

TENDER NO: 04/2019 Dated 25.06.2019
INVITATION OF TENDERS for
WORKS OF HVAC FOR GYMNASIUM ROOM AT SPORTS BLOCK OF
INDRAPRASTHA INSTITUTE OF INFORMATION TECHNOLOGY DELHI
CAMPUS AT OKHLA-III, NEW DELHI



INDRAPRASTHA INSTITUTE of
INFORMATION TECHNOLOGY DELHI



ARCHITECTS



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Indraprastha Institute of Information Technology, New Delhi (IIIT-Delhi)

DATED: 25.06.2019

TENDER NOTICE

1. Last Date & Time of issue of tender documents from 25.06.2019
2. Last Date & Time of receipt of tender 05.07.2019 upto 3.00 p.m.

CE, IIIT-Delhi, Okhla, New Delhi-110020 on behalf of Registrar, IIIT-Delhi invites sealed item rate tenders from eligible contractors for similar works.

Name of work: **Works of HVAC for Gymnasium Room at Sports Block of Indraprastha Institute of Information Technology (IIIT-Delhi) Campus, Okhla PhaseIII, New Delhi.**

Location	First floor of Sports Block
Estimated cost of work put to tender	Rs. 5 Lacs
Time of completion	30 Days

Earnest Money Deposit:**Rs. 10,000/-(Rupees Ten thousand only)** is to be submitted with tender document as earnest money. The above payment shall be made in the shape of deposit at pay order/demand draft of a scheduled bank issued in favour of **IIIT Delhi Collection payable** at New Delhi.

Works to be completed in coordination with the other agencies/contractors. No extra for non-availability of fronts or coordination with main agency shall be payable on account of the same.

Tender documents can be downloaded from IIITD website (www.iiitd.ac.in) and submitted with non refundable DD of Rs. 500/- in favour of **IIIT Delhi Collection** as cost of tender.

- 1) The tenders shall be placed in sealed envelopes with a name of work and due date written on the envelope and addressed to the CE, IIITD. Complete tender documents shall be submitted by the approved contractors in **two envelopes. 1st envelope** shall contain the earnest money in the shape of Demand Draft / Pay Order of a scheduled Bank requisite shape as per condition & eligibility criteria and cost of tender as stated above in case of the downloaded version.
- 2) The eligible contractors who have carried out similar works in IIIT-D/Govt Deptts/PSU/Reputed Pvt sector /MNCs are to submit the experience certificates for the works and registration certificates with Govt. Depts. if any. The said certificates along with the EMD be enclosed in Envelope-1.
- 3) Experience of having successfully completed similar works during last seven years ending on the 31st May 2019. The Similar works shall mean works of Heating Ventilation and Air-conditioning works. The value of executed works shall be brought to current costing level by enhancing the actual value of

work at simple rate of 7% per annum calculated from date of completion to last date of receipt of tenders.

Three similar works not less than 40% of est.cost	Rs 2 lacs each Or
Two similar works not less than 60% of est cost	Rs 3 lacs each Or
One similar work not less than 80% of est cost	Rs 4 lacs each

- 4) One completed works of any nature either part of 3) or separate one costing not less than 40% of estimated cost ie Rs 2 lacs with some Central/State/Autonomous/Central PSU/State PSU/local authority formed under any Act published in Central/State Gazette.
- 5) The applications not supported with requisite experience certificates, GST registration certificate, TIN no. and ITCC in Envelope-1 shall not be entertained
- 6) Average Annual Turnover over HVAC works should be at least Rs 12.50 lacs during immediate last 3 consecutive financial years ending 31st Mar 2019.
- 7) Should not have incurred any loss in the more than two years in the last five years ending 31st Mar 2019.
- 8) Should submit solvency certificate of 40% of estimate ie for 2 lacs from their bankers .
- 9) Performance certificates must be submitted by the vendors for the works .
- 10) The 2nd **envelope** shall contain the financial bids including Priced Schedule of Quantities, Form of Tender, Conditions of Tender, Articles of Agreement, Brief Specifications, Condition of contract, Drawings all duly signed by the authorized signatory of the firms.

All these envelopes are to be put in a single envelope duly super-scribed the name of work, and addressed to CE, (IIITD) and with their address. Incase the tenderer does not fulfill the laid down eligibility criteria or fails to deposit the earnest money in prescribed form, financial bid shall not be opened.

Tenderers shall seal the tender affix their initials and put stamp on each and every page of tender document before submission. The tender of the contractor, who submits in-complete tender document or submits more than one tender for one work, shall not be considered at all.

Tenders will be received by the **CE up to 3.00 P.M on 05.07.2019** and will be opened by him or his authorized representative in the office of Registrar, IIITD on the same day at 3.30 P.M.

First, the Technical Bids will be opened and screened .The bids shall be examined whether the EMD is in order and the bidder meets the minimum eligibility criteria specified above. . Those bidders whose EMD is in order, meets the minimum eligibility criteria, has submitted all the required documents and meet the technical requirements shall be considered for opening of

financial bid. Conditional tenders would not be accepted. Financial bids in respect of contractors who do not fulfill above criterion shall not be opened.

11) No Xerox / certified copies of tenders shall be accepted, if submitted these tenders shall be rejected.

CE

CONDITIONS

1. The time allowed for carrying out the construction work will be 45 Days from the 3rd day after the date of written orders to commence the work.
2. The site for the work is available.
3. During execution of works, because of some unforeseen circumstances to enable him to complete the work as per terms of the contract, shall not relieve the contractor from any liability or obligations under the contract and he shall be responsible for the acts, defaults and neglects of any sub-contractor, his agents or workmen as fully as if they were the acts, defaults or neglects of the contractor, his agents or workmen.
4. The Contractor shall be required to deposit an amount equal to 5% of the tendered value of the work as performance guarantee in the form of an irrevocable bank guarantee bond of any scheduled bank or State Bank of India in accordance with the form prescribed or in the form of fixed deposit receipt etc. within 4 days of the issue of letter of acceptance. The performance guarantee shall have the validity up to 31st Oct 2019
5. Tenderers are advised to inspect and examine the site and its surrounding at their own cost and satisfy themselves before submitting their tenders as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risk, contingencies and other circumstances which may influence or affect their tender. A tenderer shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charges consequent on any misunderstanding or otherwise shall be allowed. The tenderer shall be responsible for arranging and maintaining at own cost all materials, tools and plants, water, electricity, access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a tender by a tenderer implies that he has read this notice and all other contract documents and has made himself aware of the scope and specification of the work to be done, local condition and other factors having a bearing on the execution of the work.
6. The Accepting Authority (IIITD) does not bind himself to accept the lowest or any other tender and reserves to him/herself the authority to reject in whole or part, any or all of the tenders received without the assignment of any reason. All tenders in which any of the prescribed conditions are not fulfilled or for any condition including that of conditional rebate is put forth by the tenderer shall be summarily rejected.
7. Canvassing, whether directly or indirectly, in connection with tenders is strictly prohibited and the tenders submitted by the contractor who resort to canvassing will be liable to rejection.
8. The Accepting Authority reserves to himself the right of accepting the whole or any part of the tender and the tender shall be bound to perform the same at the rates quoted.

9. Tenders shall remain open for acceptance for a period of 60 days from the date of opening of the tenders. If any tenderer withdraws his tender before the said period for issue of letter of acceptance, whichever is earlier or makes any modification in the terms and condition of the tender which are not acceptable to the IIITD, then IIITD shall, with out prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money absolutely besides black listing of the tenderer.
10. The notice-inviting tender shall form a part of the contract document. The successful tenderer/contractor shall, sign the necessary contract documents consisting of the notice inviting tender, all the documents including additional conditions, specification and drawings, if any forming the tender as issued at the time of invitation of tender and acceptance thereof with any correspondence leading thereto within the time specified in the letter communicating the acceptance of the tender. In case of delay, the earnest money may be forfeited and the tender cancelled or the contract enforced as per the terms of the tender and the invitation to tender and the tenderer shall thus be bound by the condition of contract even though the formal agreement has not been executed and signed within the specified time by the tenderer.
11. The work shall be carried out as per general of conditions of contract for central PWD works 7/8 (Tender Contract) and form part of the agreement/document.
12. Contract is liable to be terminated by the IIITD without payment of any compensation, if subsequent to the acceptance of tender the contractor is black-listed by, or enters into partnership or employs any black listed contractor of the IIITD or any other department, or Govt. or its, undertakings.
13. Cost of Bidding
 - 13.1 The bidder shall bear all costs associated with the preparation and submission of his Bid, and the Employer will in no case be responsible and liable for those costs.
14. Clarification of Bidding Documents
 - 14.1 A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing/mail at the Employer's address indicated in the invitation to bid not later than 3 days before the Date of Submission of Tenders.

Email- **admin-project@iiitd.ac.in**
15. Currencies of Bid and Payment
 - 15.1 The unit rates and the prices shall be quoted by the bidder entirely in Indian Rupees. All payments will be invariably made in Indian Currency (Indian Rupees.)
16. PROTECTION OF ENVIRONMENT AND OTHER LAWS:

The contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the

public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and other local Acts/ Laws/ rules made there under, regulations, notifications and bye-laws of local authorities or any other law, bye-laws, regulations that may be passed or notification that may be issued in this respect in future by the State/ Local authority.

For and on behalf of the
REGISTRAR
Indraprastha Institute of Information Technology,
New Delhi

TENDER

I/We have read and examined and understood the notice inviting tender, schedule, A, B, C, D, E & F, Specifications applicable, drawings & Designs, General Rules and Directions, Conditions of Contract, clauses of contract, special conditions, Schedule of Rate & other documents and Rules referred to in the conditions of contract and all other contents in the tender document for the work.

I / We hereby tender for the execution of the work specified for the IIITD within the time specified in Schedule ' F ', viz., schedule of quantities and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in Rule - 1 of General Rules and Directions and in Clause 11 of the Conditions of contract and with such materials as are provided for, by, and in respect in accordance with, such conditions so far as applicable.

We agree to keep the tender open for sixty (60) days from the due date of its opening and not to make any modifications in its terms and condition.

A sum of Rs..... Rupees (.....)
has been deposited in demand draft of a scheduled bank issued by a scheduled bank as earnest money. If I / we, fail to furnish the prescribed performance guarantee within prescribed period, I / we agree that the said Director, IIITD or his successors in office shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely. Further, if I / we fail to commence work as specified, I / we agree that Director, IIITD or his successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said earnest money and the performance guarantee absolutely, otherwise the said earnest money shall be retained by him towards security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be ordered, up to maximum of the percentage mentioned in Schedule ' F' and those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 12.2 and 12.3 of the tender form. Further, I / We agree that in case of forfeiture of earnest money or both Earnest Money & Performance Guarantee as aforesaid, I / We shall be debarred for participation in the re-tendering process of the work.

I / We hereby declare that I / we shall treat the tender documents drawings and other records connected with the work as secret / confidential documents and shall no communicate information / derived there from to any person other than a person to whom I / we am / are authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.

Dated.

Witness:

Signatures of Contractor

Address:

Postal Address

Occupation:

LETTER OF SUBMISSION

The CE
Indraprastha Institute of Information Technology, Delhi
Okhla Phase-III
(Behind Govind Puri Metro Station)
New Delhi-110020.

I/We, the undersigned, have read and examined in detail, the HVAC specifications and all bidding documents and hereby declare that:

Price and Validity

1. All the rates quoted in our proposal are in accordance with the terms and conditions as specified in the bid document. All the prices and other terms and conditions of this proposal are valid for a period of 60 calendar days from the date of opening of bid.
2. We do hereby confirm that our bid prices include all taxes/levies/GST indicated separately.
3. We hereby declare that if any tax law is altered, we shall pay the same.
4. The quoted rates are inclusive of ESI , PF and Green Tax no extra on such heads would be payable on such account.

Earnest Money

We have enclosed EMD in the form of demand draft no....., dated.....favoring IIIT, Delhi payable at New Delhi issued / drawn onBank for Rs._____-/- (Rupees _____ Thousand only), as desired.

Deviations

We declare that all the works shall be performed strictly in accordance with the technical specifications and other tender conditions with no deviations.

Qualifying Data

We confirm that all information/data have been submitted as required in tender document.

We hereby declare that our proposal is made in good faith, without collusion for fraud and the information contained in the proposal is true and correct to the best of our knowledge and belief. I/We agree that in case any information is found to be incorrect the tender is liable to be rejected at any point of tendering process.

Bid submitted by us is properly sealed and prepared so as to prevent any subsequent alteration and replacement.

We understand that you are not bound to accept the lowest or any bid you may receive.

Thanking you,
Yours faithfully,
(Signature and seal of Tenderer with name, designation and contact no.)

ACCEPTANCE

The above tender (as modified by you as provided in the letters mentioned hereunder) is accepted by me for and on behalf of Registrar, IIITD for a sum of

Rs. ----- (Rupees -----)

The documents referred to below shall form part of this contract Agreement:-

- NIT
- Performa for Agreement
- Additional conditions.
- Special conditions
- Schedule of Quantities &
- Drawings
- General conditions of contract for CPWD Works-2012 with up to date correction slip

For & on behalf of
Registrar
IIIT

Signature.

Dated.....

Designation.....

SCHEDULES

SCHEDULE 'A'	
Schedule of quantities (Enclosed)	: Enclosed
SCHEDULE 'B'	
Schedule of materials to be issued to the contractor	NIL
SCHEDULE 'C'	
Tools and plants to be hired to the contractor	NIL
SCHEDULE 'D'	
Extra schedule for specific requirements/documents for the work, if any,	NIL
SCHEDULE 'E'	
Schedule of component of Cement, Steel, other materials, Labour etc. for price escalation.	NIL
CLAUSE 10 CC	
Component of Cement - expressed as percent of total value work,	N / A
Component of Steel-expressed as percent of total work.	N / A
Component of civil (except cement & steel) / Electrical construction Materials-expressed as percent of total value of work.	N / A
Component of labour-expressed as per cent of total value of work.	N / A
Component of P.O.L. - expressed as percent of total value work.	N / A
SCHEDULE 'F'	
Reference to General Conditions of contract.	

Name of Work: HVAC) Works in Gym Room of Sports Block of Indraprastha Institute of Information Technology (IIIT-Delhi) Campus, Okhla Phase III , New Delhi.

Estimated cost of work: Rs.5 lacs

- i. Earnest money: Rs. 10,000/-
- ii. Performance Guarantee- The contractor, for due and faithful performance of the Contract, shall obtain and submit to the Owner such security of 5% of the Contract Value within 7 days after the receipt of the Letter of Acceptance, in the form of BG Performa as appendix to tender from a scheduled Bank /FD providing such security shall be subject to the approval of the Owner. The cost of complying with the requirement of this Clause shall be borne by the Contractor.

Period of Validity of performance Bond

The performance bond shall be valid as at Conditions Cl 4 and till the Contractor has executed and completed the Works in accordance with the Contract. This security shall be returned to the contractor within 14 days of the issue of the said Completion Certificate.

Claim under Performance Security

Prior to making a claim under the performance security the Owner shall, in every case, notify the Contractor stating the nature of the default in respect of which the claim is to be made.

Security Deposit / Retention money shall be Five percent (5%) of the value of executed works and will be deducted from each and every payment made to the contractor against running account bill submitted for the work done at site. 50% of retention money will be released along with the payments of final bill and balance 50% will remain with Employer until the Defects Liability period is successfully over.

- iii. Defect Liability period 12 months from date of completion.
- iv. Liquidated damages In case of delay on account of reasons attributable to the Contractor Liquidated Damages shall be levied .The amount of Liquidated Damages payable by the Contractor to the Employer would be 0.25% of the value of order for each calendar day of delay subject to a maximum of 5% of the value of order after which Employer reserves the right to terminate the contract without prejudice to the rights of the Employer.

General Rules & Direction:

Officer inviting tender: Registrar (IIITD)

Definitions

2(v) Engineer-in-Charge	CE
2(viii) Accepting Authority	DIRECTOR, IIITD
2(x) Percentage on cost of materials and labour to cover all overheads and profits.	15%
2(xi) Standard Schedule of Rates	DSR-2016
2(xii) Department	IIIT
9(ii) Standard CPWD contract Form	CPWD form 8 -2010 with up to date correction slips.

Clause 1

- (i) Time allowed for submission of Performance Guarantee From the date of issue of letter of acceptance 4 days
- (ii) Maximum allowable extension beyond the period (Provided in (I) above 7days

Clause 2

Authority for fixing compensation under clause 2. Director, IIITD

Clause 2A

Whether clause 2A shall applicable No

Clause 5

Number of days from the date of issue of letter Acceptance for reckoning date of start 3 days

Time allowed for construction 30 Days

Clause 6, 6A

Clause applicable - (6 or 6A) Clause 6A

Clause 7

Gross work to be done together with net payment /adjustment or advance for material collected, if Rs 5 Lakhs.

any since the last such payment for being eligible to interim payment.

Clause 10A

List of testing equipment to be provided by the contractor at site lab. As required

Clause 10 B (ii)

Whether Clauses 10B (ii) (iv) shall be applicable
 -----do-----10B(iii) -----
 Yes
 No

Clause 10CA Escalation Not Applicable

Clause 10CC Escalation Not Applicable

Clause 11

Specification to be followed for execution of work CPWD Specifications 2007, Part I & II with Up-to-date correction slips

General Specification for HVAC works -2017

Clause 12

Deviation limit beyond which clauses 12.2 & 12.3 shall Apply for building work 100%

Clause 16

Competent Authority for deciding reduced rates. Director, IIITD

Clause 17

Contractor liable for Damages defects during maintenance period Applicable

Clause 18

List of mandatory machinery, tools & plants to be deployed by the contractor at site As per the site requirement.

Clause 36(i)

Requirement of Technical Representative (s) As per requirement.

Clause 25

Arbitration Clause As per special conditions

SPECIAL CONDITIONS

1. In the event of the tender being submitted by a firm, it must be signed by a person duly authorized through a power of attorney issued by all the partners and a certified copy of the power of attorney should be enclosed with the forwarding letter or separately by each member thereof, or in the event of the absence of any partner, it must be signed on his behalf by a person holding a power of attorney authorizing him to do so and such power of attorney shall be produced with the tender and it must disclose that the firm is registered under the Indian partnership Act.

Each and every signature given shall be separately witnessed. A Contractor or a contractor who himself / themselves has/have tendered or who may tender for the work shall not witness the tender of another person for the same work. Failure to observe this condition would render tenders of the contractors tendering as well as witnessing the tenders liable for summary rejection.

2. The conditions for item rate tender only will be applicable as given in general conditions of contract for central PWD works 2010. As mentioned there in also, in event no rate has been quoted for any items leaving space bolts in figure (s), word(s) and amount blank, it will be presumed that the contractor has included the cost of this/these item(s) in other item(s) and rate for such items will be considered as zero and work will be required to be executed accordingly.
3. Rates quoted as percentage below/above in the tender will be summarily rejected.
4. It must be understood that the work has to be completed as per the time provided in the contract and as such time is the essence of the contract.
5. The quantities furnished in the bills of quantities are only probable quantities liable to alternation by omission, deduction or addition, and it would be clearly understood that the contract is **not a lump sum contract** and the IIITD do not, in any way, assure the tenderer or guarantee that the said probable quantities are correct or that the work would correspond thereto. Payments will be regulated on the actual quantities of work authorizedly done and measured at the accepted rates. No claims due to change in quantities (+ or -) will be entertained. The drawings, forming parts of complementary installations work specifications and the bills of quantities, of the contract, are explanatory of and are to one another, representing together the works / to be carried out. If neither the drawings nor the specifications nor the accepted bills of quantities include any part/parts the intention to include which is nevertheless clearly inferred and which are obviously necessary for the proper completion of the works/ installations, all such parts shall be supplied and executed by the contractor at no extra charge. Anything contained in one or another of (a) the drawings, (b) the specifications and (c) the accepted bills of quantities and not found in the others will be equally binding as if it were contained in each of them.
6. No alterations, which are made by the tenderer in the drawings, specifications, conditions or probable quantities accompanying this notice will be recognized

and if any such alterations are made the tender, will be invalid. Conditional tenders will however be liable for rejection.

7. The tenderer must obtain for himself on his own responsibility and at his own expense all the information necessary, including risks, contingencies and other circumstances to enable him to make a proper tender and to enter into a contract with the IIITD. He must examine the drawings, specifications, conditions and so on and must inspect the site of work, examine the nature of the ground and the subsoil (so far as is practicable) and acquaint himself with local conditions, means of access to the work, storage facilities or areas for staff colony, the nature of the work, in fact all matters pertaining thereto before he submits his tender.
8. The tenderer shall also bear all expenses in connection with the preparation and submission of his tender and attendance for subsequent negotiations/clarifications.
 - (I) Omission, neglect or failure on the part of the tenderer to obtain requisite and reliable information on any matter affecting his tender, the contract and the construction, completion, maintenance, (dismantling and disposal) of the work shall not relieve the tenderer whose tender is accepted from any liability in respect of the contract.
 - (II) The tenderer whose tender is accepted shall not be entitled to make any claim for increase in the rates quoted and accepted excepting in pursuance of any specific provision in the contract.
9. The Contractor, upon award of work, shall furnish the following details for the approval of the Engineer in charge:
 - 9.1. The names of manufacturers of specialized items such as patented water proofing systems / materials, doors, flooring tiles, false ceilings, insulating materials, wind mill, cement, steel, glazing, and any other materials etc. which he proposes to use in the work.
 - 9.2. The makes and types of fittings, materials, subject to the makes and type stipulated in the specifications, which he proposes to use in the work.
 - 9.3. The details of licenses granted to him and/or to professional qualified and/or licensed technical personnel on his staff who will be engaged on the work (and submit, if called for, the licenses for inspection by the Officer in charge in consultation with Engineer in charge).
 - 9.4. Only approved agencies/ skilled workers shall be deployed to carry out requisite specialized items of work. The Officer/ Engineer in charge's decision in consultation with Architect's/ in this regard shall be binding to all the parties concerned.
10. The rates quoted in the bills of quantities shall unless specified otherwise will be for all heights, depths deemed to be for finished work in-situ/ item by item as provided for, and shall include cost for all necessary material and labours, all

necessary tools and plants and machinery, sheds, marking out, clearing site, etc. and for all taxes, octroi, excise, VAT works contract and any other tax or duty levied by Government, Central or Local, or Local Authority, GST indicated separately, if any as applicable.

- 10.1. The rates shall be firm and not be subject to any variations in exchange rates, in taxes, duties etc. in railway freight and the like including labour conditions, etc. The rates are not subject to escalation.
11. It will be the sole responsibility of the contractor to procure all the equipments/materials and other materials required for the work.
13. The IIITD further reserves the right to delete or reduce at any time, any section of the bills of quantities with out assigning any reasons whatsoever there for and no claim will be entertained in this regard.
14. The tenderer whose tender is accepted is bound to execute formal agreement with the IIITD within one week of the date of intimation of award of work in accordance with the draft agreement which will include conditions of tender, form of tender (general conditions of contract for central PWD works 2010), Articles of Agreement, Bills of quantities, Conditions of contract, Special conditions if any, the drawings and specifications, but his liability under the contract shall commence from the date of written order to commence work whether the formal agreement is drawn or not.

The Contractor shall bear all expenses in connection with the execution of the said agreement including fees for stamping and registration of documents as required.

15. The Security Deposit will bear no interest what so ever until the date of release.
16. a) The contractor, upon award of work, shall submit a memorandum of procedure giving the outline of his general scheme, programme and time table, in the form of a chart that shall be scrutinized and approved (with modifications as necessary), which shall become the approved programme for execution. The approved programme shall be the basis for assessment of comparative progress under the relevant conditions of contract.
- (b). Over and above, the contractor has to supply programme chalked out showing important milestones to be achieved and the progress actually achieved compared with, the target of the same in the programme and shortfall, if any planned for being made up in the programme for next month.
17. (a) The work in general shall conform to the CPWD Specifications 2007 with up to date correction slips & any other latest civil specification published by CPWD, New Delhi and the "Specifications for works".
- (b) In case items not covered by the general specifications referred above, reference shall be made to the appropriate I.S. Code.
- (c) Should there be any difference in the particular specifications of individual item of work and the description of item as given in the Schedule of quantity, the

latter shall prevail, which will be as per the relevant drawing.

(d), In case of any work for which there is no specification in I.S. specifications or in the specifications forming part of tender documents or in case there is any variation, such work shall be carried out in all respects in accordance with the instructions to be issued by the Engineer in charge.

18. On acceptance of the tender the Contractor shall in writing and at once inform the IIITD and the Architects the name of his accredited representative(s) who will be responsible to take instructions from the Architects / Officer in Charge.

The work of any part of it shall not be transferred, assigned or sublet without the written consent of the IIITD.

19. The Contractor shall be required to co-operate and work in co-ordination with and afford reasonable facilities for such other agencies / specialists / interior designers / consultants as may be employed by the Architects / Project Management Consultant/ Officer in Charge on other works / sub-works in connection with the project/scheme of which this work forms a part.
20. The Contractor shall get the necessary insurance done for their personal employed/ company insurance, third party insurance, marine insurance, all risk insurance or any other insurance as required.
21. The Contractor shall make arrangements of carrying water and electricity beyond one point where same shall be provided and recovery @1% of the cost of works shall be effected accordingly.
22. The Contractor is required to comply with all Acts of Government relating to labour, safety, environment and other Rules and Regulations made there under from time to time and to submit at the proper times all particulars and statements required to be furnished to the appropriate Authorities.

23. Delay and extension of time

If in the opinion of the Architect/PMC/Owner the Work is delayed:

- a) By force majeure, or
- b) By reason of any exceptionally inclement weather, or
- c) By reason of proceedings taken or threatened by or dispute with adjoining or neighboring owners or public authorities arising otherwise than through the Contractor's own default, or
- d) By the works or delays of other Contractor or tradesmen engaged or nominated by the Owner or the Architect/PMC and not referred to in the Schedule of Quantities and/or Specification, or
- e) By reason of Architect's/PMC/Owner Instructions to delay work, or

f) By reason of civil commotion, local combination of workmen or strike or lock-out affecting any of the building traders, or

g) In consequence of the Contractor not having received in due time necessary Instructions from the Architect/PMC/Owner for which he shall have specifically applied in writing,

Then the Architect/PMC/Owner shall make a fair and reasonable extension of time for completion of the Contract Work; in case of such strike or lock-out the Contractor shall, as soon as may be, give written notice thereof to the Architect/PMC/Owner, but the Contractor shall nevertheless constantly use his endeavors to prevent delay and shall do all that may reasonably be required to the satisfaction of the Architect to proceed with the work.

24. Failure by Contractor to comply with Architect's Instructions

If the Contractor after receipt of written notice from the Architect requiring compliance fails within ten days to comply with such further drawings and/or Architect's Instructions the Owner with the consent of the Architect may employ and pay other persons to execute any such work whatsoever that may be necessary to give effect thereto, and all costs incurred in connection therewith shall be recoverable from the Contractor.

25. Termination or Abridgment of Contract by the Owner

a) If the Contractor being an individual or a Firm commit any 'Act or Insolvency' or shall be adjudged an Insolvent or being an Incorporated Company or Society shall have an order for compulsory winding up made against it or pass an effective resolution for winding up voluntarily or subject to the supervision of the Court and of the Official Assignee of the Liquidator in such acts of insolvency or winding up shall be unable within seven days after notice to him requiring him to do so, to show to the reasonable satisfaction of the Architect that he is able to carry out and fulfill the Contract, and to give security therefore, if so required by the Architect, or

b) If the Contractor (whether an individual, Firm, Incorporated Company or Society) shall suffer execution to be issued, or

c) Shall suffer any payment under this Contract to be attached by or on behalf of any or the creditors of the Contractor, or

d) Shall assign or sublet this Contract without the consent in writing of the Architect/PMC first obtained, or

e) Shall charge or encumber this Contract or any payments due or which may become due to the Contractor there under, or

f) If the Architect/PMC shall certify in writing to the Owner that the Contractor:

i) Has abandoned the Contract, or

ii) Has failed to commence the works, or has without any lawful excuse under

these Conditions suspended the progress of the works for 14 days after receiving from the Architect/PMC/Owner written notice to proceed, or

iii) Has failed to proceed with the works with such due diligence and failed to make such due progress as would enable the works to be completed within the time agreed upon, or

iv) Has failed to remove materials from the site or to pull down and replace work for seven days after receiving from the Architect written notice the said materials or work were condemned and rejected by the Architect under these conditions, or

v) Has neglected or failed persistently to observe and perform all or any of the acts, matters or things by this Contract to be observed and performed by the Contractor for seven days after written notice shall have been given to the Contractor requiring the Contractor to observe or perform the same, or

vi) Has to the detriment of good workmanship or in defiance of the Architect's/PMC Instructions to the contrary sub-let any part of the Contract,

26. Then and in any of the said cases the Owner with the written consent of the Architect/PMC may, notwithstanding any previous waiver, after giving seven days' notice in writing to the Contractor, determine the Contract, but without hereby affecting the powers of the Architect or the obligations and liabilities of the Contract the whole of which shall continue in force as fully as if the Contract had not been so determined and as if the works subsequently executed had been executed by or on behalf of the Contractor. The costs of these works are therefore recoverable from the Contractor. And further, the Owner under instructions of the Architect, by his Agents or servants may enter upon and take possession of the works and all plants, tools, scaffolding, sheds, machinery, steam and other power utensils and materials lying upon the premises or the adjoining lands or roads, and use the same as his own property or may employ the same by means of his own servants and workmen in carrying on and completing the works or by employing any other Contractor or other person or persons to complete the Work, and the Contractor shall not in any way interrupt or do any act, matter or thing to prevent or hinder such other Contractor or other person or persons employed for completing and finishing or using the materials and plant for the Work. When the Work shall be completed or as soon thereafter as convenient the Architect shall give a notice in writing to the Contractor to remove his surplus materials and plant, and should the Contractor fail to do so within a period of 14 days after receipt thereof by him, Owner shall sell the same, and shall give credit to the Contractor for the amount realized. The Architect shall thereafter ascertain and certify in writing what (if anything) shall be due or payable to or by the Owner for the value of the said plant and materials so taken possession of by the Owner and the expense or loss which the Owner shall have been put to in procuring the works to be completed, and the amount, if any, owing to the Contractor and the amount which shall be so certified shall thereupon be paid by the Owner to the Contractor or by the Contractor to the Owner, as the case may be, and the certificate of the Architect shall be final and conclusive between the parties.

27. If at any time after the commencement of the work the Owner shall for any reason whatsoever not require the whole thereof, as specified in the tender, to be carried out, but need to abridge the Contract, the Owner shall give notice in writing of the fact to the Contractor who shall have no claim to any payment or compensation which he might have derived from the execution of the work in full, but which he did not derive in consequence of the whole amount of the work not having been carried out. The Contractor shall in this case, however, be entitled to payment for the work already executed by him in accordance with the agreed rates. The Owner shall also take over all building materials as might have been ordered for the work, but orders for which cannot be canceled, if delivered within a reasonable time, and shall pay for them at cost price. The Contractor shall also be allowed to remove his tools and plants from the site.
28. Termination of Contract by Contractor
- a) If payment of the amount payable by the Owner under Certificate of the Architect /PMC for beyond two months from date of issue of certificate due to reason not attributable to the contractor.
 - b) The Owner commits any 'Act of Insolvency', or
 - c) If the Owner (being an individual, or firm) shall be adjudged an Insolvent, or (being an Incorporated Company or Society) shall have an order made against him or pass an effective resolution for winding up, either compulsorily or subject to the supervision of the Court or voluntarily, or if the Official Assignee or the Owner shall repudiate the contract, or if the Official Assignee or the Liquidator in any such winding up shall be unable within fifteen days after notice to him requiring him so to do, to show to the reasonable satisfaction of the Contractor that he is able to carry out and fulfill the Contract and to make all payments due, and to become due there under and, if required by the Contractor, to give security of the same, or
 - d) If the works be stopped for three months or more under a continuous spell under the order of the Architect /PMC or the Owner or by any injunction or other order of any Court of Law,
29. Then and in any of the above said (Clause28) cases the Contractor shall be at liberty to determine the Contract by notice in writing to the Owner, through the Architect, and he shall be entitled to recover from the Owner payment for all works executed and cost of the material supplied and lying at site for the purpose of the Contract as on the said day of the termination. No other claim for idle labour , loss of overheads , profits shall be entertained nor shall any other claim on account of the delay in completion of the work /availability of site/ unwarranted conditions whatsoever shall be tenable, even if it is caused by circumstances beyond the Contractor's control.

30. Procedure for Settlement of Disputes

30.1 Engineer's Decision

If a dispute of any kind whatsoever arises between IIIT-Delhi and the contractor in connection with, or arising out of, the contract or the execution of the works, whether during the execution of the works or after their completion and whether before or after any repudiation or other termination of the contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the engineer, the matter in dispute shall, in the first place, be referred in writing to the engineer, with a copy to all parties. Such reference shall be made within one (1) month of arising of any such dispute and state that it is made pursuant to this clause. No later than one (1) month after the day on which he received such reference the engineer shall give notice of his decision to IIIT-Delhi and the contractor. Such decision shall state that it is made pursuant to the reference under this clause.

Unless the contract has already been repudiated or terminated, the contractor shall in every case, continue to proceed with the works with all due diligence and the contractor and IIIT-Delhi shall give effect forthwith to any / every such decision of the engineer unless and until the same shall be revised, as hereinafter provided, in an amicable settlement or an arbitral award. If either IIIT-Delhi or the contractor be dissatisfied with any decision of the engineer, or if the engineer fails to give notice of his decision on or before one (1) month after the day on which he received the reference, then either IIIT-Delhi or the contractor may within a further period of one (1) month from the day on which it / they receive(s) the notice of such decision, or on the day on which the said period of notice of / for decision expired, as the case may be, give notice to the other party, with copy for information to the engineer, of its / their intention to commence arbitration. Such notice shall establish the entitlement of the party giving the same to commence arbitration, as hereinafter provided, as to such dispute and no arbitration in respect thereof may be commenced unless such notice is given. If the engineer has given notice of his decision as to a matter in dispute to IIIT-Delhi and the contractor and no notification of intention to commence arbitration as to such dispute has been given by either IIIT-Delhi or the contractor as herein provided, the said decision shall become final and binding upon IIIT-Delhi and the contractor.

30.2. Amicable Settlement

Where notice of intention to commence arbitration as to a dispute has been given in accordance with sub-clause 22.1, arbitration of such dispute shall not be commenced unless an attempt has first been made by the parties to settle such dispute amicably. Provided that, unless the parties otherwise agree, arbitration may be commenced on or after one (1) month from the day on which notice of intention to commence arbitration of such dispute was given, whether or not any attempt at amicable settlement thereof has been made or result achieved.

30.3. Arbitration

Any dispute in respect of which:

- a) the decision, if any, of the engineer has not become final and binding pursuant to the first sub-clause above,

b) amicable settlement has not been reached within the period stated in the second sub-clause above,

shall be finally settled, unless otherwise specified in the contract, by arbitration to be held in New Delhi in English, under the provisions of the Arbitration and Conciliation Act 1996, including any statutory reenactment(s) / amendment(s) thereof and Rules made thereunder, by the arbitrator. The Director of the Institute shall appoint one person as the sole arbitrator. Either party shall be limited in the proceeding before such arbitrator to evidence or arguments put before the engineer for the purposes of obtaining the said decision pursuant to the first sub-clause herein. No such decision shall disqualify the engineer from being called as a witness and giving evidence before the arbitrator on any matter whatsoever relevant to the dispute. Arbitration proceedings shall not be commenced prior to the completion of the works, unless any major pre-requisite criticality is discerned by the arbitrator, and the obligations of IIIT-Delhi, the engineer and the contractor shall not be altered by reason of the arbitration. The works shall not be stopped on account of the said process of arbitration and the contractor shall not be relieved of his responsibilities for the completion of the work under any circumstances whatsoever.

31.2. Contractor to provide everything necessary

The Contractor shall provide everything necessary for the proper execution of the Work according to the intent and meaning of the Drawings, Schedule of Quantities and Specifications taken together whether the same may or may not be particularly shown or described therein provided that the same can reasonably be inferred there from, and if the Contractor finds any discrepancy in the Drawings or between the Drawings, Schedule of Quantities and Specification he shall immediately and in writing refer the same to the Architect who shall decide which is to be followed.

31.3. Materials and Workmanship to conform to Descriptions

All materials and workmanship shall so far as procurable be of the respective kinds described in the Schedule of Quantities and/or Specification and in accordance with the Architect's Instructions, and the Contractor shall upon the request of the Architect furnish him with all invoices, accounts, receipts and other vouchers to prove that the materials comply therewith. The Contractor shall at his own cost arrange for and/or carry out any test of any materials which the Architect may require.

31.4. Assignment and Sub-letting

The whole of the works included in the Contract shall be executed by the Contractor and the Contractor shall not directly or indirectly transfer, assign or underlet the Contract or any part share thereof or interest therein without the written consent of the Architect, and no undertaking shall relieve the Contractor from the full and entire responsibility of the Contract or from active superintendence of the Work during its progress.

31.5. Removal of improper work

The Architect shall, during the progress of the Work, have the power to order the removal, from the Site or works within such reasonable time or times as may be specified in the order, of any materials which in the opinion of the Architect are not in accordance with the Specification or the Instructions of the Architect, the substitution of proper materials, and the removal and proper re-execution of any works executed with materials or workmanship not in accordance with the Drawings, Specifications or Instructions and the Contractor shall forthwith carry out such order at his own cost. In case of default on the part of the Contractor to carry out such order, the Owner shall have the power to employ and pay other persons to carry out the same, and all expenses consumed thereon or incidental thereto as certified by the Architect shall be borne by the Contractor, or may be deducted by the Owner from any moneys due or that may become due to the Contractor.

ADDITIONAL CONDITIONS

1. General conditions of contract for Central PWD Works 7/8 (Tender of Form) shall be part of the agreement.
2. The work shall be carried out strictly as per CPWD specifications 2007, Part I & II with up to date correction slips. Wherever no specification is available in the above said document, drawings and specifications supplied with bill of quantities shall be applicable
3. The Contractor shall have to clear the site for the work of all overlying rubbish /garbage/dumped refuse material prior to commencement of the work in case required at no extra cost. The contractor shall take approval from the Engineer /Officer in Charge in writing for collection and stacking of materials.
4. The contractor must follow CPWD Safety Code as provided in general conditions of contract for CPWD Works.
5. Any damage done by the contractor or his workmen to any existing work during the course of execution of the work shall be made good by him at his own cost.
6. Contractor shall clear the site thoroughly of all rubbish etc. left out of his materials immediately on completion of the work and properly keep the site clean around the building to the satisfaction of the Engineer- in-Charge.
7. The preference of the codes will be IS codes.
8. The rates are inclusive of all staging, material and labour as required for the works. The items in the bill of quantities include all the materials, labour, and installation, complete as a finish items unless otherwise stated.
9. Unless specifically mentioned otherwise, quoted Rates shall be deemed to include work to be carried out at all curvatures, heights, depths, inclinations and locations, and in wet/foul locations, as and when they are encountered. The rates quoted for the various works as specified in the Priced Schedule of Quantities are work in all types of soils/rock and prevailing Site conditions including earth work, excavation, shoring, execution of various other items of work, i.e., laying of pipes, joining, concreting, masonry, plastering, etc. in and under water and dewatering as required. Nothing extra is payable on this account.
10. All security precautions shall be taken during dismantling work. The site shall be fenced /barricaded with suitable material during construction period .No payment shall be made for fencing/barricading work. Fencing/barricading shall be done immediately after possession of site and shall be removed after completion of construction period
11. No space on site/otherwise for labour huts shall be provided by IIITD, cost of same shall be borne by contractor.

12. The general condition of contract for Central P.W.D. Works has reference of various laws /acts /rules. The settlement of any disputes and arbitration, only Indian arbitration and conciliation act 1996 shall be applicable.
13. In case any specific brand of material has been specified either the same brand or of approved make of same specifications shall be used. The contractor shall take approval in advance for all such materials.
14. Costs for all materials and labour for the preparation of samples, market research, etc. shall be borne by the Contractor within his quoted Rates and nothing extra shall be payable for this. The works shall not be proceeded with without approval of the sample. In case sample is rejected and works cannot be proceeded with the IIITD shall be at liberty to terminate the contract and the Contractor shall have no claim for the works under such circumstances whatsoever.
15. The contractor should take utmost care to avoid any damage to the existing flooring, electrical works/cables, telephone cables, false ceiling, sprinkler system, fire alarm etc. in place. In case of any damage, it would be the responsibility of the contractor to restore the same immediately.

CORRIGENDUM TO FORM 7/ 8 / 9 (CPWD) MUST BE READ ALONG WITH THE PAMPHLET

S.No	FOR	READ
1	Government of India/Owner	Indraprastha Institute of Information Technology Delhi
2	C.P.W.D. or Government or Department	Indraprastha Institute of Information Technology Delhi
3	CPWD -7/8/9	CPWD 7/8/9
4	President / President of India	Chairman ,BOG,IIITD
5	Chief-Engineer	Director ,IIITD
6	Superintending Engineer	CE, IIITD
9	Administration Head	Registrar ,IIITD
11	CPWD Code, Paragraph '90	Shall be applicable to IIITD works
12	DSR'2007	Shall be applicable to IIITD works
13	CPWD specifications 2007 part - I& II	Shall be applicable to IIITD works
14	DSR (Internal) 2007 for Electrical works	Shall be applicable to IIITD works
15	CPWD specifications (Internal) 2007 for Electrical works	Shall be applicable to IIITD works
16	DSR External 2007 for Electrical works and specifications	Shall be applicable to IIITD works
17	Provision of Section 12 Sub-Section	Shall be applicable to IIITD works

	(i) of the works man compensation	
18	CPWD safety Code framed from time to time	Shall be applicable to IITD works
19	CPWD maternity benefits to labour	Shall be applicable to IITD works
20	Model Rules of the protection of health and sanitary appointment for workers employed by CPWD	Shall be applicable to IITD works
21	CPWD contractor labour Regulations	Shall be applicable to IITD works

SPECIFICATIONS:

1. GENERAL:

- 1.1. Without forgoing the requirements of the conditions of Tender and the Conditions of Contract the works in general shall conform to the "Specifications 2007" published by CPWD, New Delhi and the "Specifications for works" stated in this tender. In case items not covered by the general specifications referred above, reference shall be made to the appropriate I.S. Codes. If there is any difference in the particular specifications of individual item of work and the description of item as given in the Schedule of quantity, the latter shall prevail. In case of any work for which there is no specification in I.S. specifications in the specifications forming part of tender documents or in case there is any variation, such work shall be carried out in all respects in accordance with the instructions to be issued by the Engineer-in-charge. The term Officer in Charge appearing in the specifications shall mean supervisor and be in Charge of the work or his authorized representative as the context may demand. All corrections to "Specifications 2007" or latest revisions of I.S. Code/ Specification shall be deemed to apply to this contract.
 - 1.1.1. Materials bearing ISI certification mark certification shall be given highest preference for use in the works. Where the Contractor is required to do, perform, execute (etc.) any work or service or the like, it shall be deemed to be at his own cost. Absence of terms providing, Supplying, installing, fixing, etc. shall not even remotely entitle the Contractor to any additional payment there for
 - 1.1.2. The rates accepted in the Schedule of Quantities apply to all floors, heights, depths, leads, lifts, spans, sizes, shapes, locations, etc. unless a distinction has been included in the very Schedule.
 - 1.1.3. The Specifications and the Schedules may have been divided into various sub-heads for convenience only. This does not limit applicability of one to the other nor does it absolve the Contractor of his responsibility to complete any trade / item of work as reasonably inferred from one or more of such sub-heads.
 - 1.1.4. The Schedule of Quantities is not necessarily based on "Schedule of

Rates - Delhi 2007 or any of its later/ earlier versions. Hence the Schedule of Quantities shall be read and construed according to explanations given herein and intentions gathered there from. A mere parallel drawn form the said Schedule of Rates shall therefore not form a basis for a variation and, or additional payment.

- 1.1.5. All work under this contract is deemed to be performed above subs soil water level. However, removal of water collected from rains and the like shall be treated as part of contractual risk/obligation.
- 1.1.6. Screws, bolts, nuts, washers, hold fasts, lugs, anchors, clamps, plugs, suspenders, brackets, straps and fasteners of the like are deemed to be included in the rates of various items unless the Schedule of Quantities expressed a different intention.
- 1.1.7. Resetting any displacements, making good holes/chases and such other incidental jobs are included in rates of respective items for which these are required.

2. DRAWINGS, SPECIFICATIONS, INTERPRETATIONS ETC.:

In general, drawings shall indicate the dimensions, positions and type of construction, the specifications shall stipulate the qualities and the methods and performance criteria, and the schedule of quantities shall indicate the provisional quantities and the rates for each item of work. However, the above documents being complementary, what is called for by any one shall be as binding as if called for by all. In case of contradictory requirements between specifications and schedule of quantities, the requirements given in the schedule of quantities shall prevail.

Special conditions being mainly an amplification of General Conditions, they shall be read in conjunction with each other.

Work indicated on the drawings and not mentioned in the schedule of quantities or specifications or vice versa, shall be deemed as though fully set forth in each. Work not specifically detailed, called for, marked or specified, shall be the same as similar parts that are detailed, marked or specified.

Special Note

Though every care is taken while preparing this document to cover all necessary matters, specifications, general conditions, special conditions, provisions for smooth and complete execution of work, however in case of any omission in the tender/ contract document, latest correction slips of general conditions of contract for CPWD works 2010 will be the reference manual but not in supersession to aforesaid conditions.

I Split System Airconditioners

1. General :

The contractor shall supply and install split system air conditioners wherever indicated. The system shall be complete in all respects and comply with the specifications as given.

2. Condensing Units :

- 2.1 Each condensing unit shall be complete unit with hermetic reciprocating/scroll compressor/s, aircooled condenser, condenser fans with motors, internal piping, switches and internal wiring and shall be enclosed in a weather proof out door type housing.
- 2.2 The compressor shall be hermetic, with enclosed gas cooled motor. The compressor's shall be suitable for R-22/R-134a/R-407c/R-410a.
- 2.3 The condenser coil shall be air cooled type with aluminium fins and copper tubes and necessary refrigerant connections. The copper tubes shall not be less than 1/2" O.D.
- 2.4 The condenser air fans shall be propeller type direct driven, each complete with motor. The air quantity and area of the condenser shall be adequate for working in the specified out door conditions.
- 2.5 The casing shall be fabricated from galvanized steel, zinc phosphated and finished with baked enamel paint. The casing shall make the whole unit fully weather proof, suitable for out door installation.
- 2.6 The unit shall include a remote control assembly with thermostat and speed switches.
- 2.7 The necessary charge of refrigerant gas and lubricated oil shall be provided to run the system.

3. Indoor Units

General :

The indoor units shall be complete in all respects and shall generally comply with the specifications as given in the following paragraphs.

3.1 **Cassette Units :**

Unit

The units shall be Cassette type. The housing of the unit shall be of powder coated galvanized steel and shall include pre filter, fan section, coil section, etc. The body shall be light in weight.

The fan shall be Aerodynamically designed diffuser turbo fan type. The fan shall be mounted directly on motor shaft having supported from housing. The fan shaft shall be statically and dynamically balanced. The fan shall be direct driven type.

The cooling coil shall be of seamless copper tubes, and shall have continuous aluminium fins. The fins shall be spaced by collars forming integral part of the fins. The tubes shall be staggered in the direction of air flow. The fins shall be uniformly bonded to the tubes by mechanical expansion of the tubes. The coils shall be tested against leaks.

Unit shall have filter cleanable type of resin net (with mold resistant) fixed to an integrally molded plastic frame. The filter should be slid away type but neatly inserted.

Unit shall have a external attractive casing for supply and return air. Unit shall have two/four way supply air grilles on sides and return air grille in centre.

Control :

Each unit shall be with corded remote controller to operate maintain inside conditions.

Testing :

The indoor unit shall be tested to measure air quantity and coil performance by measuring temperature difference, and then calculating the capacity.

3.2 **Ductable Unit :**

The units shall be Ductable ceiling mounted type. The housing of the unit shall be powder coated galvanized steel and shall include pre filter, fan section, coil section, etc. The frame work shall be of extruded aluminium hollow section. All the frame shall be assembled using pressure die cast aluminium joints to make a sturdy, strong and self supporting frame work for various section. It shall follow manufacturer standard.

The fan shall be forward curved, double inlet double width type (Sirocco fan). The wheel & housing shall be fabricated from galvanized steel. The fan impeller shall be mounted on a solid shaft supported to housing. The impeller & fan shaft shall be statically and dynamically balanced. The fan outlet shall be connected to casing. The fan shall be direct driven type.

The cooling coil shall be of seamless copper tubes shall have continuous aluminium fins. The fins shall be spaced by collars forming integral part of the fins. The tubes shall be staggered in the direction of air flow. The fins shall be uniformly bonded to the tubes by mechanical expansion of the tubes. The coils shall be tested against leaks at a hydraulic pressure.

Unit shall have filter cleanable type of synthetic material fixed to an integrally moulded plastic frame. The filter should be slid away type but neatly inserted. The computerized PID control shall be used to maintain a correct room temperature. Each unit to be provided with microprocessor thermostat for cooling & heating.

Control

Each unit shall be with wired remote controller LCD type. The LCD remote controller shall memorize the latest malfunction code for easy maintenance.

Testing :

The fan coil unit shall be tested to measure air quantity and coil performance by measuring temperature difference, and then calculating the capacity.

3.3 **High Wall Mounted Units :**

The units shall be High wall mounted type. The housing of the unit shall be of powder coated galvanised steel and shall include pre filter, fan section, coil section, etc. The body shall be light in weight.

The fan shall be Aerodynamically designed diffuser turbo fan type. The fan shall be mounted directly on motor shaft having supported from housing. The fan shaft shall be statically and dynamically balanced. The fan shall be direct driven type.

The cooling coil shall be of seamless copper tubes, and shall have continuous aluminium fins. The fins shall be spaced by collars forming integral part of the fins. The tubes shall be staggered in the direction of air flow. The fins shall be uniformly bonded to the tubes by mechanical expansion of the tubes. The coils shall be tested against leaks.

Unit shall have filter cleanable type of resin net (with mold resistant) fixed to an integrally molded plastic frame. The filter should be slid away type but neatly inserted.

Unit shall have a external attractive casing for supply and return air. Unit shall have two/four way supply air grilles on sides and return air grille in centre.

Control :

Each unit shall be with corded remote controller to operate maintain inside conditions.

Testing :

The indoor unit shall be tested to measure air quantity and coil performance by measuring temperature difference, and then calculating the capacity.

4. **Refrigerant Piping :**

4.1 The condensing unit and evaporator unit shall be interconnected by type 'L' seamless copper refrigerant liquid and suction lines using flared or brazed fittings. Necessary accessories shall be incorporated in the circuit.

4.2 The suction line shall be insulated with two layers of 6 mm rubber foam insulation.

5. **Miscellaneous :**

5.1 The unit shall have control panel, housing the starting switches, contactor, relays etc.

5.2 Isolation pads shall be provided under the units.

5.3 Drain line shall be provided from fan coil unit upto drain trap. (To be priced separately).

5.4 Ductable unit shall have canvass connection at its outlet. The canvass connection shall be fire retardant, nonporous double layer.

5.5 Suitable M.S. angle iron supporting frame shall be provided for the condensing unit and supporting arrangement for the indoor units.

5.6 Interconnecting power and control cabling shall be provided between condensing unit and evaporator unit.

II Duct Work and Outlet

1. SCOPE

This chapter covers the general requirements for sheet metal ductwork for air distribution with associated items such as air outlets and inlets, fresh air intake and fire dampers.

1.1 MATERIAL

1.1.1 Ducts

- i. All ducts shall be fabricated either from Galvanised Sheet Steel (GSS) conforming to IS: 277 or aluminium sheets conforming to IS:737. The steel sheets shall be hot dip galvanized with MAT finish with coating of minimum 120 grams per square meter (GSM) of Zinc, GI sheets shall be lead free, eco friendly and RoHS compliant
- ii. The thickness of sheets for fabrication of rectangular ductwork shall be as under. The thickness required corresponding to the longest side of the rectangular section shall be applicable for all the four sides of the ductwork.

Longest side (mm)	Minimum sheet thickness	
	For GSS	For
750 mm and below	0.63	0.80
751 mm to 1500 mm	0.80	1.00
1501 mm to 2250 mm	1.00	1.50
2251 mm & above	1.25	1.80

(iii) Thickness of sheet for Round Ducts

Diameter of duct, mm	Thickness of Sheet, mm	
	GI sheets	Aluminium Sheets
150 to 500	0.63	0.80
501 to 750	0.80	0.80
751 to 1000	0.80	1.00
1001 to 1250	1.00	1.50
1251 and above	1.25	1.80

- iv) All sheet metal connections, partitions and plenums required for flow of air through the filters, fans etc. shall be at least 1.25 mm thick galvanised steel sheets, in case of G.I. sheet ducting or 1.8 mm thick aluminium sheet, in case of aluminium sheet ducting and shall be stiffened with 25 mm x 25 mm x 3 mm angle iron braces
- v) Circular ducts, where provided shall be of thickness as specified in IS: 655 as amended upto date.
- vi) Aluminium ducting shall normally be used for clean room applications, hospitals works and wherever high cleanliness standards are functional requirements.

1.1.2 Associated Items

- i. Supply/ return air outlets, F.A. grilles and accessories shall be constructed from extruded aluminium sections.
- ii. Flanges for matching duct sections, stiffening angles (braces) and supporting angles shall be of rolled steel sections, and shall be of the following sizes.

Application	Duct Width	Angle size
Flanges	Upto 1000 mm	35 mm x 35 mm x 3 mm
-do-	1001 mm to 2250 mm	40 mm x 40 mm x 3 mm
-do-	More than 2250 mm	50 mm x 50 mm x 3 mm
Bracings	Upto 1000 mm	25 mm x 25 mm x 3 mm
-do-	More than 1000 mm	40 mm x 40 mm x 3 mm
Support angles	Upto 1000 mm	40 mm x 40 mm x 3 mm
-do-	1001 mm to 2250 mm	40 mm x 40 mm x 3 mm
-do-	More than 2250 mm	Size and type of RS section shall be decided in individual cases

- iii) Hanger rods shall be of mild steel and of at least 10 mm dia for ducts upto 2250 mm size, and 12 mm dia for larger sizes.
- iv) All nuts, bolts and washers shall be zinc plated steel. All rivets shall be galvanised or shall be made of magnesium - aluminium alloy. Self tapping screws shall not be used.

1.2 CONSTRUCTION

1.2.1 Ducts

- i. Ducts shall be fabricated at site or factory fabricated and shall be generally as per IS: 655 "Specifications for metal air ducts", unless otherwise deviated in these General Specifications.
- ii. The interior surfaces of the ducting shall be smooth.
- iii. All the ducts upto 600 mm longest side shall be cross broken between flanges by a single continuous breaking Ducts of size 600 mm and above shall be cross broken by single continuous breaking between flanges and bracings. Alternatively, beading at 300 mm centres for ducts upto 600 mm longest side, and 300 mm centres for ducts above 600 mm size shall be provided for stiffening.
- iv. As far as possible, long radius elbows and gradual changes in shape shall be used to maintain uniform velocity accompanied by decreased turbulence, lower resistance and minimum noise. The ratio of the size of the duct to the radius of the elbow shall be normally not less than 1:1.5.
- v. Flanged joints shall be used at intervals not exceeding 2500 mm. Flanges shall be welded at corners first and then riveted to the duct.
- vi. Stiffening angles shall be fixed to the sides of the ducts by riveting at 1.25 meters from joints for ducts of size 600 mm to 1500 mm, and 0.6 m from joints for ducts of size larger than 1500 mm. Bracings for ducts larger than 1500 mm can alternatively be by diagonal angles.
- vii. Plenums for filters shall be complete with suitable access door of size 450 mm x 450 mm.
- viii. All factory fabricated duct shall be supplied in L sections, the length of any piece shall not be more than 1800 mm for duct with longest side of cross section as 600 mm and above and 3000 mm for rest.

1.2.2 Air Outlet and Inlets (Supply and Return)

- i. All air outlets and intakes shall be made of extruded aluminium sections & shall present a neat appearance and shall be rigid with mechanical joints.
- ii. Square and rectangular wall outlets shall have a flanged frame with the outside edges

returned or curved 5 to 7 mm and fitted with a suitable flexible gasket between the concealed face of the flanges and the finished wall face. The core of supply air register shall have adjustable front louvers parallel to the longer side to give upto 22.5 degrees vertical deflection and adjustable back louvers parallel to the shorter side to achieve a horizontal spread air pattern to at least 45 degrees. Return air grilles shall have only front louvers. The outer framework of the grilles shall be made of not less than 1.6 mm thick aluminium sheet. The louvers shall be of aerofoil design of extruded aluminium section with minimum thickness of 0.8mm at front and shall be made of 0.8mm thick aluminium sheet. Louvers may be spaced 18 mm apart.

- iii. Square and rectangular ceiling outlets/intakes shall have a flange flush with the ceiling into which it is fitted or shall be of anti smudge type. The outlets shall comprise an outer shell with duct collar and removable diffusing assembly. These shall be suitable for discharge in one or more directions as required. The outer shell shall not be less than 1.6 mm thick extruded section aluminium sheet. The diffuser assembly shall not be less than 0.80 mm thick extruded aluminium section.
- iv. Circular ceiling outlets/intakes shall have either flush or anti smudge outer cone as specified in the tender specifications. Flush outer cones shall have the lower edge of the cone not more than 5 mm below the underside of the finished ceiling into which it is fitted. Anti smudge cones shall have the outer cone profile designed to reduce dirt deposit on the ceiling adjacent to the air outlet. The metal sheet used for construction of these shall be minimum 1.6 mm thick extruded aluminium sheet.
- v. Linear diffusers shall have a flanged frame with the outside edges returned 3.5 mm and shall have one to four slots as required. The air quantity through each slot shall be adjustable. The metal sheet used for the construction of these shall be minimum 1.6 mm thick extruded aluminium sheet.
- vi. Grilles and diffusers constructed of extruded aluminium sections shall have grille bars set straight, or deflected as required. These shall be assembled by mechanical interlocking of components to prevent distortion. These grilles and diffusers shall have a rear set of adjustable blades, perpendicular to the face blades for deflection purposes.
- vii. All supply air outlets shall be fitted with a volume control device, made of extruded aluminium gate section. The blades of the device shall be mill finish/ block shade pivoted on nylon brushes to avoid rusting & rattling noise, which shall be located immediately behind the outlet and shall be fully adjustable from within the occupied space without removing any access panel. The volume control device for circular outlets shall be opposed blade radial /shutter type dampers, or two or more butterfly dampers in conjunction with equalizing grid. Opposed blade dampers shall be used for square and rectangular ceiling/wall outlets and intakes.
- viii. All the products supplied by contractor should supplement in performance by selection

curves of product ratings from the manufacturer.

- ix. Laminar supply air diffusers shall be made of 2mm thick powder coated aluminium sheet duly insulated with 5mm thick closed cell polyethylene foam insulation having factory laminated aluminium foil and joints covered with self adhesive aluminium tape and having holes 2/3 mm dia including frame work.

1.2.3 Fresh Air Intakes

- i. Fresh air intake grills shall be made of extruded aluminium sections.
- ii. A flanged frame using RS sections shall be provided on front face to conceal the gap between the louvers and the adjoining wall face. Corners of frame shall be welded. The frame shall be made structurally rigid.
- iii. Louvers made from extruded aluminium section shall be in modular panel form for ease of handling. These shall be free from waves and buckles. Vertical blades shall be truly vertical and horizontal blades shall be truly horizontal. Butt joints in blades shall not be accepted.
- iv. Additional intermediate equally spaced supports and stiffeners shall be provided to prevent sagging/ vibrating of the louvers, at not more than 750mm centres where the louver's length is longer than 750mm.
- v. A bird wire screen made of 12 mm mesh in 1.6 mm steel wire held in angle or channel frame shall be fixed to the rear face of the louver frame by screens.

1.3 FIRE DAMPERS

- i) Fire dampers shall be provided in all the supply air ducts and return air ducts (where provided), return air passage in the air-handling unit room and at all floor crossings. Access door will be provided in the duct before each set of fire dampers.
- ii) Fire dampers shall be multi blade louvers type. The blade should remain in the air stream in open position & shall allow maximum free area to reduce pressure drop & noise in the air passage. The blades and frame shall be constructed with minimum 1.6mm thick galvanised sheet & shall be factory fitted in a sleeve made out of 1.6mm galvanised sheet of minimum 400mm long. It shall be complete with locking device, motorised actuator & control panel.
- iii) Fire dampers shall be motorised smoke & fire dampers type. It shall be supplied with spring loaded UL stamped fusible link to close fire damper in the event of rise in duct temperature. Fire damper shall also close on receipt of fire alarm signal to cut off air supply instantaneously. An electric limit switch shall also be operated by the closing of fire damper, which in turn shall switch off power supply to AHU blower motor as well as strip heaters.
- iv) Fire dampers shall be CBRI tested & certified for 90 minutes rating against collapse &

flame penetration as per UL 555-1995.(Under writers laboratories)

- v) Fire dampers shall be compatible with the fire detection system of building & shall be capable of operating automatically through an electric motor on receiving signal from fire alarm panel.
- vi) Necessary wiring from fire alarm panel up to AHU electric panel shall be provided by the department & further from AHU electric panel to fire damper shall be provided by air conditioning contractor.

1.4 VARIABLE AIR VOLUME (VAV) BOXES

- i) These shall of the low velocity variable air volume boxes without re-heat coils, and shall be of open protocol as marketed by a firm specializing in this field. The contractor shall supply and install units to the quantity and locations as specified.
- ii) The unit shall be complete with damper, airflow ring, and solid-state electronic controls to provide accurate room temperature control. The damper shall be aero foil type construction with bearings.
- iii) Boxes shall be supplied with all internal attenuation treatment and acoustical damped casing necessary to achieve the required noise criteria. Casing shall be of 22G GSS minimum fitted with a completely sealed, easily removable means of access to all internal parts. Access to all boxes must be from the underside only.
- iv) The actuator shall be of 24V AC Bi-directional, direct coupled to the damper shaft. The required transformer to step down of the voltage range from 230V to 24V shall be part of the unit. The power point with an isolator near the VAV will be provided by other agencies.
- v) The unit shall be complete with transformer, access panel and other accessories as per the standard.
- vi) The noise level shall be less than 35dbA.
- vii) Maximum allowable static pressure to the boxes for its satisfactory operation shall not exceed 0.10WG, otherwise fan and motor selections may be affected.
- viii) Boxes shall be able to reset any air flow between 10% and the maximum air quantity that the boxes can handle without changing orifices or other parts. Air quantity limiters will not be accepted.
- ix) A suitable device shall be provided for the field adjustment of minimum airflow. All

boxes shall be initially factory set at minimum air quantity of Under shut-off conditions, all boxes shall not have air leakage more than 2% of the maximum air quantity at 75mm static pressure.

- x) The VAVs shall be used in standalone mode complete with its own temperature sensor and controller and shall perform the function of maintaining the temperature and airflow.
- xi) Where ever specified, the VAVs shall be BMS compatible to enable to network the VAVs to a Network Control Unit and onto BMS. In this mode all VAV data shall be available at the BMS workstation and it shall be possible to change set points and flow settings from the BMS workstation. All such controllers used for the control of VAV boxes shall be compliant with BACnet/ MODBUS protocol and be freely communicable to third party BACnet/ MODBUS IP controllers.
- xii) All boxes shall be electrically controlled. The boxes shall be pressure independent.
- xiii) VAV Box shall have provision to support from floor/ wall/ ceiling and in vertical/ horizontal condition.

1.5 FLEXIBLE DUCTING

1.5.1 Application

Flexible Duct is a round, flexible light weight duct and is preliminary used for Speedy completion of project Offers a high degree of flexibility, which allows it to be easily connected to any desired position. A quick and economical means of correcting misalignment between system components. Allows ducting around obstacles where fabricated and fitted ducts would be difficult and costly to install.

1.5.2 Material

- i. An uninsulated flexible duct shall be made of double lamination of metalized polyester film permanently bonded to a coated spring steel wire helix. Duct shall be in tear & puncture resistant construction.
- ii. For insulated flexible duct where specified, inner core for the same should be made of double lamination of metalized polyester film permanently bonded to a coated spring steel wire helix. Fiberglass insulation of minimum 14 kg/cu.m density, 25 mm thickness shall be wrapped over the inner core & covered with strong outer jacket cum vapour barrier made of fibre glass reinforced metalized polyester film laminate.
- iii. Care must be taken to install all the flexible duct in fully extended position & bends made with adequate radius as per manufacturer recommended practices.

1.6 **INSTALLATION OF METALLIC DUCT**

1.6.1 **Ducting**

- i. The fabrication and installation shall be in a workmanlike manner. Duct work shall be rigid and straight without kinks.
- ii. All exposed ducts within the conditioned space shall have slip joints. Flanged joints shall not be used.
- iii. All joints shall be airtight.
- iv. Ducts shall be supported independently from the building structure and adequately, to keep the ducts true to shape. The support spacing shall be not more than 2 m. where ducts cannot be suspended from ceiling, wall brackets or other suitable arrangements, as approved by the Engineer-in-charge shall be adopted. Neoprene or other vibration isolation packing of minimum 6 mm thickness shall be provided between the ducts and the angle iron supports/brackets. Vertical duct work shall be suitably supported at each floor by steel structural members.
- v. Where metal ducts or sleeves terminate in woodwork, tight joints shall be made by means of closely fitting heavy flanged collars. Where ducts pass through brick or masonry openings, wooden frame work shall be provided within the openings and the crossing ducts shall be provided with heavy flanged collars on either side of the wooden frame work, so that duct crossing is made leak-proof.
- vi. Duct connections to the air-handling unit shall be made by inserting a double canvas sleeve 100 mm long. The sleeve shall be securely bonded and bolted to the duct and unit casing. Dampers shall be provided in branch duct connections for proper volume control and balancing the air quantities in the system, whether indicated in the drawings or not. Suitable links, levers and quadrants shall be provided for proper operation control and setting of the dampers. Every damper shall have an indicating device clearly showing the position of the dampers at all times
- vii. Where electrical heaters are mounted in the duct, these shall be of low temperature totally enclosed type fitted with radiation fins. A removable panel for access to the heaters shall be provided in the duct. Any hole in the duct for electrical wiring must be provided with suitable bushes to avoid leakage. 6 mm thick asbestos board lining shall be provided all around the inside of the duct for a distance of 30 cms. on either side of the electrical heaters. A manually reset thermostatic safety switch shall be provided near the duct section having heaters. In addition, the heaters must be interlocked with the connected fan motor of the AHU.

1.7 **BALANCING**

Air systems shall be balanced in a manner to minimize throttling losses. The entire air distribution system shall be balanced with the help of an anemometer. The measured air quantities at fan discharge and at the various outlets shall be within ± 5 percent of those specified/quoted. For fans greater than 0.75 KW (1.0 HP), fans must then be adjusted to meet design flow conditions. Branch duct adjustments shall be permanently marked after the air balancing is completed so that these can be restored to their correct position if disturbed at any time.

1.8 MEASUREMENT

- i) Duct measurements (for insulated ducts) shall be taken before application of insulation.
- ii) Duct work shall be measured section wise on the basis of external surface area by multiplying the axial length from flange face to flange face for each section by the corresponding duct perimeter in the centre of that section length.
- iii) Uniformly tapering straight sections shall also be measured as in (ii) above. However, for special pieces like tees, bends etc. area computations for surface areas shall be done as per the shape of such pieces.
- iv) The quoted unit rate for external surfaces of ducts shall include all wastage allowances, flanges, gaskets for joints, vibration isolators, bracings, hangers and supports, inspection chambers/access panels, splitter dampers with quadrants and levers for position indication, turning vanes, straightening vanes, and all other accessories required to complete the duct installation as per the specifications. These accessories shall not be separately measured.
- v) Grilles and diffusers (except linear diffusers) shall be measured by the cross sectional areas, perpendicular to the airflow, and excluding the flanges. Volume control dampers, where provided shall not be separately accounted for.
- vi) Linear diffusers shall be measured by linear measurements only, and not by cross-sectional areas, and shall exclude flanges for mounting of the linear diffusers. The supply air plenum for linear diffusers shall be measured as described above for ducting.
- vii) Fire dampers shall be measured by their cross sectional area perpendicular to the direction of the airflow. Quoted rates shall include the necessary collars and flanges for mounting, inspection pieces with access door, fusible link/solenoid with wiring, but excluding the fire detectors, etc

III Pipe Work

1. General :

All piping work shall conform to quality standards and shall be carried out as per specifications and details given hereunder :-

2. Piping :

2.1 Drain Piping :

- 2.1.1 The drain piping shall be medium class galvanised steel as per IS 1239/1979.
- 2.1.2 The fittings shall be of 'R' brand of equal forged with screwed connections.
- 2.1.3 The gate valves shall be of gun metal as described earlier.
- 2.1.4 Pipe crosses shall be provided at bends, to permit easy cleaning of drain line.
- 2.1.5 The drain line shall be provided upto the nearest drain trap and pitched towards the trap.
- 2.1.6 Drain lines shall be provided at all the lowest points in the system, as well as at equipment, where leakage of water is likely to occur, or to remove condensate and water from pump glands.

2.2 Copper Piping :

- 2.2.1 Seamless soft copper tubing, type L shall be used to make connections to equipment, wherever required or specified.
- 2.2.2 Flare fittings e.g. flare nuts, tees, elbows, reducers etc. shall all be of brass.

2.3 Refrigerant Piping :

- 2.3.1 The condensing unit and evaporator unit shall be interconnected by type 'L' seamless copper refrigerant liquid and suction lines using flared or brazed fittings. Necessary accessories shall be incorporated in the circuit.
- 2.3.2 The suction line shall be insulated with one layer of 9 mm thick nitrile rubber pipe section insulation.

IV Insulation

1. General :

The Insulation of ducting, etc., shall be carried out as per specifications given below :

2. Materials :

The materials to be used for insulation shall be as follows, unless some other material is specifically mentioned elsewhere.

2.1 Duct Insulation :

2.1.1 The material for acoustic treatment of ducts shall open cell nitrile rubber.

2.1.2 The insulation for duct shall be carried out from closed cell polyethylene having a 'K' value of 0.034 W/(M.K) at mean temperature of 23° C. and a density of not less than 33 kgs/cubm. Water vapour permeability 4000 U and above. Fire rating class BI as per (DIN 4102). Approval of sample to be obtained in writing prior to execution.

3. Ducting :

3.1 The ducts shall be insulated with the insulation sheets as follows.

Duct insulation	-	6 mm thick
Duct accoustic lining	-	9 mm thick

V Tests at Site/Works

1. General :

The contractor must perform all inspection and tests of the system as a whole and of components individually as required, under the supervision of the Architect/Consultants, in accordance with the provisions of the applicable ASHRAE standards or approved equal and furnish necessary test certificates from manufacturers at the time of delivery of requirement at site.

2. Duct Work :

- 2.1 All branches and outlets shall be tested for air quantity, and the total of the air quantities shall be within plus five percent (5%) of fan capacity.
- 2.2 Fire dampers, volume dampers and splitter dampers shall be tested for proper operation.

3. Balancing and Adjustment :

All airhandling and ventilation equipment, duct work and outlets shall be adjusted and balanced to deliver the specified air quantities as indicated, at each outlet, on the drawings and shall be recorded and submitted to the consultant. If these air quantities cannot be delivered without exceeding the speed range of the sheaves or the available horse power, the consultant shall be notified before proceeding with the balancing of air distribution system.

3. Electrical Equipment :

- 3.1 All electrical equipment shall be cleaned and adjusted on site before application of power.
- 3.2 The following tests shall be carried out :
 - 3.2.1 Wire and cable continuity tests.
- 3.3 Insulation resistance tests, phase to phase and phase to earth, on all circuits and equipment, using a 500 Volts meggar. The meggar reading shall be not less than one megohm.
- 3.4 Earth resistance between conduit system and earth must not exceed half (1/2) CMH.
- 3.5 Phasing out and phase rotation tests.

3.6 Operating tests on all protective relays to prove their correct operation before energising the main equipment.

3.7 Operating tests on all starters, circuit breakers, etc.

4. **Performance Tests :**

4.1 The installation as a whole shall be balanced and tested upon completion, and all relevant information, including the following shall be submitted to the architects.

4.1.1 Air volume passing through each unit, duct, grilles, apertures.

4.1.2 Differential pressure readings across each filter, fan and coil, and through each pump.

4.1.3 Static pressure in each air duct.

4.1.4 Electrical current readings, in amperes of full and average load running, and starting, together with name plate current of each electrical motor.

4.1.5 Continuous recording over a specified period, of ambient wet and dry bulb temperatures under varying degrees of internal heat loads and use and occupation, in each zone of each part of the building.

4.2 Daily records should be maintained of hourly readings, taken under varying degrees of internal heat load and use and occupation, of wet and dry bulb temperatures, upstream "on coil" of each cooling coil. Also suction temperatures and pressures for each refrigerating unit. The current and voltage drawn by each machine.

4.3 Any other readings shall be taken which may subsequently be specified by the architect.

5. **Miscellaneous :**

5.1 The above tests are mentioned herein for general guidance and information only but not by way of limitation to the provisions of conditions of contract and specification.

5.2 The date of commencement of all tests listed above shall be subject to the approval of the architect, and in accordance with the requirements of this specification.

5.3 The contractor shall supply the skilled staff and all necessary instruments and carry out any test of any kind on a piece of equipment, apparatus, part of system or on a complete system if the architect requests such a test for determining specified or guaranteed data as given in the specification or on the drawings.

- 5.4 Any damage resulting from the tests shall be repaired And/or damaged material replaced, all the the satis faciton of the architect.
- 5.5 In the event of any repair or any adjustment having to be made, other than normal running adjustment, the tests shall be void and shall be recommended after the adjustment or repairs have been completed.
- 5.6 The contractor must inform the architect when such tests are to be made, giving sufficient notice, in order that the architect or his nominated representative may be present.
- 5.7 Complete records of all tests must be kept and 3 copies of these and location drawings must be furnished to the architect.
- 5.8 The contractor may be required to repeat the test as required, should the ambient conditions at the time not given, in the opinion of the architect, sufficient and suitable indication of the effect and performance of the installation as a whole or of any part, as required.

VI Mode of Measurements

1. Unit Prices in the Schedule of Quantities :

- 1.1 The item description in the schedule of quantities is in the form of a condensed resume. The unit price shall be held to include every thing necessary to complete the work covered by this item in accordance with the specifications and drawings. The sum total of all the individual item prices shall represent the total price of the installation ready to be handed over.
- 1.2 The unit price of the various items shall include the following :
 - 1.2.1 All equipment, machinery, apparatus and materials required as well as the cost of any tests which the consultant may request in addition to the tests generally required to prove quality and performance of equipment.
 - 1.2.2 All the labour required to supply and install the complete installation in accordance with the specifications.
 - 1.2.3 Use of any tools, equipment, machinery, lifting tackle, scaffolding, ladders etc. Required by the contractor to carry out his work.
 - 1.2.4 All the necessary measures to prevent the transmission of vibration.
 - 1.2.5 The necessary material to isolate equipment foundations from the building structure, wherever necessary.
 - 1.2.6 Storage and insurance of all equipment apparatus and materials.
- 1.3 The contractor's unit price shall include all equipment, apparatus, material and labour indicated in the drawings and/or specifications in conjunction with the item in question, as well as all additional equipment, apparatus, material and labour usual and necessary to make in question on its own (and within the system as a whole) complete even though not specifically shown, described or otherwise referred to.

2. Measurements of Sheet Metal Ducts, Grilles/Diffusers etc.

2.1 Sheet Metal Ducts

- 2.1.1 All duct measurements shall be taken as per actual outer duct surface area including bends, tees, reducers, collars, vanes & other fittings. Gaskets, nuts, bolts, vibration rotation pads are included in the basic duct items of the boq.

- 2.1.2 The unit of measurements shall be the finished sheet metal surface area in metres squares. No extra shall be allowed for lapse and wastages.
- 2.1.3 All the guide vanes, deflectors in duct elbows, Branches, grille collars quadrant dampers etc. Shall be measured for actual sheet metal surface and paid for at the same rate as duct of same thickness.
- 2.1.4 The unit duct price shall include all the duct hangers And supports, exposing of concrete reinforcement for supports and making good of the same as well as any materials and labour required to complete the duct frame.

2.2 **Grilles/Diffusers :**

All grilles/diffusers as per tender requirements shall be treated as a lump sum item. Where extra grilles diffusers are ordered upto award of work, they should be measured as follows :

- 2.2.1 All measurements of grilles/diffusers shall be the Actual outlet size excluding the outer flanges.
- 2.2.2 The square or rectangular grilles/diffusers shall be Measured in plain sq.m.
- 2.2.3 All round diffusers shall be measured by their diameters in cm.
- 2.2.4 All linear diffusers shall be measured as per actual Length in metres.

3. **Measurements of Piping, Fittings, Valves, Fabricated Items :**

3.1 **Pipe**

(Including water piping, steam piping, oil piping, IP gas piping, air piping, vacuum piping) etc.

- 3.1.1 All pipes shall be measured in linear metre (to the Nearest cm) along the axis of the pipes and rates shall be inclusive of all fittings e.g. Tees, bends, reducers, elbows etc. Deduction shall be made for valves in the line.
- 3.1.2 Exposing reinforcement in wall and ceiling and floor of possible and making good the same or installing anchor fasteners and inclusive of all items as specified in specifications and schedule of quantities.
- 3.1.3 Rates quoted shall be inclusive of providing and fixing Vibration pads and wooden pieces, wherever specified or required by the project co-ordinator.

- 3.1.4 Flexible connections, wherever required or specified shall be measured as part of straight length of same diameter, with no additional allowance being made for providing the same.
- 3.1.5 The length of the pipe for the purpose of payment will be taken through the centreline of the pipe and all fittings (e.g. Tees, bends, reducers, elbows, etc.) as through the fittings are also presumed to be pipe lengths. Nothing extra whatsoever will be paid for over and above for the fittings for valves and flanges, section 3.2 below applies.

3.2 **Valves and Flanges**

- 3.2.1 All the extra CI & cm flanged valves shall be measured according to the nominal size in mm and shall be measured by number. Such valves shall not be counted as part of pipe length hence deduction in pipe length will be made wherever valves occur.
- 3.2.2 All gun metal (gate & globe) valves shall include two Nos. of flanges and two numbers 150 mm long ms nipples, with one side threaded matching one of the valves, and other welded to the M.S. Slip-on-flange. Rate shall also include the necessary number of bolts, nuts and washers, 3 mm thick insertion gasket of required temp. grade and all items specified in the specifications.
- 3.2.3 The rates quoted shall be inclusive of making connections to the equipment, tanks, pumps etc. And the connection made with an installed pipe line shall be included in the rates as per the B.O.Q.

3.3 **Structural Supports**

Structural supports including supports fabricated from pipe lengths for pipes shall be measured as part of pipe line and hence no separate payment will be made. Rates shall be inclusive of hoisting, cutting, jointing, welding, cutting of holes and chases in walls, slabs or floors, painting supports and other items as described in specifications, drawings and schedule of quantities or as required a site by project co-ordinator.

3.4 **Copper Connections for Fan Coil Units**

- 3.4.1 Copper connection assembly for making connections to the fan coil units shall be measured, as part of the fan coil unit price and shall include brass flare nuts, brass straight connector, brass tees, brass reducing fittings, fixing of automatic 3 way valve, making connections and leak testing, complete assembly as per specifications and drawings. Nothing extra shall be payable on account of any variation in the length of copper pipe.

4. **Insulation :**

4.1 The measurement for vessels, piping, and ducts shall be made over the bare uninsulated surface area of the metal.

4.2 **Pipes, Ducts & Vessels**

4.2.1 **Pipes**

The measurements for installation of piping shall be made in linear metres through all valves, flanges, and fittings. Pipes/bends shall be measured along the centreline radius between tangent points. If the outer radius is R1 and the inner radius is R2. The centre line radius shall be measured as $(R1+R2)/2$. Measurement of all valves, flanges and fittings shall be measured with the running metre of pipe line as if they are also pipe lengths. Nothing extra over the above shall be payable for insulation over valves, flanges and fittings in pipe line/routings. Fittings that connect two or more different sizes of pipe shall be measured as part of the larger size.

4.2.2 **Ducts**

The measurements for insulation of ducts shall be made in actual square metres of bare uninsulated duct surface through all dampers, flanges and fittings. In case of bends the area shall be worked out by taking an average of inner and outer lengths of the bends. Measurements for the dampers, flanges, fittings shall be for the surface dimension for the connecting duct, nothing extra over the above shall be payable for insulation over dampers, flanges and fittings in duct routing.

4.2.3 **Vessels**

The area of standard dished and flat ends of vessels shall be the square of the diameter of the uninsulated body of the shell. Areas for other shapes shall be the actual calculated area. There shall be no deduction or additions for nozzles, handles ribs, dampers, expansion joints etc. All projections on vessels or tanks shall be measured separately as pipe/duct.

4.3 **Accessories Insulation**

4.3.1 The unit of measurement for accessories such as expansion tank, pumps, chiller heads etc. shall be uninsulated are in square metres.

4.3.2 In case of curved or irregular surfaces, measurements shall be taken along the curves.

4.3.3 The unit insulation price shall include all necessary adhesives, vapour proofing and finishing materials as well as additional labour and material required for fixing the insulation.

4.4 **Acoustic Duct Lining**

- 4.4.1 In case of acoustic lining of air ducts, measurements of the bare inside duct surface in square metres, shall be final for billing purposes.
- 4.4.2 The insulation/acoustic panels shall include cost of battens, supports, adhesives, vapour proofing, finished tiles/boards/sheets as well as additional labour and materials required for completing the work.

4.5 **Roof and Wall Insulation & Acoustic Treatment**

- 4.5.1 The unit of measurement for all underdeck roof insulation, wall insulation, wall/roof acoustic panel shall be the uninsulated area of walls, roofs, to be treated, in square metres.
- 4.5.2 The insulation, acoustic panels shall include cost of battens, supports, adhesives, vapour proofing, finished tiles/boards/sheets as well as additional labour and materials required for completing the work.

VII List of Approved 'Makes'

<u>S.No.</u>	<u>Items</u>	<u>Makes</u>
1.	Split units	Carrier/Hitachi/Voltas/Daikin
2.	Grilles/diffuser/VCD/ Louvers	Systemair/Mapro/Caryaire/Servex/Tristar
3.	G.I. sheets	Tata/Sail/Jindal
4.	Factory fabricated ducting	GP Spiro/Ductofab/Waves
5.	<u>Pipes</u>	
5.1	UPVC	Prakash/Polypack
5.2	Refrigerant piping	Total line/Mandev Tube
6.	<u>Insulation</u>	
6.1	Nitrile rubber	K-flex/Armacell
7.	Fastners & fittings etc.	Wurth/Hilti/Mongue
8.	Electrical Works	
	Cable tray	Neddo/MEM/RICO
	Distribution Boards with Miniature Circuit Breakers, RCCB / ELCB, Isolator	Havells, Finolex, Skytone, Poly cab
	Power Cable 1.1 KV Grade XLPE Insulated AL Conductor Armored Cables (FR Type).	Havells, Finolex, Skytone, Poly cab
	Cable Glands & Cable Lugs	Commet, Dowells, Multi ,Lapp Kabel,

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GENERAL INSTRUCTIONS FOR SITE VISIT

I, _____, aged ___ years, son/daughter of _____, presently residing at _____ and authorized by _____ (name of tenderer) ("Tenderer") to solemn this affidavit on behalf of the Tenderer, solemnly affirm on oath as hereunder: The Tenderer confirms that the Tenderer has duly undertaken the visit of the proposed project site of IIITD located at Okhla Phase III , New Delhi,.

The Tenderer has inspected and examined its surroundings and has satisfied itself about the site conditions and site logistics. The Tenderer confirms that it is aware of the ground conditions and nature of the site, means of access to the site and the accommodation area required for establishing the labour camp. The Tenderer agrees and confirms it shall be solely responsible for arranging and maintaining the aforementioned at its own cost including all materials, tools & plants, water, electricity, access, facilities for workers and all other services required for executing the Work unless otherwise specifically provided for in the contract documents.

The Tenderer confirms and agrees that the submission of the tender implies that the requisite site visit has already been undertaken and that the Tenderer has acquainted itself with the local conditions and other factors having a bearing on the execution of the Work.

DEPONENT
VERIFICATION

I, _____, aged ___ years, son/daughter of _____, presently residing at _____ and authorized by Tenderer verify that the information mentioned above is true and correct to the best of my knowledge and belief.

DEPONENT

AGREEMENT

AN AGREEMENT is made this -----BETWEEN the Indraprastha Institute of Information Technology. A State University established by Govt Of NCT of Delhi ,and with its registered office at IIITD Campus , Okhla Phase III , New Delhi 110020, which expression shall include its successor, unless repugnant to or Excluded by the contract here of and assignees of and represented by its Registrar, IIITD the first party (hereinafter called the Authority) and by its sole proprietor/partners/Director.of M/s -----and having registered office at ----- (which expression shall be including his / its successor's heirs, executors, representative and or assignees of the second party (hereinafter called the contractor}).

WHEREAS the Authority has, under tender Notification No. -----

-----,
WHEREAS the contractor has submitted tender for carrying out the work as above as per the tender document page ---- to ----- and has represented that in conformity with his / its obligation contained in the tender as modified by the correction slips and corrigendum contained he / it shall carryout the same truly, faithfully and honestly.

THE SAME has been accepted by both the parties on the terms and conditions, corrections, corrigendum contained in the tender as modified as well as the letter of acceptance Issued party No.1 annexed here to as.

The same shall be binding on both the parties.

IN WITNESS WHEREOF, the parties have signed the deed of agreement on the date, month and year referred to above.

Date: -----
At New Delhi.

Signed by _____

Party No.1

Party No.2

WITNESS

1. ----- Party No.1

2. ----- Party No.2

SCHEDULE OF QUANTITIES

HVAC and Electrical Work for Sports Block - IIIT Delhi					
Schedule of Price					
The prices are to be quoted in the below mentioned form and shall include the supply, installation, testing and commissioning at site of all the equipments, ancillary materials as specified and all such items what so ever which may be required to fulfil the intent and purpose as laid down in the specification and/or the drawings.					
S.No.	Description	Unit	Qty.	Rate	Amount
1	<u>Split Unit Airconditioners</u>				
1.1	<u>Ductable Split Unit</u>				
	Providing, fixing, testing and commissioning ductable type split unit airconditioners with evaporator with coil, fan and fan motor, aircooled condenser with hermetically sealed scroll compressor, condenser coil, propeller fans controls, control panel with cabling, earthing, corded remote, canvass connection between IDU & duct, MS stand for ODU, as per standards, requirement and drawings complete in all respect.				
1.1.1	8.5 TR	Nos.	2		
2	<u>Drain Piping</u>				
	Providing, fixing, testing and commissioning UPVC drain piping complete with fittings, U-trap, supports valves and insulate with 9 mm thick Nitrile rubber insulation complete as per standards, requirement and drawings complete in all respect.				
2.1	40 mm	Rm	5		
2.2	32 mm	Rm	20		
2.3	25 mm	Rm	10		
3	<u>Ducting</u>				
	Supply, installation, balancing and commissioning of fabricated at site GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as required.				
3.1	<u>G.I. Sheet Metal Ducting (Rectangular)</u>				
3.1.1	0.63 mm (24 Ga) (0-750 mm)	Sqm	25		

4	Factory Fabricated Circular Sprial Duct				
	Supply, fabrication, installation and testing of GSS sheet metal circular sprial ducts insulated with 6 mm thick closed cell nitrile rubber insulation or 9 mm open cell accoustic lining and complete with splitter dampers, vanes as per the requirements complete in all respect.				
4.1	24 Gauge (0.63 mm) with 9 mm accoustic lining.	Sqm	10		
4.2	24 Gauge (0.63 mm) with 6 mm insulation.	Sqm	45		
5	Grilles/Diffusers				
	Providing and fixing powder coated Aluminium supply air and return air grilles and diffusers fabricated from extruded aluminium sections duly powder coated in approved colours.				
5.1	Supply air grilles with damper	Sqm	3.0		
6	Fresh air Louvers				
	Supply and installation of Fresh air grille of aluminium powder coated with louvers, bird Screen and damper as per specifications and drawings.	Sqm	0.2		
7	Volume Control Damper				
	Supply, installation, testing and commissioning of GI volume control duct damper complete with neoprene rubber gaskets, nuts, bolts, screws linkages, flanges etc., as per specifications.	Sqm	0.3		
8	Refrigerant Piping				
	Providing and fixing of copper soft/hard refrigerant piping along (Circuit length) with control cabling and earthing should be insulated with 9 mm thick pipe section of nitrile rubber complete in all respect.				
8.1	8.5 Tons	Rm	25		
9.0	<u>DISTRIBUTION BOARDS</u>	-			
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9.1	Supplying and fixing of following ways surface/ recess mounting, vertical type , 415 volts, TPN MCB distribution board of sheet steel, dust protected, duly power painted, inclusive of 200 amps tinned copper bus bar, common neutral, link earth bar, din bar for mounting MCB'S (but without MCB's and incomer) as required. (Note: Vertical type MCB TPDB is normally used where 3 phase outlets are required.)				
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i)	4 Way Double door	No	1		
10.0	Providing and fixing following rating and breaking capacity and pole MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, etc.as required.				
i)	100 Amp, 30KA, FP MCCB	No	1		
11.0	Supplying and fixing following rating, Three pole, 415 volts MCB in the existing MCB DB complete with connections, testing and commissioning etc. as required.				
i)	40 Amps	No	1		
ii)	63 Amps	No	3		
12.0	<u>SUB MAIN WIRES AND CABLES</u>				
	Wiring for circuit/ submain wiring alongwith earth wire with the following sizes of FRLS PVC insulated copper conductor, single core cable in surface/ recessed steel conduit as required.				
i)	4x10 sq. mm +2x6 sq.mm earth wire	M	30		
ii)	4 X 16 sq. mm + 2 X 16 sq. mm earth wire	M	10		
13.0	Supply of following size of 1.1KV grade multicore aluminium conductor XLPE / PVC insulated & PVC sheathed armoured cable as per IS: 7098 (Part-1) 1988 complete as required.				
i)	3.5 core, 35 Sq.mm.	M	60		
14.0	Laying and fixing of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size on cable Tray as required.				

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i)	Upto 35 sq. mm (clamped with 1mm thick saddle)	M	60		
15.0	Suppling and making indoor end termination with brass compression gland and aluminium lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required.				
i)	3.5 core, 35 Sq.mm.	Set	2		
16	<u>Cable Tray</u>				
	Supplying and installing following size of perforated painted with powder coating M.S. cable trays with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, painting suspenders etc. as required.				
16.1	100 mm width X 50 mm depth X 1.6 mm thickness	Rm	10		
16.2	150 mm width X 50 mm depth X 1.6 mm thickness	Rm	10		
	Total Rs.				
	GST				
	Total Amount with GST				