed teakwood surfaces and teak ply surfaces and surfaces which are not treated otherwise shall be finish with stained polish to the required shade and melamine matt finish.
- All exposed cedar wood surfaces and clear ply surfaces shall be finished with ready mixed wax polish to give natural shade.
- The tendered rates shall include cost of seasoning and providing wood preservative and as given in the specification

1. Polish:-

- Pure shellac varying from pale orange to lemon yellow color free from resin or dirt shall be dissolved methylated spirit at the rate of 140 gm of shellac to 1 liter of spirit. Suitable pigment shall be added to get the required shade.
- The surface shall be cleaned. All unevenness shall be rubbed from smooth with the sand paper and well sets if variable shall be covered with a preparation of red lead and the size land on white hot Hoes an mgehtations on the surface small be stopped with plazsr's putty. The surface shall then be given a coat of won filler by mixing whiting (ground chalk) in methylated spirit at the rate of 1.50kg of whiting per liter of spirit. The required staining agent shall be added to get the required sand. The surface shall again be rubbed down perfect smooth with glass paper and wiped clean.
- The polishing rubber, the most important implement in French polish shall consist of a pad of cotton wool, which acts as a reservoir for the polish and a soft white linen or cotton fabric similar to a well worn handkerchief, which acts as a filter. The rubber must never be dipped in to the polish. It should be charged by pouring the polish on the pad with the cover remove.
- The surface shall be worked upon evenly a slow figure of eight motion until the surface is coated with a thin layer of polish. The object shall be to apply a series to thin coats, allowing only a few minutes for drying between the coats, when a level and even bodied surface is obtained the work is considered ready for the second stage is spiriting off. Allowing the work to stand for at least eight hours, a fresh rubber with a double thickness of cover material shall be rubber with a double thickness or cover shall be taken and charged with methylated spirit. The surface shall be sprite off to remove the rubber marks and to give the brilliance of finish. The rubber shall be worked in the direction grain an continued till the surface is free from smears and rubber marks and left to harden off.

2. MALAMINE FINISH:

Melamine finishing shall be done on wooden surfaces. The finish shall be Matt, glossy, semi-glossy type which shall be as approved by the Engineer In charge.

All uneven and rough surfaces shall be rubbed-using sandpaper of the requiredgrades till a smooth surface is obtained and the surface shall then be well dusted. The nail marks/ pores in the wood shall be filled with wood filler and the surface shall be rubbed with the required grade of sandpaper so that the entire surface is uniformlysmooth.

After preparing the surface as specified above, the application of a sealer coat shall be done. Wherever necessary the pores in the wood shall be again filled with wood filler and the surface shall be rubbed with the required grade of sandpaper in the presence of water so that the entire

surface is uniformly smooth. Staining as required shall be done manually, application of the second coat of sealers shall be done. Finally, 3 coats of Melamine spraying, strictly under dust-free condition, shall be done, after which the surface is buffed with Wax & Oil.

The Specialists/Manufacturer's specification/instruction in using the product shall strictly be adhered to, in preference to the specification in the contract. It is preferable to carry out the process under warm weather condition. The spray gun before/after using shall be cleared thoroughly using thinner or spirit.

F. WOOD WORK / FINISHES

CARPENTRY / JOINERY

Scope of work includes Materials such as wood, labour for joinery of wooden frame and shutter, fixing of the frame and shutter, fixing of laminates or veneer, fittings and fixtures and such other related carpentry works.

Wood for Furniture shall be approved, seasoned and 1st class Teak wood/ Steam Beach wood. It shall be fairly uniform in COLOR and texture. It shall be free from blemishes, hollow pockets and knots, spiral or twisted grain, warp and any kind of decay or insect attack, cupcakes, door holes, splits, cracks, pinholes, wormholes etc.

Wood shall be kiln seasoned before being planned to the required sizes, in accordance with IS 401-1982. Samples of seasoned wood and Commercial Boards/Plywood's shall be submitted to PM for approval, before placing an order. The contract shall get the wood and Commercial Board/Plywood sample tested in an approved laboratory. If desired by the PM, the Contractor shall submit all information such as manufacturer's/brand name, test certificate etc.

The contractor shall submit a test certificate in support of the kiln seasoning including ASCII treatment for the entire quantity of timber required for the work from the factory where seasoning has been done.

Commercial Flush Shutters of thickness 19/32/33 mm & 45 mm and of sizes as specified in drawings shall be solid core type with block board core and shall conform to IS 2202:1983-part I (specification for wooden flush door shutters solid core type) IS 1003 part 1 and 2, IS 3097. Flush door shutters shall be free from twist or warp in-plane, and the four edges of the shutter shall be square. Both faces of shutter shall be sandpapered to a smooth and even texture. Tolerance on nominal thickness shall be +0.8mm. The thickness of shutter shall be uniform throughout with the variation not exceeding +0.8 mm when measured at any two points.

All commercial shutters shall be internally lipped using approved wood, pressed and ready from the factory directly. In the case of double leafed shutters, rebating shall be as indicated in drawings and directed by the Engineer In charge. Where separate lipping is provided, the depth of lipping at the meeting of styles shall not be less than 35mm.

Shutters shall not be damaged during transportation, storage and fixing. Damaged shutters shall be rejected and shall be replaced with the new shutter as directed by the Engineer In-charge whose decisions will be final and binding in this regard. From the time the shutters are procured to the time they are taken up for fixing in position, the shutters shall be stored in a proper

manner with adequate supports so as to avoid damages to any part, particularly the edge.

The Flush shutters shall be laminated with a plastic laminate sheet or veneer, whose samples shall be submitted along with manufacturers' brand name, test certificate etc to the CONSULTANT for approval before placing an order. The laminate/veneer sheet is protected with building paper until ready for use.

The average moisture content of all the WOODEN samples from a lot shall be within + 4% and moisture content of individual samples + 6% of the maximum permissible moisture content. For this purpose, the site of work shall be deemed to fall under climatic zone II. Seasoned wood as per IS 1141 – 1973 and IS 287 – 1973 shall be the basis of acceptance.

Timber sections for frames shall be planed, smoothed to accuracy on all sides to the full dimension, rebated, rounded, chamfered or moulded as shown in drawings or as directed by PM without patching or plugging of any kind before they are framed and jointed. A tolerance of + 2 mm shall be allowed in the finished cross-sectional dimensions.

The joints shall be of mortise and tendon or tongue & groove type simple, neat and strong. Joints shall fit in fully and accurately without wedging or filling. The joints shall be glued, framed, put together and pinned with hardwood or pins not less than 10 mm dia, sash bars if any shall have metered joints with styles. Putty, where used, shall conform to IS 419-1967 and shall be a homogeneous paste and shall be free of dust, grit and other visible impurities.

After the frames are put together, they shall be pressed in position by means of a press. The contact surfaces of tendon and mortise joints shall be treated (before putting together) with bulk type synthetic resin adhesive of a make approved by the PM. Rails, which are more than 180 mm in width, shall have 2 tenons. Styles and shutters shall be made out of a single piece and shall have a 12 mm groove to receive panels.

Before the frames are fixed in position, these shall be inspected and passed by the Engineer In charge. The frame shall be placed in the proper position, secured to walls or columns as the case may be, with bimetallic fasteners, iron holdfasts etc. as shown in drawings and directed by the Engineer In charge. In case of door frames with sills are provided, these sills shall be embedded/sunk in the floor for the full thickness of the floor. The door frames without sills, while being placed in position, shall be suitably strutted and wedged in order to prevent warping during construction. The frame shall be protected for damage during construction. Where glazed openings are indicated, the size, thickness and type of glazing shall be provided as in the drawings and shall be lipped internally with Teak wood/ S. Beech wood. Shutters shall have provision for mortise locks where so indicated on drawings or as directed by the Engineer In charge.

Shutters shall be checked after fixing for proper location, alignment and swinging. After fixing all the fittings the shutters shall be tried again for proper closure, handling and easy movement etc., and any defects noticed should be immediately rectified as directed.

1. TIMBER:

- The timber shall be of the species stipulated in the schedule of Quantities/Drawings.

- Teak wood shall be of C.P. Teakwood variety.
- Wood for frame work/ rough wood shall be teak wood even though drawings may show Miranti/ hollock.
- All dimensions given in the schedule of quantities and drawings are the required finished size.
- Timber shall be well seasoned and kiln dried with a moisture content of 12% nominal +2% for teakwood. The contractor should get the timber tested for moisture content of wood at his own cost as per the directions of the EIC.
- All timber shall be treated with preservatives and anti termite chemicals as directed.
- All timber shall be free from worm holes, loose or dead knots or other defects and shall not suffer from warping splitting or other defects. All timber shall be approved by the EIC before use.

2. MDF BOARD/BLOCK BOARD/PLYWOOD/PARTICLE BOARD:

- MDF boards block boards/plywood/particle board etc. as specified in the approved list of manufacturers shall only be used.
- Only B.W.R. grade phenol formaldehyde bonded boards to be used.
- MDF board shall comply with I.S. 12406-1988. Manufacturer's specification shall be followed in the use of MDF boards for the various usages.

3. PLYWOOD :

Plywood for general purpose shall conform ISI 303 iv 1975. It shall be of B.W.R. grade in the specified thickness for the commercial type B.W.R. grade plywood, Intermediate veneers in two opposite grain direction shall be 1:1. The moisture content shall not be more than 12.5% by mass. It shall be of approved make. Where B.W.P. grade is specified it should be boiling water proof conforming to I.S. Standards.

4. MELAMINE FACED PARTICAL BOARD:

It should be three layered wood based particle board, such as Nova pan melamine faced pre-laminated on both sides. Particle board should be ISI 3087FPTH (type II, 1965) marked on edges and should also conform to German Din Standard viz DIN 66761. It should impart good bending strength, modulus of elasticity, internal bond strength and screw holding strength. Melamine faced surface should be resistant to crack at 100 and should pass cigarette burn test.

5. GYPROC FIRELINE BOARD

Gyproc Fireline Board is gypsum based interior Wall & Ceiling product used in areas where High Fire Resistance Performance is required to restrict fire to pass from one side of wall to the other side.

Gyproc Fireline Board's gypsum core incorporates glass fibers & other fire resistive additives that are encased & firmly bonded to strong pink colored paper liners. It provides fire resistance from 60 Minutes to 240 Minutes in Wall, Ceiling, Shaft wall & Beam / Column Encasement systems. Below are standard size details:

Thickness	Width	Length	Edge type
9.5 mm	1220 mm	1829 mm	TE/SE
12.5 mm	1219 mm	1829 mm	TE/SE
12.5 mm	1219 mm	2438 mm	TE/SE
15 mm	1219 mm	1829 mm	TE/SE
15 mm	1219 mm	2438 mm	TE/SE

Manufacturing Standard: EN 520:2004, Type F ASTM C1396, Type X

Properties: Thermal Conductivity: 0.24 (w/m²K)

Thermal resistance: 0.05 for 12mm thick board

0.06 For 15mm thick board

Board Colour: Pink face paper

Brown reverse side paper

Edges: Taper edge along length of board

Square edge along width of board

Flexural breaking load of GyprocFirestop as per EN 520: 2004, Type F :

For 12.5 mm board: Transverse direction (N) = 210 , Logitudnal Direction (N) = 550

For 15 mm board: Transverse direction (N) = 250 , Logitudnal Direction (N) = 650

6. GYPROC HABITO BOARD

Characteristics of Habito board : Calcium sulphate dihydrate encased in paper liners, with glass fibers and other additives. The Habito boards are part of a new generation of products specially designed to give flexibility of loading anywhere on the drywall to utilise space in a fast and functional way.

It Complies with EN 520:2004 – Type A, D, R, I. standards.

Properties:

Thermal Conductivity: 0.24 (w/m²K)

Thermal resistance: 0.05 (m²K/w) for 12.5mm thick board

Board Colour:

Faced with ivory coloured paper

Reverse faced with brown coloured paper

Edges: Taper edge along length of board

Square edge along width of board

Flexural breaking load of Gyproc Habito Board as per EN 520: 2004, Type A,D,R,I :

For 12.5 mm board:(size 1220x2440) Transverse direction (N) = 850 , Logitudnal Direction (N) = 1100

7. PRE LAMINATION / VENEERING TREATMENT

Before Lamination/Veneering the Commercial Flush board with Laminate/ Veneer sheet, the surface to be laminated/veneered should be thoroughly

cleaned, all cracks and nail holes filled as directed. The laminate sheet shall be fixed using the approved quality adhesive recommended by the manufacturer and applied strictly in accordance with their instruction/specifications. The adhesive shall be applied on both member in a thin layer and while still tacky, it shall be spread evenly with steel in both directions to assume full contact with the adhesive / Fevicol / SR. A constant and even pressure is applied for not less than 24 hours to ensure good bonding of the sheet to the board. The laminate/veneer surface shall be cleaned as recommended by the manufacturer of all stains/ adhesive mark etc.

All Wooden and Veneered surfaces shall be water cut melamine finished after it has been approved and passed by the Engineer In charge. All portions of timber-built into masonry or abutting a concrete portion of the building or buried in ground shall be coated with boiling coal tar or another type of approved wood preservative or primer before fixing them in position.

All fittings and fixtures for the doors, storage and worktops shall be as indicated in the schedule shown in the drawings. The samples along with manufacturer's / brand name, test certificate etc, shall be submitted to the Engineer In-charge for approval before placing order.

8. LAMINATES:

- Thickness of the laminate to be used shall be 1.0 mm.
- Joints in laminates will not be permitted until and unless the same is unavoidable or is required as per the drawings.
- Measurements: Length and breadth of the plan area of the finished work shall be measured correct to a cm. no deductions shall be made for small openings like switch cockets, AC grills/ diffusers, light fixtures etc, nor shall extra material or labour involved in such openings shall be provided. Rate shall include provision access panel with MDF panel. Rate to include decorative work with sunk raised levels in false ceiling. Rate shall include all scaffoldings staging etc.
- The tendered rates shall apply for all floors heights.
- All chair stands shall be 5-prong tilting as approved by EIC / Architects, with a diameter of 25-1/2 inches, and finished with powder coating of high quality. In case M.S stands are approved, the same shall be embossed M.S with a seven-tank antirust treatment procedure before powder coating.
- All castors shall be of approved make, quality and type. They shall be glass reinforced nylon castors, with twin wheels having independent movement, and with a load carrying capacity of 100 Kg. per castors.

9. CORIAN (Solid Acrylic Surface)

- Composition: Corian should be solid, non-porous surfacing material homogeneously composed of acrylic resin (also known as Poly Methyl Meth Acrylate or PMMA), and natural minerals.
- Clearances: The recommended expansion clearance with UN-caulked Corian joints should be minimum 30.5 x 10 X6 x (length of the Corian piece) x (biggest temperature range expected in mm. Joints to be caulked should be approximately 3 mm wide to allow satisfactory caulk penetration and expansion.
- Joints: corner joints should be made square (butt) rather than mitred. All Corian joints should be reinforced. The edges to be joined should be straight, smooth and clean. Joints should only be made with "Joint Adhesive for DuPont Corian. Make cutouts with a router equipped with a sharp 9.5mm diameter (minimum) carbide bit.
- Corners of a cutout must be rounded to 5 mm radius and edges smoothed, top and bottom, all around a cutout. L- and U- shaped corners need smooth, 13mm radius inside corners. For hob cutouts corners should be reinforced with a Corian corner block.
- Sealants and Adhesives: FDA-listed silicone sealant sold by DuPont or its distributors should be used to achieve the best performance and color match. Vertical panels of Corian may be installed over suitable substrates, including water-resistant gypsum board, marine grade plywood and ceramic tiles. Use "Silicone Sealant" for DuPont Corian whenever low flame spread is required. In other cases, light colored elastic polyurethane adhesive or Type I (ANSI A 136.1-1967) elastic solvent based spread mastic adhesives may also be used. DO NOT USE WATERBASED ADHESIVES. Install countertops on perimeter framing support (without added substrate) using small amounts of silicone sealant. For making joints in countertops, repairs and custom edges, "Joint Adhesive for DuPont Corian" is required. When used in accordance with manufacturer's instructions, it provides a smooth.

10. SHOP DRAWINGS:

The contractor shall submit shop drawing for approval all joinery details for total furniture. Shop drawings shall relate to site measurements and shall show in detail the construction of various parts of the work, the method of jointing, thickness and type of material, the finishes to be applied to the various exposed surfaces, details of anchoring, joints, welds, fastening and all other relevant information.

G. ACOUSTIC INSULATION

Dry Wall Insulation helps attain acoustic privacy and fire rating. TwigaInsul slabs are to be placed in the cavities of the grid structure for partition wall. Both side of the grid is then covered with single or multiple layers of Ply. With 50mm, TwigaInsul slabs of density 48 Kg/m³, STC value of 34 , 67 dB and thermal resistance (R-value) of 0.75 to 3.33 sq.m K/W can be obtained.

The overall Thermal transmittance or U-value should be less than 0.44 W/sq.m. K to conform requirement. The insulation should conform to non-combustibility, Class-P(not easily ignitable), Class 1(surface spread of flame NIL), as per BS 476 standards.

H. POWDER COATING

The process of coating is basically.

- Degreasing
- Watering
- Picking/chromatin
- Waterrising
- Phosphating
- Oven heatingand
- Cooling at room temperatureetc.

VAPOCURING-

Vapocuring finish shall be done for Metal surfaces exposed to both interior and exterior atmosphere. The putty material, hardener, base coats material, Polyurethane coat material and the paints used shall strictly be in accordance with the manufacturers' specification.

Heating shall be at 70°C. The temperature may be varied depending on the hardener added with the color in the specified recommended proportion. The surface to be vapocured should be first made free from dust, dirt, grease or any such foreign material. The porches of Vapocuring shall be done under a dust-free environment and basically consist of

- Preparation of the surface
- Putty Work
- Spray coat either mixed with hardener or otherwise
- Heat treatment
- Polyurethane coating, etc.

I. FALSE CEILING

1. Item includes false ceiling in design with **coves & curves**, Suspending system and frame work shall match layout of A.C. Ducts / grills, electrical / fire protection wiring / fixtures, Return Air grills etc. Rate to include provision of extra height (Total Floor to floor height is 4.5 Mtr approx.) supports for frame work needed due to layout referred above and fixtures etc. Rates to include necessary scaffolding. **(PAYMENT WILL BE DONE FOR GYPSUM AREA ONLY).**
2. The false ceiling design can be stepped / curved/architectural design, cove etc. However only board surface area shall be measured for the purpose of payment. Nothing extra for design or curve. Existing floor to slab height on the site shall vary. Ceiling shall be hung from the existing slab through hangers. Rate quoted in the tender shall be applicable for all floor levels /all floor height (approx. 4.5 Mtr floor to floor approx.) including scaffolding, etc. complete. The rate of false ceiling items also includes 6 mm ply backing for supporting light fixtures in the false ceiling. The rate of false ceiling items also includes making all necessary cut outs & frame work for electrical fixtures / air conditioning work coves etc.

3. For technical details B.O.Q, drawings and technical specifications shall be referred, in case any details which are not available in these documents manufacturer's standard details shall be referred and that must be approved by EIC prior to procurement and supply at site.

4. **Mineral Fibre Board False ceiling**

Mineral Fiber Ceiling Tiles shall be made of granulated high-density Mineral Wool as the main material and top production technique which gives it superior features of fire-proofing, sound absorption, heat insulation & sag resistance. They are cost effective and are mainly used for acoustics and decoration.

Tiles shall be appropriate class and of finished thickness as specified in the description of the item. Only selected tiles of uniform width shall be used. Unless otherwise specified in the description of the item or shown in the drawings, the width of tiles selected for use shall not be less than 595 x 595mm in size and of approved texture, design and patterns and patterns and shall be of 15mm/ 16mm thick Beveled Tegular edge type.

Where width of room/ corridor is in multiple of standard width of tiles, same pattern shall be maintained throughout the length. Where the width of rooms/ corridor is not in multiple of standard width of tiles, borders with appropriate width and material of boards shall be provided in design approved by the Engineer-in-charge and maintained uniformly throughout of the length/ width of room/ corridor. Mineral Fibre tiles shall have the following properties:

- (a) Surface: Shall be of approved texture, design and pattern.
- (b) Dimensions: 595mm x 595mm x 16mm thick Beveled Tegular edge type. Size referred to are always module sizes. The nominal panel size may differ depending on the suspension system used.
- (c) Relative humidity: 99% RH resistant.
- (d) Fire resistance: Fire performance as per BS:476 (Part-6 & 7)
- (e) Thermal conductivity: 0.052 W/m-K – 0.057 W/m-K
- (f) Acoustic control: Noise reduction coefficient (NRC) = 0.50 to 0.60
- (g) Light reflectance:>85%.
- (h) Weight: 3.10 Kg/m² (for 16mm thick) & 5.29 Kg/m² (for 20mm thick)
- (i) Suspension system: Suspension system shall be made of interlocking metal T-grids of hot-dipped all round galvanized steel.

J. HVAC WORKS

I) **Supply, Installation, Testing, Commissioning & Holding Performance Responsibility of the system as per duty conditions & capacity ratings**

- a) Type: Inverter type VRV/ VRF systems (Heat pump).
- b) Capacity & Duty: As per BOQ / Schedule of Quantities
- c) Mandatory: Refer detailed specification & BOQ Requirements

II) **Scope:**

The scope of this section comprises the supply, erection testing and commissioning of Variable Refrigerant Volume/ flow System conforming to these specifications and in accordance with the requirements of Drawing and Schedule of Quantities.

III) **Type:**

Units shall be air cooled, variable refrigerant volume heat pump, consisting of one / multiple outdoor unit and single / multiple indoor units all connected in single refrigerant Piping circuit. Each indoor units shall be capable to cool/heat independently as per the requirement of the rooms. The systems will operate either on cooling or heating duty.

The indoor units on any circuit can be of different type and also controlled individually. Following type of indoor units (Depending upon the type specified in the drawings and the BOQ) shall be connected to the system:

- Ceiling mounted cassette type,
- Multiflow-standard Ceiling mounted cassette type,
- Multiflow-compact Ceiling mounted Low static, Duct type
- Ceiling mounted high static Duct type Ceiling suspended,
- Exposed type High Wall mounted type

IV) **OUTDOOR UNIT :**

The outdoor unit shall be factory assembled, weather proof casing, constructed from heavy gauge galvanized steel panels and powder coated. The unit should be completely factory wired tested with all necessary controls.

All outdoor units shall have hermetically sealed scroll/twin rotary compressors, DC inverter driven, and shall be able to operate even in case one of compressor is out of order.

Outdoor unit should also be provided with duty cycling and starting sequence changing facility for multiple inverter compressor and multiple outdoor units working in one system.

The outdoor unit shall be modular in design and should be allowed for side by side installation the unit shall be provided with its own microprocessor control panel with provision for integration with Building management system using BACNET/MODBUS-Protocol.

The outdoor units should have anti-corrosion paint free steel plate for easy mounting of unit. The outdoor units should be fitted with low noise, aero spiral design fan with grill for spiral discharge airflow to reduce pressure loss and should be fitted with DC fan motor to better efficiency. The unit should also be capable to deliver 55 Pa external static pressure to meet long exhaust duct connection requirement.

All outdoor units must be equipped with night time quiet operation feature. The condensing unit shall be designed to operate safely when connected to multiple fan coil units.

The Noise level shall not be more than 65 dbA at anechoic chamber, measured horizontally 1m away and 1.5m above ground level.

The outdoor units shall be suitable for three phase, 415 V, 50c/s AC Supply. Each outdoor units shall be provided with suitable capacity MCB/MCCB in water proof enclosure. All power & control wiring between multiple outdoor unit connected to a single circuit with adequate rating MCB/MCCB shall be done by HVAC contractor.

a) Compressor:

The compressor shall be highly efficient scroll / twin rotary type and capable of all inverter control & capable of working on 415 +/- 10% volts. It shall change the speed in accordance to the variation in cooling / heating load requirement: All outdoor units shall have multiple steps of capacity control to meet load fluctuation and indoor unit individual control. All parts of compressor shall be sufficiently lubricated stock. For oil recovery, every compressor shall have oil separator for stable operation. Forced lubrication may also be employed for better oil management. Oil heater shall be provided in the compressor casing

b) Heat Exchanger:

The heat exchanger shall be constructed with copper tubes mechanically bonded to aluminum fins to form across fin coil. The aluminum fins shall be covered by anti-corrosion resin film. The unit should be with by-pass heat exchanger type for good efficiency of condenser. The unit shall be provided with necessary number of direct driven low noise level propeller type fans arranged for vertical discharge. Each fan shall have a safety guard.

c) Refrigerant :

The refrigerant circuit shall include liquid & gas shut-off valves and a solenoid valves at condenser end. All necessary safety devices shall be provided to ensure the safe operation of the system.

d) Safety Devices:

All necessary safety devices shall be provided to ensure safe operation of the system.

Following safety devices shall be part of outdoor unit; high pressure switch, fuse, fan drive overload protector, fusible plug, overload relay, overload protection for inverter Anti-corrosion treatment

Outdoor units should be designed with anti-corrosion specifications as detailed below for use in area, which are subject to salt damage and atmospheric pollution

The portions of machines like side panel, outer panel, bottom frame, which are exposed to corrosive atmosphere, should be of alloyed hot-dip zinc coated steel plate, coated with corrosion protection powder polyester resin coating on both inner and outer surfaces in thickness of 64 micron or more. Finned coil protection net should have coating of resin coating containing ultraviolet ray absorbent. Fan and its fan protective net should be with weather resistant polypropylene resin.

The copper pipe aluminum fin shall be with special acrylic resin coated. And internal supports, frame, control box shall also be hot-dip zinc coated steel plate and with rust preventive powder coating of 64 micron or more on inner and outer surfaces.

All screws, bolt used in outdoor unit shall be with SUS410, Zinc-nickel alloy plating, zinc chrome acid film treatment and rust inhibitor coating.

When running power and control wires parallel to each other, either run them in separate conduits or maintain a suitable distance between them.

All control wiring shall be two core, shielded wire (outdoor to outdoor, indoor to indoor, outdoor to indoor) to prevent noise.

e) Oil Recovery System:

Unit shall be equipped with an oil recovery system to ensure stable operation with long refrigeration piping lengths.

v) INDOOR UNIT:

This section deals with supply, installation, testing, commissioning of various type of indoor units conforming to general specification and suitable for the duty selected. The type, capacity and size of indoor units shall be as specified in detailed Bill of Quantities.

While all indoor units shall be suitable for single phase, 220 V, 50 c/s AC supply, or as mentioned in BOQ, all outdoor units shall be suitable for three phase, 415 V, 50 c/s AC supply.

Indoor units shall be either ceiling mounted cassette type, or ceiling mounted ductable type or floor standing type or wall mounted type or other as specified in BOQ. Each unit shall have electronic expansion valve to control refrigerant flow rate respond to load variations of the room. The address of the indoor unit shall be set automatically in case of individual and group control. In case of centralized control, it shall be set by liquid crystal remote controller. The fan shall be dual suction, aerodynamically designed turbo, multi blade type, statically & dynamically balanced to ensure low noise and vibration free operation of the system. The fan shall be direct drive type, mounted directly on motor shaft having supported from housing. The cooling coil shall be made out of seamless copper tubes and have continuous aluminum fins. The fins shall be spaced by collars forming an integral part. The tubes shall be staggered in the direction of airflow. The tubes shall be hydraulically/mechanically expanded for minimum thermal contact resistance with fins. Each coils shall be factory tested at 21 kg/sqm air pressure under water. Unit shall have cleanable type filter fixed to an integrally moulded plastic frame. The filter shall be slide away type and neatly inserted. Each indoor unit shall have computerized PID control for maintaining design room temperature. Each unit shall be provided with microprocessor thermostat for cooling or cooling and heating. Each unit shall be cable of

being controlled by wired/LCD type remote controller. The remote controller shall memorize the latest malfunction code for easy maintenance

The controller shall have self-diagnostic features for easy and quick maintenance and service. The controller shall be able to change fan speed and angle of swing flap individually as per requirement.

a) Ceiling Mounted cassette type:

The unit shall be ceiling mounted type. The unit shall include pre-filter, fan section. The Cassette Type housing of the unit shall be powder coated galvanized steel. The body shall be light in weight shall be able to suspend from four corners. The fan shall be aerodynamically (MULTI FLOW TYPE) designed diffuser turbo fan type. Unit shall have an external attractive panel for supply and return air. Unit shall have four-way supply air grilles on sides and return air grille in center.

Each unit shall have high lift drain pump, fresh air intake provision (if specified). Low gas detection system and very low operating sound.

All the indoor units regardless of their difference in capacity should have same decorative panel size for harmonious aesthetic point of view. It should have provision of connecting branch ducts.

b) Ceiling Mounted ductable type:

Unit shall be suitable for ceiling mounted type. The unit shall include pre-filter, fan Ductable section & DX coil section. The housing of unit shall be light weight powder coated galvanized steel. Type Unit The units shall have high static fan for Ductable arrangement.

c) High Wall mounted type:

The units shall be wall-mounted type. The unit includes pre filter, fan section & DX coil Mounted unit section. The housing of unit shall be light weight powder coated galvanized steel. Unit shall have an attractive external casing for supply and return air.

d) Refrigerant Piping:

All refrigerant piping for the air conditioning system shall be constructed from soft seamless up to 19.1mm and hard drawn copper refrigerant pipes for above 19.1 mm with copper fittings and copper-soldered for copper joints & silver -soldered for copper to other material joints. The refrigerant piping arrangements shall be in accordance with good practice within the air-conditioning industry, and are to include charging connections, suction line insulation and all other items normally forming part of proper refrigerant circuits. Refrigerant pipe fitting while include Y/Refnet joints and headers as per OEM design for correct distribution of refrigerant.

All joints in copper piping shall be sweat joints using low temperature brazing and or silver solder.

Before joining any copper pipe or fittings, its interior shall be thoroughly cleaned by passing a clean cloth

via wire or cable through its entire length. The piping shall be continuously kept clean of dirt etc. while constructing the joints. Subsequently, it shall be thoroughly blown out using nitrogen.

After the refrigerant piping installation has been completed, the refrigerant piping system shall be pressure tested using nitrogen at pressure of low side. Pressure shall be maintained in the system for 24 hours. The system shall then be evacuated to minimum vacuum if 700 mmHg and held for 24 hours.

The air-conditioning system suppliers shall design pipe sizes and erect proper interconnections of the complete refrigerant circuit.

The thickness of copper piping shall not be less than mentioned below:

Pipe Size in mm (OD)	Wall Thickness in mm
54.1	1.5
41.3	1.3
34.9	1.3
28.6	1.2
25.4	1.2
22.2	1.0
19.1	1.0
15.9	1.0
12.7	0.8
9.5	0.8
6.4	0.8

The suction line pipe size and the liquid line pipe size shall be selected according to the manufacturer's specified outside diameter. All refrigerant pipes shall be properly supported and anchored to the building structure using steel hangers, anchors, brackets and supports which shall be fixed to the building structure by means of inserts or expansion shields of adequate size and number to support the load imposed thereon.

VI) PIPE INSULATION

a) Refrigerant Pipe:

Entire liquid and suction refrigerant lines including all fittings, valves and strainer bodies, etc. shall be insulated with 19mm / 13 mm thick elastomeric, class O, nitrile rubber as specified in BOQ. For outdoor duty, if exposed to sun, to protect from degradation from UV rays, the

insulation shall be covered with 7 miles thick glass cloth & two coats of UV coating/26Galmuniumsheetcladingofapprovedshade&colour.

b) Drain Pipe:

Drain pipes carrying condensate water shall be insulated with 6 mm thick Elastomeric insulation nitrile. For proper drainage of condensate, U Trap shall be provided in the drain piping (wherever required). All pipe supports shall be of pre fabricated & pre painted slotted angle supports, properly installed with clamp etc.

INSTALLATION

The units shall be mounted on ribbed rubber pads for vibration isolation. The contractor shall supply the required charge of refrigerant, lubricant and other consumables, for commissioning and testing of the equipment.

All the equipment shall be thoroughly tested and checked for leaks. All safety controls shall be suitably set and a record of all settings shall be furnished to the project supervisor.

TESTING & BALANCING

Unit capacity in tons Refrigeration, shall be computed from the temperature readings and air-flow measurements. Flow measurements shall be preferably by a hot-wire anemometer or a velometer. Computed results shall conform to the specified capacities and the power consumption shall conform to the figures furnished by the manufacturer.

- a. All piping shall be tested to hydrostatic test pressure of at least two and half times the maximum operating pressure, but not less than 24 hours. All leaks and defects in joints revealed during the testing shall be rectified and gotten approved at site.
- b. Piping repaired subsequent to the above pressure test shall be retested in the same manner.
- c. System may be tested in sections and such sections shall be securely capped, then retested for entire system.
- d. The contractor shall give sufficient notice to all other agencies at site, of his intention to test a section or sections of piping and all testing shall be witnessed and recorded by Owner's site representative.
- e. The contractor shall make sure that proper noiseless circulation of fluid is achieved through all coils and other heat exchange equipment in the system concerned. If proper circulation is not achieved the contractor shall rectify the defective connection. He shall bear all expenses for carrying out the above rectifications, including the tearing up and refinishing of floors and walls as required.
- f. The contractor shall provide all materials, tools, equipment, instruments, services and labour required to perform the test.
- g. Complete certified report shall be submitted for evaluation and approval. Upon approval, four copies of the balancing report shall be submitted with completed drawings and documents.

K. ELECTRICAL WORKS

TECHNICAL SPECIFICATIONS –ELECTRICAL WORKS

1.00 GENERAL

It is not the intention to specify completely herein all aspects of design and constructional features of equipment's and details of the work to be carried out, nevertheless, the equipment and work shall conform in all respects to high standards of Engineering, Design and workmanship and shall be capable of performing in continuous commercial operation in a manner acceptable to the owner who will interpret the meaning of the specifications and drawings and shall have right to reject or accept any work or material which in his assessment is not complete to meet the requirements of this specifications and / or applicable code and standards mentioned elsewhere in this specifications.

2.00 SCOPE OF WORK

The scope of work under these specifications shall include design, manufacture, testing, supply, storage, erections, testing and commissioning of various items for complete electrification including labour, tools, tackles and plants etc. as required.

SERVICES

- a) For Electrical points, telephone, fire alarm system wiring, cabling connections and their terminations at required points with respective accessories.
- b) Laying of conduits, made of PVC/MS with respective accessories.
- c) Panel and distribution boards with accessories and their terminations.
- d) Raising mains/sub-mains/bus ducts with accessories and their terminations.
- e) Earthing system.
- f) The scope of work shall also include all minor/ civil works associated with lighting, power panels, Distribution boards, Cables, cable trays, conduits either on surface or in walls or ceiling for light points, switch boxes cutting and chasing the walls, ceiling including refilling, plastering the same.
- g) Materials and components not specifically mentioned in the specifications but necessary for satisfactory installations and operations of the system mentioned therein shall be deemed to have been included in the scope of work of this specification and NO extra payment shall be made for the same.

2.02 The installation shall comply in all respects with the requirements of Indian Electricity Act 1910 as amended up to date. Indian Electricity Rules 1956, there under and special requirements, if any of the state electricity boards etc.

DRAWINGS

- i) Few drawings showing general layout of building and distribution as such are enclosed with these specifications or can be seen at consultant/ Architect's office. These drawings are meant to give a general Idea to bidder regarding the nature of work covered by these specifications.
- ii) No information/Data shown/not shown in these drawings shall relieve the contractor of his responsibility to carry out the work as per these specifications and or drawings after the award of the work. Prices shall not be subject to variation after award of work due to difference in drawings and actual construction drawings released from time to time.
- iii) Contractor shall prepare and submit shop drawings to the consultant for his approval, detailed shop drawings of all system of wiring, Distribution boards, panels etc. All work shall be carried out on the approval of these drawings. However approval of these drawings does not release the contractor of his responsibility with the intent of the specifications.

METALLIC CONDUIT WIRING SYSTEM

Scope

This chapter covers the detailed requirements for wiring work in metallic conduits. This chapter covers both surface and recessed types of works.

Application

- (i) Recessed conduit is suitable generally for all applications. Surface conduit work may be adopted in places like workshops, plant rooms, pump rooms, wiring above false ceiling/below false flooring, and at locations where recessed work may not be possible to be done. The type of work, viz. surface or recessed, shall be as specified in the respective works.
- (ii) Flexible conduits may only be permitted for interconnections between switchgear, DBs and conduit terminations in wall.

Material

Conduits

- (i) All rigid conduit pipes shall be of steel and be ISI marked. The wall thickness shall be not less than 1.6 mm (16 SWG) for conduits upto 32 mm dia and not less than 2 mm (14 SWG) for conduits above 32 mm dia. These shall be solid drawn or reamed by welding, and finished with galvanized or stove enameled surface.
- (ii) The maximum number of PVC insulated cables conforming to IS 694 : 1990 that can be drawn in one conduit will be followed as per CPWD Norms, and the number of cables per conduit shall not be exceeded. Conduit sizes shall be selected accordingly in each run.
- (iii) No steel conduit less than 20 mm in diameter shall be used.

Conduit Accessories

- (i) The conduit wiring system shall be complete in all respects, including their accessories.

- (ii) All conduit accessories shall be of threaded type, and under no circumstances pin grip type or clamp grip type accessories shall be used.
- (iii) Bends couplers etc. shall be solid type in recessed type of works and may be solid or inspection type as required, in surface type of works.
- (iv) (a) saddles for surface conduit work on wall shall not be less than 0.55 mm (24 gauges) for conduits upto 25 mm dia and not less than 0.9 mm (20 gauges) for larger diameter. The corresponding widths shall be 19 mm & 25 mm.
(b) The minimum width and the thickness of girder clips used for fixing conduits to steel joists, and clamps shall be as per CPWD.

ELECTRIC POWER DISTRIBUTION AND WIRING

Introduction

The electric power will be received and distributed in a building, through following means:-

- (i) Cabling and switchgear to receive power.

The building is divided into convenient number of parts, each part served by a rising main system to distribute power vertically/horizontally.

- (ii) Power flows from rising main through tap-off box to floor main board to final DBs and then to wiring.

(iii) Dedicated circuit for different loads such as lighting, HVAC, power plug loads shall be provided, wherever possible.

(iv) Rising main, which takes care of general lighting and power outlet load of the building, should have independent cables for lighting as well as power, wherever possible. Other loads like lifts, water pump sets, other motor loads are fed by independent cables of suitable capacity fed from properly designed essential/ non-essential LT power panels with suitably designed switchgear having necessary control and safety features.

(v) Therefore the distribution/wiring system essentially consists of provision of cables, switchgear, rising main, bus-ducting, earthing, laying of pipes/ conduits etc. (in surface or recess) based on proper detailed designing to decide on various sizes/ capacities of these components and various controls and safeties involved, to provide an efficient, reliable, safe and adequate electrical distribution and wiring system.

- (vi) A typical schematic diagram of power distribution of a building is enclosed. (See Fig. 3)

System of Distribution and Wiring

- (i) The wiring shall be done from a distribution system through main and/or branch distribution boards. The system design and location of boards will be properly worked out.

- (ii) Each main distribution board and branch distribution board shall be controlled by an incoming circuit breaker/linked switch with fuse. Each outgoing circuit shall be controlled by a circuit breaker/switch with fuse
- (iii) For non-residential and residential buildings as far as possible DBs shall be separate for light and power.
- (iv) Only MCCB/MCB/HRC fuse type DBs shall be used. Re-wirable type fuses shall not be used.
- (v) Three phase DBs shall not be used for final circuit distribution as far as possible.
- (vi) 'Power' wiring shall be kept separate and distinct from light wiring, from the level of circuits, i.e., beyond the branch distribution boards. Conduits for light/power wiring shall be separate.
- (vii) Essential/non-essential/UPS distribution each will have a completely independent and separate distribution system starting from the main, switchboard upto final wiring for each system. As for example, conduit carrying non-essential wiring shall not have essential or UPS wiring. Wiring for essential and UPS supply will have their own conduit system. No mixing of wiring is allowed.
- (viii) Generally, no switchboard will have more than one source of incoming supply. More than one incoming supply will be allowed only at main board with proper safety and interlocking so that only one source can be switched on at a time.
- (ix) Each MDB/DB/Switch Board will have reasonable spare outgoing ways for future expansion.
- (x) Balancing of 3-phase circuit shall be done.

Wiring

Sub-main & Circuit Wiring

(a) Sub-main Wiring

Sub-main wiring shall mean the wiring from one main/distribution switchboard to another.

(b) Circuit Wiring

Circuit wiring shall mean the wiring from the distribution board to the 1st tapping point inside the switch box, from where point wiring starts.

Measurement of Sub main and Circuit Wiring

- (i) Circuit and sub main wiring shall be measured on linear basis along the run of the wiring. The measurement shall include all lengths from end to end of conduit or channel as the case may be, including Protective (loop earthing) conductors, which are run along the circuit wiring and the submain wiring, but exclusive of interconnections inside the switchboard etc. The increase on account of diversion or slackness shall not be included in the measurement.

- (ii) The length of circuit wiring with two wires shall be measured from the distribution board to the nearest switch box from which the point wiring starts. Looping of switch boxes also will be counted towards circuit wiring, measured along the length of conduit/channel
- (iii) When wires of different circuits are grouped in a single conduit/ channel, the same shall be measured on linear basis depending on the actual number and sizes of wires run.

Note: Conduit carrying submain will not carry circuit/point wiring. Similarly conduit carrying circuit wiring will not carry submain/point wiring. Conduit carrying point wiring will not carry submain/circuit wiring.

Measurement of Other Wiring Work

Except as specified above for point wiring, circuit wiring and sub-main wiring, other types of wiring shall be measured separately on linear basis along the run of wiring depending on the actual number and sizes of wires run.

POINT WIRING

Definition

A point (other than socket outlet point) shall include all work necessary in complete wiring to the following outlets from the controlling switch or MCB.

- (a) Ceiling rose or connector (in the case of points for ceiling/exhaust fan points, prewired light fittings, and call bells).
- (b) Ceiling rose (in case of pendants except stiff pendants).
- (c) Back plate (in the case of stiff pendants).
- (d) Lamp holder (in the case of goose neck type wall brackets, batten holders and fittings which are not prewired).

Scope

Following shall be deemed to be included in point wiring:

- (a) Conduit/channel as the case may be, accessories for the same and wiring cables between the switch box and the point outlet, loop protective earthing of each fan/ light fixture.
- (b) All fixing accessories such as clips, screws, Phil plug, rawl plug etc. as required.
- (c) Metal or PVC switch boxes for control switches, regulators, sockets etc, recessed or surface type, and phenolic laminated sheet covers over the same.
- (d) Outlet boxes, junction boxes, pull-through boxes etc. but excluding metal boxes if any, provided with switchboards for loose wires/conduit terminations.
- (e) Control switch or MCB, as specified.
- (f) 3 Pin or 6 pin socket, ceiling rose or connector as required. (2 pin and 5 pin socket outlet shall not be permitted.)
- (g) Connections to ceiling rose, connector, socket outlet, lamp holder, switch etc.
- (h) Bushed conduit or porcelain tubing where wiring cables pass through wall etc.

(Note: In areas where false ceiling are provided, termination of wires should be at the fittings. Flexible conduits from ceiling junction box to the fittings shall be provided duly coupled at both ends. This shall be included within the scope of point wiring.)

(i) Interconnecting wiring between switches within the switch box on the same circuit.

Twin Control Light Point Wiring

- I. A light point controlled by two numbers of two way switches shall be measured as two points from the fitting to the switches on either side.
- II. No recovery shall be made for non-provision of more than one ceiling rose or connector in such cases.

Wiring System

- I. Wiring shall be done only by the looping system. Phase/live conductors shall be looped at the switch box. For point wiring, neutral wire/earth wire looping for the 1st point shall be done in the switch box; and neutral/earth looping of subsequent points will be made from point outlets.
- II. In wiring, no joints in wiring will be permitted any where, except in switch box or point outlets, where jointing of wires will be allowed with use of suitable connector.
- III. The wiring throughout the installation shall be such that there is no break in the neutral wire except in the form of linked switchgear.
- IV. Light fans and call bells shall be wired in the 'lighting' circuits. 15A/16A socket outlets and other power outlets shall be wired in the 'power' circuits.
- V. Colour Coding

Following colour coding shall be followed in wiring:

Phase: Red/Yellow/Blue.(Three phase wiring)

Live: Red (Single phase wiring)

Neutral: Black

Earth: Yellow/Green.

(vi) Termination of Circuit into Switchboard

Circuit will consist of phase/neutral/earth wire. Circuit will terminate in a switch board (first tapping point, where from point wiring starts) in following manner:

Phase wire terminated in phase connector.

Neutral wire terminated in neutral connector.

Earth wire terminated in earth connector.

The switchboard will have phase, neutral and earth terminal connector blocks to receive phase/neutral/ earth wire.

Run of Wiring

(i) The type of wiring shall be as specified in the tender documents namely, surface conduit/recessed conduit, steel/PVC, channel.

(ii) Surface wiring shall run as far as possible along the walls and ceiling, so as to be easily accessible for inspection.

(iii) Above false ceiling, in no case, open wiring shall be allowed. Wiring will be done in recessed conduit or surface steel conduit.

(iv) In recessed conduit system, routes of conduit will be planned, so that various inspection boxes provided don't present a shabby look. Such boxes can be provided 5 mm above plaster level, and they can be covered with plaster of paris with marking of junction boxes.

(v) Where number of electrical services like electrical wiring, telephone wiring, computer cabling, pass through corridors, it may be proper to plan such service with properly designed aluminium/PVC channels duly covered by a false ceiling, so that subsequently such service can be maintained and additional cables can be provided.

(vi) Generally conduits for wiring will not be taken in floor slabs. When it is unavoidable, special precaution to be taken to provide floor channels, with provision for safety and maintenance. Alternatively false flooring can be provided.

PASSING THROUGH WALLS OR FLOORS

- I. When wiring cables are to pass through a wall, these shall be taken through a protection (steel/ PVC) pipe or porcelain tube of suitable size such that they pass through in a straight line without twist or cross in them on either porcelain, PVC or other approved material.
- II. All floor openings for carrying any wiring shall be suitably sealed after installation.

Joints in Wiring

- I. No bare conductor in phase and/or neutral or twisted joints in phase, neutral, and/or protective conductors in wiring shall be permitted.
- II. There shall be no joints in the through-runs of cables. If the length of final circuit or sub main is more than the length of a standard coil, thus necessitating a through joint, such joints shall be made by means of approved mechanical connectors in suitable junction boxes.
- III. Termination of multi stranded conductors shall be done using suitable crimping type thimbles.

Capacity of Circuits

Lighting circuit shall feed light/fan/ call bell points. Each circuit shall not have more than 800 Watt connected load or more than 10 points whichever is less. However, in case of CFL points where load per point may be less, number of points may be suitably increased.

- I. Power circuit in non-residential building will have only one outlet per circuit.
- II. Each power circuit in residential building can feed following outlets:
 - (a) Not more than 1 Nos. 16A outlets.
 - (b) Not more than 1 No.16A and 1 Nos. 6A outlets.

Socket Outlets

- I. Socket outlets modular type shall be 6A 5 pin, 16 Amp 3 pin or 16/6 Amp 6 pin. The third pin shall be connected to earth through protective (loop earthing) conductor. 2 pin sockets shall not be permitted to be used.
- II. Conductors connecting electrical appliances with socket outlets shall be of flexible type with an earthing conductor for connection to the earth terminal of plug and the metallic body of the electrical appliance.
- III. Where specified, shutter type (interlocking type) of sockets shall be used.
- IV. Every socket outlet shall be controlled by a switch or MCB, as specified. The control switch/MCB shall be connected on the 'live' side of the line.
- V. Unless and otherwise specified, the control switches for the 6A and 16A socket outlets shall be kept along with the socket outlets.

Cables

- I. Copper conductor cable only will be used for sub main/ circuit/ point wiring.
- II. Minimum size of wiring:
 - Light Circuit Wiring: 2.5 Sq.mm
 - Light Point Wiring: 1.5 sq.mm.
 - Power Wiring: 4.0 sq.mm.

(iii) Insulation: Copper conductor cable shall be PVC insulated conforming to BIS Specification.

(iv) Multi stranded: Cables are permitted to be used.

Wiring Accessories

- a) Control Switches for Point
 - i. Control switches (single pole switch) carrying not more than 16A shall be modular type. The switch shall be 'On' when the knob is down.
 - ii. Modular type switches to be provided All types of points as may be decided by the Architect/ user department.
- b) Switch Box
 - i. Switch box shall be hot dip galvanized, factory fabricated, suitable in size for surface/ recess mounting and suitable in size for accommodating the required number of switches and accessories.
 - ii. Switch box also can be of non-metallic material. The technical sanctioning authority will approve specified makes of reputed quality and specifications.

Fittings

Types : The type of fittings shall be as specified in tender documents.

Indoor Type Fittings

- I. Where conductors are required to be drawn through tube or channel leading to the fitting, the tube or channel must be free from sharp angles or projecting edge, and of such size as will enable them to be wired with the conductors used for the final circuit without removing the braiding or sheathing. As far as possible all such tubes or channels should be of sufficient size to permit looping back.
- II. Wires used within prewired fittings shall be flexible with PVC insulation and 14/0.193 mm (minimum) copper conductors. The leads shall be terminated on built-in-terminal block, ceiling rose or connector, as required.
- III. Fittings using discharge lamps shall be complete with power factor correction capacitors, either integrally or externally. An earth terminal with suitable marking shall be provided for each fitting for discharge lamps.
- IV. Fittings made of CRCA shall be phosphatized and powder/epoxy painted.

Outdoor Fittings

Outdoor fittings shall have suitable IP protection. It is preferable that street light fittings are of cast Aluminium body of IP 65, for reducing recurring maintenance cost and improved performance. Wherever required, IP 66 fittings also can be provided for reducing maintenance frequency and cost.

POSITION OF POINTS, DISTRIBUTION BOARDS & SWITCHBOARDS

- a) The recommended position of the light point, control switches, distribution boards as shown on the drawings shall be adhered to as far as practicable. In case of location changes due to Architectural requirements, no extra payments will be made on this account.
- b) Should there be any discrepancy or incomplete description ambiguity or emission in the drawings or in other documents whether original or supplementary forming the contract, the

tenderer shall immediately on discovering the same shall draw attention of the Architect / consultant.

- c) Before commencement of work, the exact final position of all points, switch boxes and the distribution boards shall be ascertained by the tenderer from the Architects / Consultants.

SAMPLES

The contractor shall submit 2 sets of samples of accessories and apparatus; he proposes to use in the installations, at site for approval a required. This specification shall not be departed from without any written instructions from the consultants.

MANUFACTURER'S INSTRUCTIONS.

Where manufacturers have furnished specific instructions relating to the material/ equipment to be used in this job, covering points, not specifically mentioned in these documents, manufacturer's instructions shall be followed.

MATERIALS AND EQUIPMENTS

All the materials and equipments shall be of approved make and design, Unless otherwise called for, only the best quality materials and equipment shall be used.

PRICES

Prices shall remain firm and free from variations due to rise in the cost of materials/ labour during the stipulated period of execution and during extended period of Completion of project.

L. DATA WORKS

Networking Equipment

- All active components shall be of the same make.
- All passive components excluding racks shall be of the same make.
- Bidder may supply equipments of same specification or better.
- Managed layer-2 Edge Switches :

The minimum specification of the layer 2/3 Edge Switches shall be:

a) Edge switch consisting of:

1 20 numbers of 10/100 Mbps T Ports + 4 nos. Combo loaded with three nos. of 100/1000 Tx module and 1 no. of 1G base SX Ethernet module.

b) The Edge Switch should have the following features & requirements.

1 Modular and Scalable managed L2/L3 Switch

2 Switching Fabric of minimum 12 Gbps

3 Configurable up to 5000 MAC addresses

c) Protocols/Standards support:30/45

- Ethernet IEEE 802.3, 10 Base T
- IEEE 802.3u - Fast Ethernet
- IEEE 803z, 802.3ab Gigabit Ethernet
- IEEE 802.1 q - VLAN Taggin
- IEEE 802.1p priority tags
- IEEE 802.3x - Flow Control
- Port Mirroring
- IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)/ equivalent
- IEEE 802.1x – port authentication
- IEEE 802.3ad Link Aggregation Control Protocol
- IEEE 802.1D spanning tree protocol
- Up to 255 VLANs per switch
- IGMP (Internet Group management protocol)

d) Network Management features:

1 Web based

2 Telnet and TFTP (Trivial file transfer protocol) access

3 RMON (Remote Network monitoring)

4 SNMP

e) Architecture

1 Layer 2 switching (managed)

f) Quality of Service (QoS)

1 IEEE 802.1p prioritization with minimum 4 priority queues

2 Provision for IP telephony & VOIP support

3 Differentiated services (RFC 2474) All equipments shall support TCP/IP with full QoS features

ii) The minimum Specification for Passive components shall be: SI. No. Specifications

A Cat 6 Patch Cord/Mounting Cord Patch Cable

(a) Shall be Unshielded Twisted Pair

(b) Shall Meet TIA/EIA-568-B.2-1 Category 6 specifications

(c) Shall have RJ45 connector at both ends (Straight cable)

(d) Standard length: 3 ft.

(e) All patch cords shall be factory crimped.

B Cat 6 Patch Panel

(a) Shall be Rack Mountable.

(b) Shall be of powder coated steel chassis

(c) Shall have port identification no. in front of the panel.

(d) Shall be available in 24 ports configuration.

(e) Shall be covered by ETL verification program for compliance with TIA 568B.2-1

(Category 6 connecting hardware specification)

(f) Shall have integrated rear cable management shelf.

(g) Power Manager

iii) The minimum Specification for Racks shall be :

SI. No. Specifications

1 Specification of Rack(12 U wall mount rack)

- The specification of the racks shall be as follows:
- The rack shall be of metallic structure with box type design.
- The racks shall be Wall / Floor Mountable : 19 " frame structure
- The racks shall be provided with lock & key arrangement and toughened glass fitted front door.
- The racks shall be provided with proper ventilation arrangements and proper opening for cable entry.
- A/C main distribution Box with minimum 5 nos. of 5 amp sockets.
- Double section – that can be opened from both front & back.
- 19" cable manager.

2.0 Final Acceptance Test (FAT) :

After successfully installation of the system, final acceptance tests shall be undertaken for a period of 7 days for integrated operation of the network. The bidder in the presence of the purchaser shall carry out the final acceptance test.

3.0 Completeness

Any equipment, materials or supplies which may not be specifically mentioned, but are necessary for carrying out the contract work shall be in the scope of the bidder and the systems must be complete in all respects.

4.0 Warranty:

Three year comprehensive on-site warrantee for the materials supplied after successful completion and issue of acceptance certificate shall be provided. This warranty shall be provided by the bidder through Original Equipments supplier.

5.0 Bill of Quantity:

The bill of quantity may vary during actual execution of work. However for price evaluation items & quantity as indicated in SOR shall be considered.

LIST OF APPROVED MAKE, BRANDS & MANUFACTURERS

All materials to be used for furnishing & interior work is to be of following approved make, manufacturers other than listed below may also be considered at the discretion of the Engineer in charge/ Architect.

Unless otherwise mentioned, any one of the following approved makes or brands shall only be allowed to be used. In case of non-availability due to any verifiable reason, EIC may allow alternate brand(s), if sufficient options are not available. In case of a product not mentioned in the list, material/brand/model needs to be approved by Engineer-in-Charge and/or Architect, before use.

FOR LABORATORY WORKS

SR NO	MATERIAL	APPROVED MANUFACTURER / SUB CONTRACTOR / SUPPLIERS
1	LAB Furniture	Kotterman/Kewaunee/ ART LAB
2	Work Surface - Benches	18/19mm Thick Jet Black Granite
3	PP Sink	Premiere/Broen or Equivalent, Indigenous
4	Water Tap	Water saver/ Broen
5	Bench Mounted Valves	Water saver/ Broen
6	Eye Wash	Guardian / Broen/watersaver
7	Electrical / Data / Voice Sockets	Northwest/ MK
8	Blower	Colasit / Plastifer
9	Blower Motor	ABB / CG
10	VFD	Delta / ABB
11	CPVC Pipes, Valves and Fittings	Ashirvad/Astral/Supreme
12	HDPE Pipes and Fittings	Ashirvad/Astral/Supreme

FOR CIVIL/ INTERIOR WORKS

SR NO	MATERIAL	APPROVED MANUFACTURER / SUB CONTRACTOR / SUPPLIERS
1	Cement	Ultra Tech, ACC, Ambuja
2	White cement	Birla, J.K.
3	Carpet Flooring	Belgotex, Welpsun or as similar approved

4	Wood Preservative	ASCU PS-2 or equivalent
5	Tile adhesive cement and joint filling compound	MYK Laticrete, Ardex,
6	Glazed tiles (1 st Quality)	H & R Johnson, Nitco, Kajaria, Somany, Orient Bell
7	Vitrified tiles (1 st Quality)	Kajaria, H & R Johnson, Nitco, Somany, Orient Bell
8	Ceramic tiles(1 st Quality)	Kajaria, H & R Johnson, Nitco, Somany, Orient Bell
9	Plasterboard wall	Gyproc or equivalent
10	Insulation Wool	U.F. Twiga, Crown, Lloyd
11	Charcol flute panel	Ventura, Euro prateek
12	Double Side tape	SGG PlaniFIX or equivalent
	HARD WARE /PAINT/PLYWOOD	
13	Hinges and hardware	Hafele, Hettich, or equivalent
14	Paint-Plastic Emulsion/ Exterior/ OBD/ Luster	Asian paint, ICI Dulux, Burger, Nerolac
15	Fire retardant paint	Akzonnobel, Newkem, Viper
16	Texture paint	Asian Royale Play, Oikos or equivalent
17	Surface texture wall coating	Unitile, OIKOS, Asian, Acro paints
18	Locks	Godrej, Kich, Hetich, Hafele
19	Laminate	Greenlam, Formica, Century, Archid, Merino, Duro
20	Block board/Plywood	DURO Primium, Green ply (only green ply not subsidiary ply accepted like Ecotech), Century (only century ply not subsidiary ply accepted like Sanik), Archid Assam Only. All ply certificate must be supplied at site by company
21	BWP Board/ply	DURO Primium, Green ply (only green ply not subsidiary ply accepted like Ecotech), Century (only century ply not subsidiary ply accepted like Sanik), Archid Assam Only. All ply certificate must be supplied at site by company
22	Soft Board	Sitatex or equivalent

23	Veneer	Archid, Century, Green Lam, Duro
24	Acrylic solid Surfaces	Corian(Du-point), LG, Marino
25	Stainless steel handle	Kich, Dorma, Geze, Hafele, ozone
26	Floor spring / Door closer / fittings	Dorma, Hemco, Hafele, Geze, ozone
27	Flush Doors	Archid, Century, Greenply
28	Fire retardant fabric	RSWM, Arvind, Mafatlal
29	Wall paper	Poly décor, Marshal, Green Terror
30	Glass/ Mirror/ lacquered	Asahi, Saint Gobain, Modiguard or Equivalent
31	UPVC Window	Fenesta, LG Hausys, Rehau or equivalent
32	Blind	Vista, Mac, Hunter Douglas Or Equivalent
	FURNITURE	
33	Chairs, tables, sofas, storage units, other furniture	Godrej/ BP Ergo / wipro/spark

FOR FALSE CEILING & MISC ITEMS

Sr No	Material	Approved Manufacturer / Subcontractor / Suppliers
	False Ceiling	
1	Calcium Silicate false ceiling	Ramco, Gyproc , USG or Equivalent
2	Gypsum board	India Gypsum/ USG Boral / Saint Gobain Gyproc
3	GI Section	Saint Gobain Gyproc/India Gypsum/ USG Boral
4	Open Cell Ceiling	Durlum / Armstrong/saint gobain
5	Aluminum false ceiling	Durlum / Armstrong/ saint gobain
6	Acoustical false ceiling & Paneling	Armstrong / Ecophone/ AMF / saint gobain /USG Boral

7	Stretch Ceiling	Euroceil or equivalent
8	Mineral Fibre Tile Ceiling	Armstrong, Durlum, USG

ELECTRICAL WORKS

Sr. No	MATERIAL	NAME OF MANUFACTURER
1	Wires (FRLS)	Polycab, Finolex, KEI, Gloster, Havells.
2	Switches , Sockets , face plates, TV, telephone, data outlets and GI back box	Legrand (Mosaic/ Arteur), MK (Blenze), ABB (Cherian), Anchor Roma
3	Conduits	Precision, AKG, BEC
4	Electrical panels	CPRI Approved
5	Distribution boards	Legrand , Siemens, Schneider, L&T.(double door only)
6	Switchgears(ACB/MCCB/MCB)	Legrand, Siemens, Schneider, L&T
7	Cables	Polycab, KEI, Gloster, Havells.
8	Chemical earthing	Indelec
9	Light Fitting	Philips / Havells / Jaquar / Wipro
10	Underfloor Raceway	MK, Legrand
11	CAT 6 Cabling	TE Connectivity (AMP Netconnect)/ Systimax/ ADC Krone/ Panduit/ Siemon
12	Patch Panel	TE Connectivity (AMP Netconnect)/ Systimax/ ADC Krone/ Panduit/ Siemon
13	Switches	Legrand or equivalent
14	Racks	Valrack or equivalent
15	Intelligent addressable Fire alarm system	Honeywell/ Essar/ Johnson/ Siemens or equivalent
16	Public address system	Bosch, Honey well, Yamaha or equivalent
17	UPS	Emerson, Schenider, APC or equivalent
18	Exhaust fan	Usha/Bajaj/Crompton/Havells

19	Emergency Exit Light Fixture	Prolite
20	Batteries	Exide /Amaron/ Amara Raja
21	Cable Tray	UB/Profab/Legrand

HVAC WORKS

Sr. No	MATERIAL	APPROVED MAKE, BRANDS & MANUFACTURERS
1	Equipment	Carrier/Hitachi /Bluestar/Daikin
2	Fans	Kruger/ Nicotra/ Carryair
3	Ducting	Rolastar /Ductofab/RSP/VJ Perfect/ Eqv.
4	Air Products	Airmaster/SystemAir/ Cosmos/Ruskin Titus
5	Heater	Daspass/Mathrusree
5	Humidifier	Raidcool/Daspass
6	Copper Piping	Rajco/Mandev/Totaline/Maxflow
7	Insulation	Armacell/K-Flex/ALP
8	Cable Trays	Patny/UB Engineering/Profab
9	Switch Gear	ABB/L&T
10	PVC Pipe	AKG/BEC-Plast/Supreme/Sudhakar/Ajay
11	Cables	Polycab/Orbit/Finolex/Masterflex
12	Starter Panels	CPRI Approved Vendor

The Contractor shall supply ISI marked material as per any of the makes or brands indicated above. In case ISI marked material for any of the brands is not being manufactured, first quality material shall be accepted. The samples of the material shall in either case have to be got approved from the Engineer.

Material where no make/brand has been mentioned, ISI marked samples shall be submitted by the Contractor for approval of Site Engineer. For those classes of materials, where no firm exists with ISI approval, sample of first quality material of the firm shall be submitted for the approval of the Site Engineer.