

## ACCEPTANCE FORM

**PROJECT:                    MODIFICATION OF EXISTING A-320 SIMULATOR I  
BUILDING TO ACCOMMODATE ATR 72-212 SIMULATOR  
AT CTE, FERROZGUDA. HYDERABAD – HVAC WORKS**

**REF     :                    HYD/CTE/PFD/115/HVAC/419 Dated 20.04.2017**

Dear Sirs,

I/We the undersigned have carefully gone through and clearly understood after visiting the site and the Tender drawings and tender documents comprising of the tender form, Notice to contractors, and conditions for building contract, Special Conditions, Specifications and Schedule of Probable quantities and Draft Agreement prepared by your Architects M/s MURTY & MANYAM, Architects & Engineers, Hyderabad.

I/We do hereby undertake to execute and complete the whole or part of the work (as desired by you) at the respective rates which/I/We have quoted for the respective items of the Probable Bill of Quantities and at which rate the items specified amount to **Rs.64,67,850 lakhs, approx .**

I/We are depositing as Earnest Money a sum of **Rs. 1,61,696/-** by demand draft/Bankers cheque drawn on any scheduled bank payable at Hyderabad in favor of Air India Limited along with this tender for due execution of the work at my/our tendered rates together with any variations which shall be adjusted by the Architects at prices based on our tendered rates.

In the event of this Tender being accepted I/We agree to enter into an agreement as and when required and execute the contract according to your form of Agreement, within a month of receipt of work order, in default thereof, I/We do hereby bind my-self/ourselves to forfeit the aforesaid initial security deposit.

I/We further agree to complete the work covered in the said schedule of quantities in **3 months** from the reckoned from the date of issue of the work order to commence the work or on which contractor is instructed to take possession of the site, whichever is later.

I/We agree not to employ Sub-contractors other than those that may be specifically approved by your Architects for this contract work.

I/We agree to pay the Government, General and Sales Tax (State and Central), Excise and Octroi duties, Insurance, labour cess and all other taxes including works contract tax etc., as the prevailing from time to time, on such items for which the same are leviable, and to get the work, workers, employees (of contractor, Architect & Employer) engaged on the work at site and all materials at site for execution of the work shall be insured comprehensive insurance including fire/accidents/ rain/ floods/riots/CAR policy (contractor's all risk insurance policy) and the insurance shall cover the period from date of start of work to date of actual completion of work plus 3 months. In case part work is taken over by the Employer before final completion of the whole work, such parts may not be covered by the insurance from the date of taking over that part of work by the Employer. Draft Insurance deed will be got vetted by the Architect, before obtaining the same. All the rates quoted by me/ us are inclusive of the same in full and nothing extra shall be claimed anytime on account of any of these.

I/We agree for all statutory deduction i.e Income tax, works & contract tax (VAT) at applicable rates from the bills payable to me. The rates quoted by me are inclusive of the same to be deducted at source, at the rate prevailing from time to time on the Gross value of the work done, and the rates quoted by me/we are inclusive of same.

I/We agree for seigniorage fee to be deducted at source, at the rates prevailing from time to time as per AP Govt. Act, as amended and rates quoted by me/us are inclusive of the same.

Yours faithfully,

Contractor's Signature

Address:

Date:

---

---

---

---

## NOTICE TO CONTRACTOR

ADDRESS:

---

---

---

**PROJECT:                    MODIFICATION OF EXISTING A-320 SIMULATOR I BUILDING TO ACCOMMODATE ATR 72-212 SIMULATOR AT CTE, FEROZGUDA. HYDERABAD – HVAC WORKS**

**REF ;                        HYD/CTE/PFD/115/HVAC/419 Dated 20.04.2017**

1. SIMULATOR BUILDING
2. EMM ROOM
3. COMPUTER ROOM

Dear Sirs,

1. On behalf of our clients, **AIR INDIA LTD**, Central training establishment, Hyderabad, we have pleasure in inviting you to tender for the aforesaid work.
2. The scope of work broadly as given below is for **Modification of Existing A-320 Simulator I Building to accommodate ATR 72-212 simulator at CTE Ferozguda, Hyderabad-500 011-HVAC Works**
3. Tender Documents shall be downloaded from Air India Limited web site [www.airindia.in](http://www.airindia.in) with effect from 20.04.2017 to 03.05.2017. After downloading the prospective bidders shall attend the Pre-bid meeting at on 11:30 - 13:00 hrs in the office of Senior Manager , P& F at Air India Limited ,CTE, Ferozguda ,Hyderabad-500 011 on 04<sup>th</sup> May 2017.

**ELIGIBILITY CRITERIA:** The tenderer shall submit the following copies of the documents in support of their eligibility in envelope-I ;

- 1) Copy of work order and work completion certificate having carried out similar works during the last 5 years
  - a) One work of 80% of estimated cost.
  - b) Two works of 60% of estimated cost.
  - c) Three works of 40% of estimated cost.
- 2) Copy of list of works on hand.
- 3) Latest IT Clearance Certificate & Copy of PAN Card.
- 4) Copy of ESI & PF Certificates

Additional Information:

- a) Copy of Registration Certificates, if any.
- b) List of qualified Technical Personnel.
- c) List of Tools & Plants.
- d) Audited Balance Sheet for the last three years.

4. Sealed tenders in the prescribed form, in a sealed envelope should be **addressed to Sr.Manager(P&F), Air India Ltd, Ferozguda, Hyderabad- 500 011.**

a. **Envelope No.1:** : To contain A) Demand Draft/Banker's cheque for **Rs. 1,61,696/-** as EMD & DD for **Rs.2000** /- towards cost of tender drawn in favour of Air India Limited, and Acceptance form.

B) Tender document duly signed

C) Eligibility credentials including work orders and completion certificates.

b. **Envelope No.2 :** Only Price bid along with BOQ completed in all respects and duly **Signed.**

Sealed tenders shall be submitted in the **office off Sr.Manager (P&F),Air India Limited, CTE ,Ferozguda,Hyderabad-500 011** not later than **15.00** hours on 8<sup>th</sup> May 2017. Envelope No.1 will be opened on the same day at **15.30** hours in the presence of the contractors, who may be present. Envelope No.2 will be opened on 11<sup>th</sup> May 2017 or any other day which will be notified to the qualified bidders in technical evaluation.

Conditional Tenders If any submitted by tenderers will not be accepted.

5. The tenderer must obtain for himself, on his own responsibility and at his own expenses, all the information which may be necessary for the purpose of filling this tender and for entering into a contract for the execution of the same and must examine the drawings and inspect the site of the work and acquaint himself with all local conditions and matters pertaining thereto.
6. Each of the tender documents page is required to be signed by the person or persons submitting the tender in token of his/their having acquainted himself/themselves with the General conditions etc., as laid down. Any tender with any of the documents not so signed will be rejected.
7. The tender documents must be filled in English and all the entries must be made by hand and written in ink. All rates shall be quoted in figures and words. If any item is not quoted or left blank ("rate" and "Amount" columns), the tender will be treated as incomplete tender and in liable for rejection. If any of the documents are missing or un-signed, the tender shall be considered invalid.
8. Each and every one of all erasures and additions/alterations made, while filling the tender, must be attested by initials of the tenderer. Over-writing of figures must be attested by initials of the tenderer. Overwriting of figures is not permitted. Failure to comply with either of these conditions will render the tender void. After submission of the tender no advice or any change in rate or conditions will be entertained. All the rates should be quoted both in figures and words. In-case of any discrepancy in rates quoted in words/figures and the amounts, the rate quoted in words shall be taken as final and binding.

9. The tender shall be valid for a period of 90 days from the date of opening the Envelope No.1
10. TOTAL SECURITY DEPOSIT: shall comprise of:
- a. Earnest Money deposit
  - b. Initial Security deposit
  - c. Retention money
- 10.1 EMD amount shall be forfeited as liquidated damages, in the event of any evasive/direct refusal or delay in starting the work and or signing the contract. The deposit of the unsuccessful tenderers will be returned, without interest, immediately after a decision is taken regarding the award of the contract. The Earnest money of the successful tenderer will be adjusted
- towards Security Deposit. A tender not accompanied by Earnest money deposit will not be considered. No concession will be made to Public sector companies from payment of earnest money deposit.
- 10.2 Together with the Earnest money Deposit , further retention of 10% of the value of the work done will be deducted from every running bill, till total retention, including EMD and initial SD paid earlier, comes to 10% of the contract value, and same shall be held by the Air India Ltd. as Total Security Deposit. On the Architect's certifying the completion of work, (Virtual completion) 50% of the total security deposit shall be released to the contractor alongwith the final certificate of payment, and the balance amount will be retained in the manner stated elsewhere for a further period of twelve months after the completion date recorded in completion certificate, issued by the Architects and agreed to Air India . Also refer condition 22(ii) on Page 7 of Volume 1.
11. Within two weeks of the receipt of intimation from the Architects of the acceptance of his/their tender, the successful tenderer shall be bound to sign an agreement, on a stamp paper in accordance with the Draft Agreement and conditions of contract attached herewith, but the work order or the written acceptance of a tender by the Employer will constitute a binding agreement between the Employer and the person tendering whether such formal contract is or not signed by the contractor.
12. All compensation or other sums of money payable by the contractors to the clients, under the terms of this contract, may be deducted from the Security Deposit or from any sum that may be or may become due to the contractor on any account whatsoever, and in the event of the Security deposit being reduced by reasons of any such deductions, the contractor shall within 15 days of being asked to do so make good in cash or cheque, any sum which have been deducted from his security deposit.
13. The contractor shall arrange for the procurement of all the materials at site as required and directed, and store them in their godown at the site of construction, and also bear all the expense incurred in connection therewith, including payment of taxes, octroi, storage, watch and ward etc.

14. The rates quoted by the Contractor shall include all eventualities, such as heavy rain, sudden floods, accidents, fire, riots etc., which may cause damage to the executed work or which may totally wash out the work. Until the completion certificate is issued to the Contractors, neither the Architect nor the clients will be responsible for such damage or wash out of the construction work.
15. Time is the essence of the contract. The work should be completed in 3 months, from the date of commencement. The date of commencement shall be
- a) The day two weeks from the date of issue of work order.
- Or
- b) The day on which the contractor receives the possession of the site which ever is later.
- Or
- c) The contractor is asked in writing to take over the possession of the site. The successful contractor will have to give a CPM/PERT chart of various activities of work to be done so that the work gets completed within the stipulated time. The chart shall be submitted within 15 days from the date of acceptance of the tender.
16. Time is the essence of the contract and if the contractor fails to complete the work by the Scheduled date of completion or within any sanctioned extended time, he will have to pay liquidated damages at the rate of ½% of contract amount for each week of delay the work remains incomplete beyond the completion (Original/extended date), subject to maximum of 10% of the contract value (without extra items) as per clause 33 of the General conditions of contract.
17. The quantities contained in the Schedule are only indicative. The work as actually carried out and done will be measured up from time to time, for which payment will be made subject to the terms and conditions of contract.
18. The unit prices shall be deemed to be fixed prices. In case of extra items, a record of labour charges paid shall be maintained and shall be presented every month for extra/substituted items regularly to the Architects for checking. The settlement will be made based on figures arrived at jointly and taking into account unit prices of items of work mentioned in the contract assigned to the successful tenderers. In case, of extra items, where similar or comparable items are quoted in the tender, extra rates shall invariably be based on those tender rates to the extent reasonable.
19. Our clients, Air India Ltd. Hyderabad, do not bind themselves to accept the lowest or any tender and reserve to themselves the right to accept or reject any or all tenders, either in whole or in part, without assigning any reason whatsoever for doing so.
20. No employee of the Air India is allowed to work as a contractor for a period of two years of his retirement from service, without the previous permission of the company. This contract is liable to be cancelled, if either the contractor or any of his employees is found at any time to be such a person who had not obtained the

permission of the company as aforesaid before submission of the tender or engagement in the contractor's service.

21. The tenderer, apart from being a competent contractor must associate himself with agencies of the appropriate class who are eligible to tender for (1) Electrical (2) Sanitary & Water Supply installations and (3) Horticulture (4) Airconditioning works (5) Fire fighting systems & (6) Interiors (fixed furniture), as the case maybe.
22. Release of security deposit:
  - i) 50% of the total security deposit will be released along with the final certificate of payments as stipulated under para 9 on page 10 of Volume I, Appendix to General Conditions of contract,
  - ii) Balance 50% of Retention money will also be released as noted under (i) above on completion of defects liability period of 12 months.

**ARCHITECTS:**

MURTY & MANYAM  
Architects & Engineers  
859, Banjara Avenue  
6-3-597/A/12/A/68  
Hyderabad – 500 004.  
Tel: 23318020, 23301138,

**ARTICLES OF AGREEMENT**

ARTICLES OF AGREEMENT made the \_\_\_\_\_ day of \_\_\_\_\_ 2017  
between \_\_\_\_\_

of \_\_\_\_\_

(Hereinafter called the "Employer") of the one part and \_\_\_\_\_  
of \_\_\_\_\_ (hereinafter called "The Contractor")  
of the other part, where as the Employer is desirous of getting the work of  
"\_\_\_\_\_"

executed and has caused drawings, conditions of contract, specifications and schedule of  
quantities etc., describing the works prepared by M/s MURTY & MANYAM, Architects &  
Engineers, Hyderabad.

AND WHEREAS the SAID DRAWINGS numbered as per list attached inclusive of and the  
conditions of contract, specifications and schedule of quantities etc., have been signed by or  
on behalf of the parties hereto.

AND WHEREAS THE CONTRACTOR has agreed to execute upon and subject to the  
conditions set forth in the Schedule hereto (hereinafter referred to as "Said Conditions") the  
works shown upon the said drawings and described in the same specifications and included  
in the said schedule of quantities for such sum as may be ascertained to be payable in terms  
of the Bills of Quantities, and which sum is estimated to be Rs. \_\_\_\_\_  
(Rupees \_\_\_\_\_ (hereinafter  
referred to as "Said Contract Amount").

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. In consideration of the said sum to be paid at the times and in the manner set forth in the said conditions, the contractor shall upon and subject to the said conditions, execute and complete the work shown in the said drawings and described in the said specifications.
2. The Employer shall pay the contractor the said sum or such sums as shall become payable hereunder at the times and in the manner specified in the said conditions.
3. The term "Architect" in the said conditions shall mean the said M/s Murty & Manyam, Architects & Engineers, or in the event of their ceasing to be the Architect for the purpose of this contract, such other person as shall be nominated for that purpose by the Employer, not being a person to whom the contractor shall object for reasons considered to be sufficient by the Arbitrator mentioned in the said conditions provided always that no persons subsequently appointed to be the Architect under this contract shall be entitled to disregard or over-rule any previous decision or approval or direction given or expressed by the Architect for the time being.
4. Tender documents containing work order Notice to the Contractor, Conditions of Contract, Appendix thereto, Special Conditions of Contract, Specifications and Schedule of Quantities with the rates entered therein, shall be read and studied as forming part of this agreement and the parties hereto shall respectively abide by and Submit themselves to the conditions and stipulations and perform the agreement on their part respectively in such conditions contained.



5. The contract is neither a fixed lumpsum contract or a piece work contract, but is a contract to carry out work in respect of the entire works to be paid for according to actual measured quantities, including variations from BOQ at the rates contained in the Schedule of rates and Probable bill of quantities or as provided in the said conditions.
6. The Employer through the Architect, reserves to himself the right of altering the drawings and natures of the work, of adding/substitution to or omitting any items of work or having portions of the same carried out through alternate agencies without prejudice to this contract.
7. Time shall be considered a the essence of this agreement and the contractor hereby agrees to commence the work soon after the site is handed over to him but within 15 days reckoned from the date of issue of work order to execute the work, as provided for in the said conditions and complete the entire work in **3 months** subject to nevertheless to the provisions for extension of time.
8. This agreement and contract shall be deemed to have been made in Hyderabad and any questions or dispute rising out of or in any way connected with this Agreement and Contract shall be deemed to have arisen in Hyderabad and only the courts in Hyderabad shall have jurisdiction to determine the same. The limitation period will be 90 days from the date of dispute having arisen.

AS WITNESS our hand this \_\_\_\_\_ day of \_\_\_\_\_ 2017

Signed by the said in the presence of:

WITNESS: SIGNATURE

NAME :

ADDRESS: \_\_\_\_\_ EMPLOYER

WITNESS: SIGNATURE

NAME :

ADDRESS:

**APPENDIX TO GENERAL CONDITIONS OF CONTRACT**

1. Earnest Money Deposit (EMD) : Rs. 1,61,696/-
2. Period of completion : 3 Months
3. Defects Liability period : 12 Months after completion as recorded in the completion certificate.
4. Agreed Liquidated Damages : ½% of contract amount per week of delay subjected to a maximum of 10% of contract value.
5. Period of final measurement : Three months after completion as recorded in the completion certificate.
6. Minimum value of work to be Executed for issue of interim Certificates for making payment : Minimum Rs.10.00 Lakhs per bill.  
Maximum 4 bills including final bill
- 7.a) Retention money from each bill : 10% of gross value of each interim bill, subject to 8(b) below.
- b) Total retention money including Earnest money and initial security Deposit : 10% of the contract value.
8. Release of Security deposit after Virtual completion. : 50% of the total security to be released along with final certificate of payment, but only after removing all his materials, equipment, labour, huts/force, temporary sheds/stores, all his installations, machinery etc., from the site. Balance payment to be released after the completion of defects liability period of 12 months.
9. Period for honouring certificate : 15 working days from date of

Architects certificate of payment for interim bills and 90 days for final certificate.

WITNESS :

DATE : SIGNATURE OF THE CONTRACTOR WITH DATE

## INDEX TO GENERAL CONDITIONS OF CONTRACT

1. Interpretations
2. Scope of Contract
3. Drawings and Specifications
4. Schedule of Quantities
5. Sufficiency of Schedule of Quantities
6. Errors in schedule of Quantities
7. Contractor to provide everything necessary
8. Authorities, Notices, Patent rights and royalties
9. Seigniorage Charges
10. Materials and workmanship to conform to description.
11. The setting out
12. Removal of all offensive matters
13. Opening up works
14. Contractor's superintendence and representative on the work
15. Dismissal of workmen
16. Access to works
17. Employer's representative/PMC
18. Assignment of sub-letting
19. Sub contractors
20. Variations not to vitiate contract
21. Measurement to works
22. Prices of Extras etc., Ascertainment of
23. Unfixed materials
24. Removal of improper work and materials

25. Defects after completion
26. Certificate of virtual completion
27. Other persons engaged by the Employer
28. Insurance in respect of damage to persons and property
29. Contractor's All risk policy
30. Minimum amount of third party Insurance
31. Commencement and completion
32. Delay and extension of time
33. Damages for Non-completion
34. Failure by contractor to comply with Architect's instructions
35. Architect's delay in progress.
36. Supervision of works
37. Prime cost and provisional sums
38. Certificates and payments
39. Notices
40. Termination of contract by the Employer.
41. Termination of contract by the contractor.
42. Matters to be finally determined by the Architects
43. Settlement of dispute (Arbitration)

## GENERAL CONDITIONS OF CONTRACT

### 1. INTERPRETATIONS:

In constructing these conditions and the specifications, schedule of quantities and contract agreement, the following words shall have the meaning herein assigned to them except where the subject or context otherwise required:

- a. "Employer" shall mean Air India Ltd, Ferozguda, Hyderabad and shall include his/their heirs, legal representatives, assignees and successors.
- b. "Contractor" shall mean \_\_\_\_\_  
\_\_\_\_\_ and shall include his/their heirs, legal representatives, assignees and successors.
- c. "Air India Engineer" shall mean any Engineer who is employed by Air India Ltd or any other Engineer appointed from time to time by the Employer, and certified in writing to the Architect and the contractor, to act as Engineer for the purpose of the Contract in place of the said engineer.
- d. "Employer's Representative" shall mean Project Management Consultants employed by the Air India Ltd./any assistant of the Engineer or any site engineer/ PMC appointed from time to time by the employer to perform the duties set forth in clause 17 hereof whose authority shall be notified in writing to the Architect and Contractor by the EMPLOYER.
- e. "Architects" shall mean any Engineer/ representative appointed by M/s Murty & Manyam, Hyderabad.
- f. "Works" shall mean the works to be executed in accordance with contract specifications, quantities etc.
- g. "Contract" shall mean the Articles of Agreement, the General Conditions, Special Conditions, the Appendix, the Schedule of Quantities, Specifications and drawings, work order etc., attached hereto and duly signed.
- h. "Contract Price" shall mean the sum named in the tender, subject to such amount additions thereto or deductions there from as may be made under the provisions, hereinafter contained.
- i. "Site" shall mean the lands and other places as shown on the site plan, on which the works are to be, provided, by the Employer or Architect for the purpose of the Contract.

- j. “Drawings” shall mean the drawings referred to in the contract etc., and any modifications of such drawings approved in writing by the Architect and the Air India and such other drawings as may from time to time be furnished or approved in writing by the Architect and Employer.
- k. “Notice in Writing” or written notice shall mean a notice in writing, typed or printed characters sent (unless delivered personally or otherwise provided to have been received) by registered post to the last known private or business address or registered office of the address and shall be deemed to have been received, when in the ordinary course of post, it would have been delivered.
- l. “Act of Insolvency” shall mean any Act of Insolvency as defined by the Presidency Towns Insolvency Act or the Provincial Insolvency Act or any act amending such original.
- m. “Net Prices” if in arriving at the Contract Amount, the contractor has added to or deducted from the total of the items of the Tender any sum, either as a percentage or otherwise, then the net price of any items, in the tender, shall be the sum arrived at by adding to or deducting from the actual figure appearing in the Tender, as the price of that item, a similar percentage or proportionate sum. Provided always that in determining the percentage or proportion of the sum so added or deducted by the contractor, the total amount of any Prime cost items and provisional sums of money shall be deducted from the total amount of the Tender. The expression “net rates” or “net prices” when used with reference to the contract or account shall be held to mean rates or prices so arrived at.
- n. “Virtual Completion” shall mean that the building is in the opinion of the Architect and Employer, sufficiently completed for occupation by the Employer, in relation to the scope of work of this contract.
- o. Words importing persons include firms and corporations. Words importing the singular only, also include the plural and vice versa, where the context requires.

## 2. **SCOPE OF CONTRACT:**

The contractor shall carry out and complete the said work in every respect in accordance with this contract with the directions of and to the satisfaction of the Architect and Employer. Architect, with the approval of the Employer, may issue further drawings and/or written instructions, details, directions and explanations, which are hereafter collectively referred to as “Architect’s Instructions” in regard to:

- a. The variations or modifications of the designs, quality or quantity of works or the addition or omission or substitution of any work.
- b. Any discrepancy in the drawings or between the Schedule of Quantities/ or drawings and/or specifications etc.

- c. The removal and/or re-execution or any works executed by the contractor.
- d. The removal from the site of any material brought there on by the contractor, and the substitution of any other material there from.
- e. The dismissal from the works of any person employed thereupon.
- f. The opening up for inspection of any work covered up.
- g. The amending and making good of any defects under clause 24 "Removal of Improper works and Materials".

The contractor shall forthwith comply and fully execute any work comprised in such Architect's instruction, provided always that instructions, directions and explanations given to the contractor or his representative upon the works by the Architect shall, if involving a variation, be confirmed in writing by the contractor or within 7 days, and if not dissented from in writing within further 7 days by the Architect, such shall be deemed to be the Architects instructions with in the scope of contract.

If compliance with the Architect's instructions as aforesaid involved work and/or expense and/or loss beyond that contemplated by the contract, then unless the same were issued owing to some breach of this contract by the contractors, the employer shall pay to the Contractor on the Architect's certificate, the price of the said work (as an extra to be valued as herein after provided) and/or expense and/or loss.

3. **DRAWINGS AND SPECIFICATIONS:**

The works shall be carried out to the entire satisfaction of the EMPLOYER and the Architect, in accordance with the signed contract document, drawings and specifications and such further drawings and details as may be provided by the Architect, and in accordance with such written instructions, directions and explanations, as may from time to time be given by the Architect and the Air India, whose decision as to the sufficiency and quality of the work and materials shall be final and binding on the contractor. If the work shown on any such further drawings or work that may be necessary to comply with any such instructions, directions or explanations, be in the opinion of the contractor outside the scope of work or reasonably could not be inferred from the contract, he shall before proceeding with such work, give notice in writing to this effect to the Architect and the Air India, and in the event of the Architects and the Air India, agreeing to the same in writing, the contractor shall be entitled to an allowance in respect of such extra work as an authorized extra. If the Architect and the contractor fail to agree, as to whether or not there is an extra, then, if the Architect decided that the contractor is to carry out the said work, the contractor shall do so, and the question whether or not there is any extra and if so, the amount thereof, shall failing agreement be settled by Arbitration as hereinafter provided, but such reference shall in no way delay the fulfillment of this contract.



No drawing shall be taken as in itself an order for variation, unless in addition to the Architect's signature, it bears express works stating that it is intended to be such an order or bears a remark "VALID FOR CONSTRUCTION". No claim for payment for extra work shall be allowed, unless the said work shall have been executed under the provisions of clause 8 (Authorities, notices, patents, rights and royalties) or by the authorities, of directions in drawing of the Architect as herein mentioned.

One complete set of the signed drawings and a copy of contract document (specifications and schedule of quantities etc) shall be furnished by the Architect to the contractor. The Architect shall furnish within such time as he may consider reasonable, one copy of any additional drawings, which in his opinion may be necessary for the execution of any part of the work. Such copies shall be kept at the works, and the Architect or his representatives shall, at all reasonable times have access to the same and shall be returned to the Architect by the Contractor, before the issue of the final certificate. The original contract documents shall remain in the custody of employer.

Please refer clause 36 of Special conditions of contract.

4. **SCHEDULE OF QUANTITIES:**

The Schedule of Quantities unless otherwise stated shall be deemed to have been prepared in accordance with the Standard Procedure of the Architects and shall be considered to be approximate and no liability shall attach to the Architect for any error/variations that may be discovered therein.

Please refer Clause 5, 6 and 40 of Special conditions of contract.

5. **SUFFICIENCY OF SCHEDULE OF QUANTITIES:**

The contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the prices stated in the schedule of Quantities and/or the Schedule of Rates and Prices, which rates and prices shall cover all things necessary for the proper completion of the works.

Please refer clauses 5, 6 and 40 of Special Conditions of Contract.

6. **ERRORS IN SCHEDULE OF QUANTITIES:**

Should any error appear in the Schedule of Quantities, other than in the Contractor's prices and calculations, it shall be rectified and such rectification shall not vitiate the contract but shall constitute a variation of the contract and be dealt with as an authorised extra or deduction.

7. **CONTRACTOR TO PROVIDE EVERYTHING NECESSARY:**

The contractor shall provide everything necessary for the proper execution of works according to the true intent and meaning of the drawings, specifications and the Schedule of Quantities etc., taken together, whether the same may or may not be particularly shown or described there in, provided the same can be inferred there from. The several documents forming the contract are to be taken as mutually explanatory to one another; detailed drawings and figured dimensions in preference to scale, and special conditions in preference to General conditions and particular specifications in preference to General specifications.

In case of discrepancy between the Schedule of Quantities, the specifications and/or the drawings, the following order of preference shall be observed:-

- i) Description of Schedule of Quantities.
- ii) Particular specifications and special condition, if any.
- iii) Drawings.
- iv) C.P.W.D. specifications.
- v) Indian Standard specifications of B.I.S.

If there are varying or conflicting provisions made in any document forming part of the contract, the Architect shall be the deciding authority, with regard to the intention of the document and his decision shall be final and binding on the contractor.

Any error in description, quantity or rate in schedule of quantities or any omission therefrom shall not vitiate the contract or release the contractor from the execution of the whole or any part of the works expressed therein according to drawings and specifications or from any of his obligations under the contract.

The contractor shall make his own arrangements for providing water, for carrying out the work, at his own cost. If water from any source other than Municipal main is to be used for construction, the same shall be tested at the contractor's cost, and a report submitted to the Architect for his approval, before such water is used for the works. Temporary Electrical connections shall be obtained by the contractor to facilitate execution and completion of work at their cost and all the charges there of should be borne by them. Alternatively Air India Ltd at its discretion may give power & water supply and recovery at the rate of 1% each for water & power of the Bill Value will be recover for the items consuming water & Electricity.

The contractor shall supply, fix and maintain at his cost, during the execution of any works, all the necessary centering, scaffolding, staging, planking, timbering, strutting, shoring, pumping, fencing, hoarding, watching and lighting during nights as well as by day required not only for the proper execution and protection of the said works, but also for the protection of the public and the safety of any adjacent road, streets, cellars, vaults, pavements, walls, houses, buildings and all other erections, matters or things. The Contractor shall take down and remove any or all such centering, scaffolding, staging, planking, strutting, shoring etc., as occasion shall require or when ordered or so to do, and shall fully reinstate at his own cost

and make good all the matters and things disturbed during the execution of the works to the satisfaction of the Architects.

Please refer clause 7 of Special conditions of contract.

8. **AUTHORITIES, NOTICES, PATENT RIGHTS AND ROYALTIES:**

The contractor shall conform to the provisions of the statutes relating to the works, and to the regulation and by laws of any local authority, and of any water, lighting and other companies or authorities, with whose systems the structures are proposed to be connected; and shall before making any variation from the drawings or specifications, that may be necessitated by so conforming, give to the Architects a written notice, specifying the variations proposed to be made and the reason for making it and apply for instruction thereon. In case, the contractor shall not within ten days receive such instructions, he shall proceed with the work conforming with the provisions, regulations or by laws in question.

The contractor shall bring to the attention of the Architect all notices required by the said acts, regulations or bylaws to be given to any authority, and pay to such authority or to any Public Officer all fees that may be properly chargeable in respect of the works, and lodge the receipts with the Architects.

The contractor shall indemnify the Employer against all claims in respect of patent rights, designs, trade marks or name or other protected rights in respect of any constructional plant, machine, work or material used for or in connection with works or temporary works and from and against all claims, demands, proceedings, damages, costs, charges, and expenses whatsoever in respect thereof or in relation thereto. The Contractor shall defend all actions arising from such claims, unless he has informed the Architects, before any such infringement and received their permission to proceed, and shall himself pay all royalties, licence fees, damages, cost and changes of all and every sort that may be legally incurred in respect thereof. Please refer clause 23 of special conditions of contract.

9. **SEIGNIORAGE CHARGES:**

The Seigniorage charges will be recovered from contractor's bill as per the rates prescribed in the contract documents for the materials used on the work only. The Seigniorage charges to be deducted at source at the rates prevailing from time to time as per Government of Andhra Pradesh Department of Mines and Geology.

**RATES OF SEIGNIORAGE FEE**

S.NO. (1)	NAME OF THE MINERAL (2)	RATE OF SEIGNIORAGE FEE (RS) (3)
1.	Building Stone	Rs. 50/33 (Rupees fifty/Thirty Three) per CMT/MT
2.	Rough Stone/Boulders	Rs. 50/33 (Rupees fifty/Thirty Three) per CMT/MT

3.	Road Metal	Rs. 50/33 (Rupees fifty/Thirty Three five ) per CMT/MT
4.	Limekankar/Lime stone	The rate of Royalty as applicable to limestone (other than L.D.Grade) in respect of Major Mineral as per the 2 <sup>nd</sup> Schedule of the Mines and Minerals (D&R) Act, 1957.
5.	Lime Shell	Rs. 88/- (Rupees eighty eight) per MT
6.	Mosaic chips	Rs. 44/- (Rupees Forty Four) per MT
7.	Muram/Gravel	Rs. 22/14 (Rupees Twenty Two / Fourteen) per CMT/MT
8.	Ordinary sand useful for civil construction	Rs. 40/- (Rupees Forty) per CMT
9.	Shingle	Rs. 17/- (Rupees Seventeen) per CMT
10.	Chalcedony pebbles	Rs. 33/- (Rupees Thirty Three) per MT
11.	Fullers Earth/Bentonite	Rs. 110/- (Rupees One hundred and Ten) per MT-
12.	Shale/Slate	Rs. 110/- (Rupees hundred and Ten) per MT
13.	Rehmatti	Rs. 17/- (Rupees Seventeen) per CMT
14.	Limestone slabs (i) Colour  (ii) White  (iii) Black	Rs. 7/- (Rupees Seven) Per Sq.Mt or Rs.88/- (Rupees Eighty Eight per MT, whichever is higher.  Rs. 5/- (Rupees five) Per Sq.Mt or Rs. 55/- (Rupees fifty five) per MT, whichever is higher  Rs. 4/- (Rupees Four) per Sq.mt or Rs. 44/- (Rupees forty four) per MT whichever is higher.
15.	Ordinary clay silt and brick earth used in the manufacture of bricks including Mangalore tiles.	Rs.3850/- (Rupees three thousand eight hundred and fifty only) per kiln per annum for bricks and Tiles.

**(Rate per Cubic metre)**

16	Granite useful for Cutting & Polishing	Mini Gang saw above 270 Cm x 150 cm & less than 300 cm x 180 cm	Below 270 cm x 150 cm size	Below 75 Cm size
A	Black Granite Galaxy Variety	Rs. 2625/- (Rupees Two thousand six hundred twenty five only)	Rs. 2475/- (Rupees two thousand four hundred and seventy five only)	Rs. 1100/- (Rupees one thousand one hundred only)
b.	Black Granite other than Galaxy Variety	Rs.2000/- (Rupees two thousand only)	Rs.1925/- (Rupees one thousand nine hundred and twenty five only)	Rs.825/- (Rupees eight hundred and twenty five only)

c.	Colour Granite of Srikakulam Blue, Indian Aurora of Nizamabad District, Leptinites of coastal Districts, Black Pearl of Prakasam & Guntur District	Rs.2000/- (Rupees two thousand only)	Rs.1925/- (Rupees one thousand nine hundred and Twenty five only)	Rs.825/- (Rupees Eight hundred Twenty five only)
d.	<b>Colour Granite of Other Varieties</b>	Rs.1625/- (Rupees one thousand six hundred twenty five )	Rs.1650/- (Rupees one thousand six hundred fifty only)	Rs.825/- (Rupees Eight hundred twenty five only)

10. **MATERIALS AND WORKMANSHIP TO CONFORM DESCRIPTION:**

All materials and workmanship shall, so far as procurable be of the respective kinds specified in the Schedule of Quantities and/or specifications and in accordance with the Architect's instructions and the contractor shall on the request of the Architects furnish to them all invoices, accounts, receipts and the other vouchers to prove that the materials comply therewith. The contractor shall at his own cost arrange for and/or carry any test of any materials, which the Architect & Employer may require. The costs of materials used for testing, packing, transportation and testing shall be borne by the contractor and his quoted rates/amounts shall include all such expenses/contingencies.

10. a. In case of non-availability of specified Make/brand of any material including steel and cement the alternate make/brand will be given by the Employer/Architect.

11. **THE SETTING OUT:**

The Contractor shall at his own expense, set out the works accurately in accordance with the plans and to the complete satisfaction of the Architect. The Contractor shall be solely responsible for the true and perfect setting out of the same and for the correctness of the positions, levels, dimensions and alignment of all parts thereof. If at any time any error shall appear during the progress or on completion of any part of the work, the contractor shall at his cost rectify such error if called upon to the satisfaction of the Architects/Employer. The work shall from time to time be inspected by the Architect and/or his representatives, but such inspections shall not exonerate the contractor in any way from his obligation to remedy any defects, which may be found to exist at any stage of the work or after the same is completed, at his own cost.

12. **REMOVAL OF ALL OFFENSIVE MATTERS:**

All soil, filth or other matter of an offensive nature, taken out of any trench, sewer, drain, cesspool or other place shall not be deposited on the surface, but shall at once be carried out away by the contractor to some pits or place provided by them and shall be disposed off as per the rules and regulations of the Local authorities concerned.

13. **OPENING UP WORKS:**

The contractor shall notify the Architect in writing immediately, the trenches or excavation as shown on the drawings are get ready or as soon as any ground is cut into which, from unexpected causes, appears need for immediate attention. After notifying the Architect, he shall await instructions, which shall be given within ten days of receipt of such notice. If the contractor put in any parts of the foundations before he has so notified the Architect and received instructions, he shall be liable to reinstate all such work that may be subsequently, at any time, damaged on account of any defect or insufficiency of the foundations. The Contractor shall at the request of the Architect, within such time as the Architect so desires, open for inspection any work, and should the contractor refuse or neglect, to comply with such request, the employer, through the Architect may employ other workmen to open up the same. If the said work has been covered up in contravention of the Architect's instructions, or if, on being opened up, it be found in accordance with the drawings and specifications, or the instructions of the Architect or otherwise, the expenses of such other workmen shall be borne by and recoverable from the contractor, or may be deducted from any money due or which may become due to the contractor. If the work has not been covered up in contravention of such instruction, and be found in accordance with the said drawings and specifications and instructions, then the expenses aforesaid shall be borne by the Employer and be added to the contract sum, provided always that in the case of foundations or of any other urgent work so opened up and requiring immediate attention, the Architect shall within seven days after receipt of the written notice from the contractor that the work has been opened, make or cause the inspection thereof to be made, and at the expiration of such time, if such inspection shall not have been made, the contractor may cover the same and shall not be required to open it up again, except at the expenses of Employer.

Refer clause 7 & 25 of special conditions of contract.

14. **CONTRACTOR'S SUPERINTENDENCE & REPRESENTATIVE ON THE WORKS:**

The contractor shall give all necessary personal superintendence during the execution of the works and so long thereafter as the Architect may consider it necessary until the expiration of the "Defects Liability Period" stated in clause 25. The Contractor shall meet the Architect or his representative, whenever required and so informed by the Architect.

The Contractor shall maintain and be represented at site at all times, while the work is in progress, by a responsible and efficient foreman, approved by the Architect and who must thoroughly understand all the trades entailed and be constantly in attendance while the men are at work. Any directions, explanations, instructions or notices give by the Architect & Employer to such foreman shall be deemed to have been given to the contractor and shall be binding as such on the contractor. The Foreman shall be thoroughly conversant with the English language and should be able to read, write and speak English. **Since the work is required to be carried in restricted area, the contractor shall obtain the necessary entry permits from Security Department, on furnishing copy of Passport/Police Verification Certificate for all his workman and materials**

15. **DISMISSAL OF WORKMEN:**

The contractor shall on the request of the Architect and Employer immediately dismiss from the works any person employed thereon who may, in the opinion of the Architect and Employer be unsuitable or incompetent or who may misconduct himself, and such person shall not again be employed or allowed on the works without the permission of the Architect & Employer.

16. **ACCESS TO WORKS:**

The Architect, the Employer and any person authorised by them shall at all reasonable times have free access to the works and to the workshops, factories or other places where materials are being prepared or constructed by the contract and also to any place where the materials are lying or from which they are being obtained. The Contractor shall give every facility to the Architect and the Employer and their representatives for inspection and examination and test of the materials and workmanship. No person, unless authorised by the Architect or the Employer, except the representatives of Public authorities, shall be allowed on the works at any time. If any work is to be done at a place other than the site of works, the contractor shall obtain the written permission of the Architect for doing so.

17. **EMPLOYER'S REPRESENTATIVE/PMC:**

The Employer may appoint an assistant to the Engineer, any Site Engineer or Project Management Consultant (PMC), who shall be the representative of the Employer. The duties of the Employer's representatives are to watch and supervise the works and to test any materials to be used and of workmanship employed in connection with the works. He shall have no authority either to relieve the contractor of any of his duties or obligations under the contract, or except those expressly provided hereunder, to order any work involving delay or any extra payment by the Employer or any variation of or in the works.

The contractor shall afford the Employer's representative every facility and assistance for examining the works and materials and checking and measuring item and materials. Neither the Employer's representative nor any assistant to the Architect shall have power to revoke, alter, enlarge or relax the requirements of this contract, or to sanction any new-work, additions, alterations, deviations or omissions unless such an authority may be specially conferred by a written order of the Architect and Employer.

The Employer's representative shall have to give notice to the Contractor or his representing about the non-approval of any work or materials and such works shall be suspended or the use of such materials should be discontinued until the decision of the Architect is obtained. The work will from time to time be examined by the Architect or the Employer's representative, but such examinations shall not in any way exonerate the contractor from the obligation to remedy any defects, which may be found to exist at any stage of the work or after the same is completed. Subject to the limitations of the clause, the contractor shall take instructions only from the Architect and Employer.

18. **ASSIGNMENT OF SUB-LETTING:**

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 Employer, and no undertaking shall relieve the contractor from the full and entire responsibility of the contract or from active superintendence of the works during their progress.

19. **SUB-CONTRACTORS:**

All specialists, merchants, tradesmen, and others, executing any work or supply and fixing any goods for which prime cost prices or provisional sums are included in the Schedule of Quantities and/or specifications, who may be nominated or selected by the Architect and employer and hereby declared to be sub-contractors employed by the Contractor, are herein referred to as nominated sub-contractors. No nominated sub-contractors shall be employed on or in connection with the works, against whom the contractor shall make reasonable objection or (see where the Architect and contractor shall otherwise agree), who will not enter into a contract provided.

- a. The nominated sub-contractors shall indemnify the contractor against the same obligations in respect of the sub-contract as the contractor is under, in respect of this contract.
- b. The nominated sub-contractors shall indemnify the contractor against claims in respect of any negligence by the sub-contractor, his servants or agents or any misuse by him or them of any scaffolding or other plant, the property of the contractor or under any Workman's Compensation Act in force.
- c. Payment shall be made by the contractor to the nominated sub-contractor, within 14 days of receipt of the Architect's certificate, provided that before any certificate is issued, the contractor shall upon request furnish to the Architect proof that all nominated sub-contractor's account included in the previous certificates have been duly discharged; in default whereof the Employer may pay the same upon a certificate of the Architect and deduct the amount thereof from any sums due to the contractor. The exercise of this power shall not create any contract between Employer and Sub-contractor.

20. **VARIATIONS NOT TO VITIATE CONTRACT:**

The contractor shall when directed in writing by the Architect, omit from or vary works shown upon the drawings or described in the specifications or included in the priced schedule of quantities, but the contractor shall not make any alterations or additions to or omissions from the works or any deviations from the provisions of the Contract without such authorizations or direction in writing from the Architect and Employer.



No claim for any extra item or deviations shall be allowed, unless it shall have been executed by the Authority of the Architect and Employer as herein mentioned. Any such extra item or deviation is hereinafter referred to as an authorised extra item or deviation. No variations i.e., additions, omissions or substitutions shall vitiate the contract.

The rate of items not included in the bill of quantities shall be settled by the Architect and Employer in accordance with the provisions of clause 21, hereof.

21. **MEASUREMENTS OF WORKS:**

The Architect/PMC may from time to time intimate the Contractor that he requires the works to be measured and the contractor shall forthwith attend or send a qualified agent to assist PMC/Architect's representative in taking measurements and calculations, and to furnish all particulars or give all assistance required by either of them.

Should the contractor not attend or neglect or omit to send such an agent, then the measurements and calculations, and to furnish all particulars or give all assistance required by either of them.

Should the contractor not attend or neglect or omit to send such an agent, then the measurements taken by the PMC/Architects representative approved by them shall be taken to be the correct measurements. The mode of measurements wherever not mentioned in contract documents be taken in accordance with the Indian Standard of Method of measurements of building works (I.S.1200 – 1958) and its revisions, if any. In case of any discrepancy between various contract documents on mode of measurements, the mode given in Bill of Quantities will take precedence over others.

The contractor or his agent may at the time of measurement take such notes and measurements as he may require.

All authorised extra works, omissions and all variations made without the Architect's knowledge, if substantially sanctioned by him in writing shall be included in such measurements.

22. **PRICES FOR SUBSTITUTIONS/EXTRA ETC., ASCERTAINMENT OF:**

Should it be found after the completion of the works from measurements taken (in accordance with the previous paragraph) that any of the quantities or amounts specified for the works in the priced schedule of quantities of work thus ascertained are less or greater than the amounts and/or tender or that any variations, is made, and any substituted/ extra (new) items have been executed, the valuation of such quantities/items, amounts or variations, unless previously or otherwise agreed upon, shall be made in accordance with the following rules:

- a. The net rates or prices in the original tender shall determine the valuation of the extra (additional quantities and or extra/substituted item of work), where that work is of a similar character and executed under similar conditions of the work priced therein. This applied to extra and substituted items of work to the extent they are similar in nature to the items in the contract.
- b. The net prices given in the original tender shall determine the value of the items omitted, provided if omissions vary the conditions under which any remaining items of work are carried out, the prices for the same shall be valued under thereof.
- c. Where extra/substituted item of works are not of similar character (either partly & fully) and/or executed under similar conditions as aforesaid or where the omissions vary the conditions under which any remaining items of works are carried out or if the amount of any omission or additions relative to the amount of the whole of the contract works or to be any part thereof shall be such that in the opinion of the Architects the net rate or price contained in the priced schedule of quantities or tender or for any item of the work involves less or more beyond that reasonably contemplated by the Contractor or is by reason of such omission or addition rendered unreasonable for in-applicable, the Architect shall fix in consultation with the Employer such other rates or prices as in the circumstances he shall think reasonable and proper, which shall be final and binding on the contractor. For extra and substituted items this will apply for portions of the items for which, items of similar nature are not available in the contract.
- d. Where extra and or substituted items of work cannot be properly measured or valued, the contractor shall be allowed based on the net local day work rates and wages for the district and prevalent market rates for materials etc., at the time of ordering that item; provided that in either case vouchers for wages paid specifying the daily time (and if required by the Architect, the workmen's name) and materials employed at or before the end of the week following that in which the work has been executed.

The measurements and valuations in respect of the extra and substituted items of work shall be completed within the "Period of final measurement" or within 3 (three) months from the completion of the contract works as defined under clause No.26 (certificate of virtual completion).

See Special Conditions of Contract Clause 45.

23. **UNFIXED MATERIALS:**

When any materials intended for the works shall have been placed at site by the contractor, such materials shall not be removed therefrom (except for the purposes of being used on the works) without the written authority of the Architect and Employer and when the contractor shall have received payment in respect of any

certificate in which the architect shall have stated that he has taken into account the value of such unfixed materials on the works such materials shall become the

property of the Employer and the Contractor shall be liable for any loss or damage to any such materials.

24. **REMOVAL OF IMPROPER WORK AND MATERIALS:**

The Architect shall, during the progress of the works, have power to order in writing from time to time the removal from the works, within such reasonable times as may be specified in the order, of any materials which in the opinion of the Architect and Employer are not in accordance with the specifications or the instructions of the Architect and Employer; and the substitution with proper materials and the removal and proper re-execution of any work, which has been executed with materials or workmanship, not in accordance with the contract/drawings and specifications or instructions etc., the contractor shall forthwith carry out such orders at his own cost. In case of default on the part of the contractor to carry out such orders, the Employer shall have the power to employ and pay other persons to carry out the same and all expenses consequent thereon or incidental thereto shall be borne by the Contractor, and shall be recoverable from the contractor by the Employer, or may be deducted by the Architect, from any money due or may become due to the contractor for this work or on any other account.

Instead of this procedure for work not done in accordance with the contract, the Architect and Employer may allow such work to remain, and in that case may make allowance for the difference in value together with such further allowance for damages to the Employer, as in his opinion may be reasonable. This allowance shall be recoverable from the contractor by the Employer, or may be deducted by the Architect, from any money due or may become due to the contractor for this work or on any other accounts. The decision of Architects in these matters shall be final and binding on the contractor.

25. **DEFECTS AFTER COMPLETION:**

Any defect, shrinkage, settlement or other faults which may appear within the “Defects Liability Period” stated in the Appendix on Page 10 i.e. within 12 months after the virtual completion of the works arising in the opinion of the Architect and the Air India, from materials or workmanship not in accordance with the contract, shall upon the directions and writing of the Architect and Employer and within such reasonable time as shall be specified therein, be rectified and made good by the Contractor at his own cost. In case of default, the Employer may employ any other person to amend and make good such defects, shrinkage, settlements or other faults. All damages, loss and expenses consequent therein or incidental thereto shall be made good and borne by the contractor and such damage, loss and expenses shall be recoverable from him by the employer or may be deducted by the Employer, the damages, loss and expenses from any sums that may be due to the contractor or amount retained under condition 38 (Certificate and payment) and in event of the amount retained being insufficient recover the balance from the amount held against EMD & Security deposit under clause 11.1 & 11.2 on Page 4 or any other amounts due or may become due later.

26. **CERTIFICATE OF VIRTUAL COMPLETION:**

The contractors shall intimate in writing to the Architects, as and when the works are complete in all respects in order to enable the Architect to intimate the Employer to take possession of the same. The works shall not be considered as virtually completed, until the Architect has certified in writing that the same have been “Virtually completed” and accepted by the employed. The defects liability period shall commence, only from the date of such virtual completion certificate.

27. **OTHER PERSONS ENGAGED BY THE EMPLOYER:**

The Employer reserves the right to use the premises and any portions of the site for the execution of any work not included in this contract which he may desire to carry out through other persons, and the contractor is to allow all reasonable facilities for the execution of such work, except by special arrangement with the Employer. Such work shall be carried out in such a manner as not to impede the progress of the works included in the contract, and the contractor shall not be responsible for any damage or delay which may happen to or be occasioned by such work.

28. **INSURANCE IN RESPECT OF DAMAGE TO PERSONS AND PROPERTY:**

The contractor shall be responsible for all injury to persons, animals or things and for all structural and decorative damage to property, which may arise from operation or neglect of himself or any of his or sub-contractor’s employees, whether or any other cause whatever in any way connected with the carrying out of this contract. This clause shall be held to include, inter alia any damage to buildings, whether immediately adjacent or otherwise, any damage to roads, caused to the buildings and works forming the subject of this contract by frost or other inclement weather. The contractor shall indemnify the employer and hold him harmless in respect of all and any expenses arising from any such injury or damage to persons or property as aforesaid and also in respect of any claim made in respect of injury or damage under any acts of government or otherwise, and also in respect of any award of compensation or damages consequent upon such claim.

The Contractor shall reinstate all damages of every sort mentioned in this clause, so as to deliver up the whole of the contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of third parties.

The contractor shall indemnify the Employer against all claims which may be made against the Employer, by any member of the Public or other party, in respect of anything which may arise in respect of the works or in consequence thereof and shall at his own cost, effect and maintain until one month after the works are taken over by the Employer or three months after the date of completion of the contract with an approved office, a policy of Insurance in the joint names of the Employer and the contractor against such risks and signing of the contract. The contract shall also indemnify the employer against all claims which may be made upon the Employer whether under the Workmen’s compensation act or any other statute in force during the currency of this contract or at common law in respect of any employees of the contractor or of any sub-contractor and shall at his own expense

effect and maintain until one month beyond the virtual completion of the contract, with an approved office. A policy of Insurance in the joint names of the Employer and the Contractor against such risks and deposit such policy or policies with the

Architects from time to time, during the currency of the contract. In default of the contractor insuring as provided above, the Architect on behalf of the Employer may so insure and may deduct the premiums paid from any money due or which may become due to the contractor.

The contractor shall be responsible for anything which may be excluded from the Insurance Policies above referred to and also for all other damages to any property arising out of and incidental to the negligent or defective carrying out of this contract however, such damage shall be caused.

The Contractor shall also indemnify the Employer in respect of any costs, charges or expenses arising out of any claim or proceedings and also in respect of any Award of or compensation of damages arising therefrom.

The Employer with the concurrence of the Architect shall be at liberty and is hereby empowered to deduct the amount of any damages, compensations, costs, charges and expenses arising or occurring from or in respect of any such claims of damages from any sums due or to become due to the contractor.

29. **CONTRACTOR'S ALL RISK POLICY:**

The contractor shall within 14 days from the date of commencement of the work insure the works at his cost and keep them insured until one month after the works are taken over by the Employer or three months after the date of completion whichever is earlier, against loss or damage by fire and usual risks other than fire against which insurers generally provide cover in a CONTRACTOR'S ALL RISK POLICY, with an insurer to be approved the Architects, in the joint names of the Employer and contractor (the name of the former being placed first in the policy), progressively for the full amount of the contract, in three stages, beginning with 1/3 of the contract value, and for any further sum as called upon to do so by the Architect, with the prior written consent of the Employer, the premium of such further sum being allowed to the contractor as an authorised extra. Such policy shall cover the property of the Employer only and Architects and surveyor's fees for assessing the claim and in connection with his services generally in reinstatement and shall not cover any property of the contractor or any subcontractor or employee. The contractor shall deposit the policy and receipts for the premiums paid with the Architects, within twenty one days of the date of commencement of work, unless otherwise instructed, as provided above failing which the employer or the Architect on his behalf may insure and may deduct the premium paid from any money that may be due or that may become due to the contractor. The contractor shall as soon as the claim under the policy is settled, or the work reinstated by the insurers should they elect to do so, proceed with all due diligence with the completion of the works in the same manner as though the fire or other such risk had not occurred and in all respects under the same conditions of contract.

The contractor in case of rebuilding or reinstatement after fire or other such usual risk shall be entitled to such extension of time for completion as recommended by the Architect.

Please refer Special Conditions of Contract, clauses.

30. **MINIMUM AMOUNT OF THIRD PARTY INSURANCE:**

Such insurance shall be effected with an insurer and in terms approved by the SBI which approval shall not be reasonably withheld and for at least the amount stated below. The contractor shall, whenever required, produce to the Architect/Consultant the policy or policies of insurance cover and receipts for payment of the current premium.

The minimum insurance cover for physical property, injury, and death is Rs.5.00 lakhs per occurrence with the number of occurrences limited to four. After each occurrence contractor will pay additional premium necessary to make insurance valid for four occurrences always.

31. **COMMENCEMENT AND COMPLETION:**

The contractor shall be allowed admittance to the site on the “Date of Commencement” stated in the Appendix, and he shall thereupon and forthwith begin the works and shall regularly proceed with and complete the same (except such painting or other decorative work as the Architect may desire to delay) on or before the ‘Day of Completion’ started in the Appendix subject nevertheless to the provisions for extension of time hereinafter contained.

Refer clause 9 & 37 of Special Conditions of Contract.

32. **DELAY AND EXTENSION OF TIME:**

If in the opinion of the Architect the works be delayed:

- a. by force majeure, or
- b. by reason of any exceptionally inclement weather, or
- c. by reason of proceedings taken on threatened by or dispute with adjoining or neighbouring owners or public authorities arising otherwise, than through the contractor’s own default, or
- d. by the works or delays of the contractors or tradesmen engaged or nominated by the Employer or Architect and not referred to in the Schedule of Quantities and/or specifications, or
- e. by reason of civil, commotion, local combination of workmen or strike or lock-out affecting any of the buildings/traders, or
- f. by reason of the Architect’s instructions as per clause 2, or
- g. In consequence of the contractor not having in due time, necessary instructions from the Architect, for which he shall have specifically applied in writing ahead of time, giving reasonable time to prepare such instructions.

The Architect shall make a fair and reasonable assessment for extension of time, for completion of the contract works which may be approved by the Employer.

In case of such strike or lock-out, the contractor shall as soon as possible, give written notice thereof to the Architect, but the contractor shall nevertheless constantly use his endeavours to prevent delay and shall do all that may reasonably be required, to the satisfaction of the Architect to proceed with the work.

33. **DAMAGES FOR NON-COMPLETION:**

If the contractor fails to complete the works by the date stated in clause 31 (date of completion) or within any extended time certified under clause 32 (extension of time) and if the Architect shall certify in writing on or before the date of issue of the certificate for the last payment to which the contractor may become entitled hereunder that the works could have been reasonably completed by the said date or within the said extended time, then the contractor shall pay to the Employer or allow

the employer to recover from dues to the contractor on any account the sum stated in clause 17 of “Notice to contractors” (Page 6) (liquidated damages and not by way of penalty), subject to a maximum amount of 10% as stated in Appendix of General Conditions of contract (page 10) and as stated in clause 17 of “Notice to contractors”(Page 6) and such damages may be deducted from any money due or which may become due to the contractor.

The deduction of such sums shall not, however, absolve the contractor of his responsibility and obligations to complete the work in its entirety.

Please refer clauses 9 & 37 of special conditions of contract.

34. **FAILURE BY CONTRACTOR TO COMPLY WITH ARCHITECT’S INSTRUCTIONS:**

If the contractor after receipt of written notice from the Architect requiring compliance with such further drawings and/or Architects instruction, fails within seven days to comply with the same, the Architect and Employer may employ and pay other persons to execute any such work whatsoever as may be necessary to give effect thereto and all costs incurred in connection therewith shall be recoverable from the contractors by the employer on a Certificate by the Architect as a debit or may be deducted by him from any money due or which may become due to the contractors.

35. **ARCHITECT’S DELAY IN PROGRESS:**

The Architect may delay the progress of the works in case of rains or otherwise, without vitiating the contract and grant such extension of time with the approval of the Employer for the completion of the contract as he may think proper and sufficient in consequence of such delay, and the contractor shall not make any claim for compensation or damage in relation thereto.

36. **SUSPENSION OF WORKS:**

If the contractor, except on account of any legal restraint upon the employer preventing the continuance of the works, or on account of any of the causes mentioned in the clause "Extension of time" or in the case of certificate being withheld or not paid when due, shall suspend works or in the opinion of the Architects, shall neglect or fail to proceed with due diligence in the performance of his part of the contract or if he shall more than once make default in the respects mentioned in clause 24 (removal of improper work and materials), the Employer through the Architect shall have the power to give notice in writing to the contractor required that the works be provided within a reasonable manner, and with reasonable despatch, such notice shall not be unreasonably given and must signify that it purports to be a notice under the provisions of this clause and must specify the acts or defaults on the part of the contractor upon which it is based. After such notice shall have been given, the contractor shall not be at liberty to remove from the site of works, or from any ground contiguous thereto, the site of works, or from any ground contiguous thereto, any plant or materials belonging to him which shall have been placed thereon for the purpose of work, and the Employer shall have lien upon such plants and materials to subsist from date of such notice being given until the notice shall has been complied with, provided always that such line shall not under any circumstances subsist after the expiration of 30 (thirty) day from the date of such notice given, unless the employer shall have entered upon and taken possession of the works and site, as hereinafter provided.

If the contractor shall fail for seven days after such notice has been given, to proceed with the works as therein prescribed, the Employer may enter upon and take possession of the works and site, and of all such plants, machinery and materials thereon intended to be used for the works, and the Employer shall retain and hold a lien upon all such plants, machinery and materials until the work shall have been completed, under powers hereinafter conferred upon him;

If the Employer shall exercise the above power, he may engage any other person to complete the works and exclude the contractor, his agents and servants from entry upon or access to the same, except that the contractor or any person appointed in writing may have access at all times during the progress of the works to inspect, survey and measure the works. Such written appointments or a copy thereof shall be delivered to the Architects before the person appointed comes on to the works and the Employer shall take such steps as in the opinion of the Architect may be reasonably necessary for completion the works, without undue delay or expenses using for that purpose the plant, machinery and materials above mentioned in so far as they as they are suitable and adopted to such use.

Upon the completion of the works, the Architects shall certify the amount of the expenses properly incurred consequent on and incidental to the default of the contractor as aforesaid and in completion the works by other persons.

Should the amount so certified as the expenses properly incurred be less than amount which should have been due to the contractor upon the completion of the works by him, the difference shall be paid to the contractor by the Employer, should the amount of the former exceed the later, the difference shall be paid by the

contractor to the Employer. The Employer shall not be liable to make any further payments or compensations to the contractor for or on accounts of the proper use of



the plant for the completion of the works under the provisions herein before mentioned other than such payments as is included in the contract.

After the works shall have been so completed by persons other than the contractor, under the provisions herein before contained, the Architect shall give notice to the contractor to remove his plan and all surplus materials as may not have been used in the completion of the works from the site.

If such plant and materials are not removed within a period of 14 days after the notice shall have been given, the Employer may remove and sell the same, holding the proceeds less the cost of the removal and sale, to the credit of the contractor.

The Employer shall not be responsible for any loss sustained by the Contractor from the sale of the plant in the event of the Contractor not removing it after notice.

37. **PRIME COST AND PROVISIONAL SUMS:**

- a. Where “Prime Cost” (P.C.) prices or provisional sums of money are considered for any goods or works in the specifications or Schedule of quantities or deviations hereof, the same are exclusive of any trade discounts, or allowances, discount for cash, or profit which the contractor may require and or carriage and fixing.
- b. All goods or work, for which prime cost prices or provisional sums of money are considered may be selected or ordered from any manufacturer’s or firms, at the discretion of the Architect or the Employer. The Employer reserves to himself the right of paying directly for any such goods or work and the Architect may deduct the said prices or sums from the amount of the contract. Should any goods or works for which prime cost prices or provisional sums are considered or portions of same be not required, such prices or sums, together with the profits allowed for such additional amount as the Contractor may have allowed for carriage and fixing will be deducted in full from the amount of the Contract. Whether the goods be ordered by the Contractor or otherwise, the contractor shall at his own cost fix the same, if called upon to do so, and the contractor shall also receive and sign for such goods and be responsible for their safe custody as and from the date of their delivery upon the works.
- c. In cases in which provisional quantities of items/materials are contained in the contract, the contractor shall provide such materials and or execute such items to such amounts or to greater or lesser amounts as the Architect shall direct in his schedule of quantities.
- d. No prime cost sum or sums (or any portion thereof) shall be included in any certificate for payment to the contractor until the receipted accounts relating to them have been produced by the contractor to the Architect. Such accounts shall show all discounts and any sum or sums in respect of such discounts shall be treated as a trade discount. Provided always, that should the contractor in lieu of producing such receipted accounts, request the Architect in writing to issue a certificate to the Employer for such sum or sums, due either on account or in settlement to a sub-contractor direct, the Architect shall, upon satisfying himself that the sub-contractor

is entitled to the same, so issue the certificate and such sum or sums be deducted from the amount of the contractor, at the settlement of accounts and any profit or sum to which the contractor is properly entitled, in respect of such sub-contract, and which is in conformity with the terms of contract as though the amount of such certificates to the sub-contractor has been included in a certificate drawn in favour of the contractor.

- e. If the contractor neither produces the receipt nor gives authority to the Architect to issue a certificate in favour of such sub-contractor direct, the Architect may upon giving the contractor SEVEN DAYS NOTICE in writing of his intentions to do so, issue to the sub-contractor such certificate direct to the Employer and obtain a receipt from the sub-contractor, which receipt shall be deemed as a discharge for the amount of such certificates, as though given by the contractor. In such event, the contractor shall not be allowed any profit he may have added in the Schedule of Quantities upon such sub-contract.
- f. The exercise of the option before referred to by the Contractor and the issue of certificates, as before described to sub-contractor direct of certificates by the Architect, shall not however, relieve the contractor from any of the liabilities in respect of insufficient, faulty or incompleting work of the sub-contractor for which he may be liable under the terms of the contract.

38. **CERTIFICATES AND PAYMENTS:**

The contractor shall be paid by the Employer after due checking and after making necessary correction from time to time, by instalments under Interim Certificates to be issued by the Architect on account of the works executed by the contractor based on the joint measurements taken by the PMC, the Architects representative and the contractors representative when in the opinion of the Architect, work to the approximate value named in the Appendix on Page 10 as "Value of work for Interim Certificates", (or less at the reasonable discretion of the Architect & Employer) has been executed in accordance with the Contract, subject however, to a retention of the percentage of such value named in the Appendix hereto mentioned as "Retention Percentage for Interim Certificates", until the total amount retained shall reach the sum named in the appendix as Total Retention Money, after which time the instalments shall be upto the full value of the work subsequently so executed plus such amount as he may consider proper on account of materials delivered upon the site by the contractor for use in the work and available on the date of billing.

And when the works have been virtually completed and the Architect shall have certified in writing that they have been so completed, the contractor shall be paid by the Employer after satisfying himself in accordance with the certificate to be issued by the Architect, the sum of money named in the Appendix as 'Instalment after Virtual Completion' being a part of the said Total Retention Money.

The Contractor shall be entitled to the payment of the final balance (balance security deposit/retention money) in accordance with the final certificate to be issued in writing by the Architect at the expiration of the period referred to as 'The Defects Liquidation Liability period' in appendix on page 10 hereto, from the date of virtual completion or as soon after the expiration of such period as the work shall have been

finally completed and all defects made good according to the true intent and meaning hereof, whichever shall happen, provided always that the issue by the Architect of any Certificate during the progress of the works or after the completion shall not relieve the contractor from his liabilities in cases of fraud, dishonesty or fraudulent concealment relating to the works or materials or any matter dealt within the certificate, and in case of all such defects and insufficiencies in the works or materials, which reasonable examination would have disclosed. No certificate of the Architect shall by itself be conclusive evidence that any works or materials to which it relates are in accordance with the contract.

The Architect shall have power to withhold any Certificate, if the works or any parts thereof are not being carried out to his and employers satisfaction. The Architect may by any certificate make any correction in any previous Certificate, which shall have been issued by him. Payment upon the Architect's Certificates shall be made within the period named in the Appendix as 'Period of Honoring of Certificates, after such certificates have been delivered to Employer.

Please refer clause 38 & 45 of Special conditions of agreement.

39. **NOTICES:**

Notices for the Employer, the Architect, or the Contractor may be served personally or by being left at or sent by registered post to the last known place of abode or business of the party to whom the same is to be given or in the case of the contractor by being left on the works. In case of a company or corporation, notices may be served at or sent by registered post to the Registered Offices of the Company or Corporation. Any notice sent by registered post shall be deemed to be served at the time, when in the ordinary course of post it would be delivered.

40. **TERMINATION OF CONTRACT BY THE EMPLOYER:**

If the contractor being an individual or a firm, commit any act of insolvency, or shall be adjudged as Insolvent or being an incorporated Company 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 thereof, if so required by the Architect.

Or if the contractor (whether an individual, firm or incorporated Co.) shall suffer execution to be issued.

Or shall suffer any payment under this contract to be attached by or on behalf of any of the creditors of the contractor.

Or shall assign or sublet this contract without the consent in writing of the Architects/Employer first obtained.

Or shall charge or encumber this Contract or any payments due or which may be due to the Contract thereunder.

Or if the Architect shall certify in writing to the Employer that the contractor,

- a. has abandoned the contract or
- b. 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 written notice to proceed, or
- c. 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
- d. has failed to remove materials from the site or to pull down and replace work for 7 days after receiving from the Architect written notice that the said materials or work were condemned and rejected by the Architect under these conditions, or
- e. has neglected persistently to observe and perform all or any of the acts, matters or things by this contract to the observed and performed by the Contractors for 7 days after written notice shall have been given to the contractor requiring the contractor to observe or perform the same, or
- f. has to the detriment of good workmanship or in defiance of the Architect's instructions to the contrary, sublet any part of the contract.

Then and in any of the said cases the Employer with written consent of the Architect, may notwithstanding any previous waiver, after giving 7 days notice in writing to the contractor, determine the contract, but without hereby affecting the powers of the Architect to continue in force as full as if the contract has not been so determined and as if the works subsequently executed has been executed by or on behalf of the contractor.

And further, the Employer under recommendations of the Architect, by his Agents, or servants may enter upon and take possession of the works and all plants, tools, scaffoldings, sheds, machinery, and other equipment and materials also laying 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 completion the works or by employing any other contractors or other persons to complete the works and the contractor shall not in any way interrupt or do not act, matter or thing to prevent or hinder such other contractor or other persons or person employed for completing and finishing or using the materials and plant for the works. When the works shall be completed or 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, the Employer shall sell the same by publication and shall give credit to the contractor for the amount realised.

The Architect shall thereafter ascertain and certify in writing under his hand when (if anything) what shall be due to or payable by the Employer for the value of the said plant and materials so taken possession of by the Employer, and the expense or loss, which the Employer shall have incurred due to the contractor, and the amount which shall be so certified shall thereupon be paid by the Employer to the contractor or by the contractor to the Employer, as the case may be.

41. **TERMINATION OF CONTRACT BY CONTRACTOR:**

If payment of the amount payable by the Employer under certificate of the Architect as provided for hereinafter shall be in arrears and unpaid for 30 (thirty) days after notice in writing requiring payment of the amount, as aforesaid shall have been given by the Contractor to the Employer, or if the Employer obstructs the issue of any such certificates, or if the employer commits any Act of insolvency, or if the Employer (being an incorporated company) 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 Liquidator or the Employer shall repudiate the contract, or if the if the Official Liquidator in any such winding up shall be unable within 15 days notice to him requiring him to do so, to the reasonable satisfaction of the contractor that he is not able to carry out and fulfill the contract and to give security for the same (including Earnest money), or if the works be stopped for any payments due, and to become due thereunder and if required under the order of the Architects or the Employer or by an injunction or other order of any court of law, then in any of the said cases, the contractor shall be at liberty to determine the contract by notice in writing to the Employer/Architect, and he shall be entitled to recover from the Employer, payment for all works executed and for any losses he may sustain, upon any plant or materials supplied or purchased or prepared for the purpose of the contract.

In arriving at the amount of such payment, the net rates contained in the contract shall be followed, or where the same may not apply, valuation shall be made in accordance with clause 22 thereof.

42. Matters to be finally determined by the Architects and the Air India Ltd. (Called excepted matters) – (refer 43(a) below), which shall be final, conclusive and binding on the following matters:

- a) Instructions
- b) Transactions with local authorities
- c) Proof of quality of materials
- d) Assigning or under letting of the contract,
- e) Certificate as to the causes of delay on the part of the contractor and justifying extension of time or otherwise,
- f) Rectification of defects pointed out during the defects liability period.
- g) Notice to the contractor to the effect that he is not proceeding with due diligence.
- h) Certificate that the contractor has abandoned the contract.
- i) Notice for determination of the contract by the Employer.

43. **ARBITRATION:**

- a. Parties agree that the avoidance or early resolution of disputes is crucial for a smooth execution of this Contract and success of the assignment. The parties shall use their best efforts to settle amicably all disputes arising in connection with this Agreement or its interpretation.
- b. All disputes, differences, claim, question or controversy between the Parties arising out of or in relation to this Contract, or the material breach, termination or invalidity thereof, or as to the scope, effect, interpretation, validity or existence of any clause or terms thereof, or in any way relating to or in connection with the work, whether during the progress of work or after its completion (“Dispute”) which can not be settled amicably within 120 days after receipt by one party of the other party’s request for such amicable settlement may be submitted by either party for settlement through arbitration to be conducted in accordance with the procedure of the Arbitration and Conciliation Act, 1996 of India as amended from time to time, through a sole Arbitrator to be nominated by the Chairman & Managing Director of Air India Ltd., It is expressly clarified that any person or persons so appointed by the chairman & Managing Director of Air India Ltd, may, have been associated with or worked upon the Project and that this shall not be a ground for disqualification of such person as arbitrator. The arbitration proceedings shall be conducted in English at Hyderabad only. The arbitration award of the Sole Arbitrator will be final, conclusive and binding upon both parties. The cost of arbitration proceedings shall be borne equally by both the Parties. Further the existence of any disputes or pendency of any arbitration or other proceedings will not entitle or enable Contractor to abandon or delay the work or in any manner withhold the services to be performed here under.

## INDEX TO SPECIAL CONDITIONS OF CONTRACT

1. Inspection of drawings
2. Contractor to visit site
3. Execution of work (Prices to include)
4. R.C.C.Work
5. Schedule of Quantities
- 6a. Quantities liable to alterations
- b. Filling of tenders
7. Access for inspection
8. Dimensions
9. Program of works
10. Offices, Stores, Sheds etc., at the site
11. Water and Electricity
12. Procurement of materials
13. Secured advance for materials on site
14. Facilities to other contractors
15. Testing
16. Testing of concrete
17. Site meetings
18. Custody and security of materials
19. Cement
20. Steel
21. Price variations adjustment for all materials and labour
22. Treasure trove

23. Notices
24. Statutory regulations
25. Measurements to be recorded before work is covered up.
26. Working at night or on holidays.
27. Working on holidays
28. Action where there is no specification
29. Reporting of accident
30. Cleaning the site on completion/determination of work
31. Possession of buildings/work completed
32. Typographic, Clerical and other errors.
33. Information to be supplied by the Contractors.
34. Bench marks
35. Force Majeure
36. Architect's drawings and instructions
37. Completion of work and liquidated damages
38. Bill of payments
39. Workmanship
40. Schedule of quantities
41. Site Supervision
42. Engagement of Apprentices
43. Rates
44. Income tax and works contract tax
45. Extra items rates
46. Service drawings/shop drawings/catalogue
47. Payment



48. Permission
49. Maintaining Registers at site
50. Agreement
51. Insurance
52. Indebtedness and liens
53. Work performed at contractor's risk
54. Photographs
55. Inspection by the Chief Technical Examiner
56. Special conditions of contract
57. B.I.S. Codes

## SPECIAL CONDITIONS OF CONTRACT

### 1. INSPECTION OF DRAWINGS:

Before filling in the tender, the contractor will have to check up all drawings and Schedule of quantities, and will have to get immediate clarifications from the Architect on any point, that he feels is vague or uncertain. No claim/damages or compensation will be entertained on this account.

### 2. CONTRACTOR TO VISIT SITE:

Each tenderer must, before submitting his tender, visit the site of works, so as to ascertain the physical site conditions prices and availability and quality of materials according to specifications before submitting the quotations. No excuse regarding non-availability of any materials or changes in the price will be entertained or extra allowed on that account.

The existing adjacent buildings belonging to Govt/private which are in close proximity of the proposed construction, hence the contractor shall cater for all arrangements to carry out the work without causing any disturbance to the occupants by providing screens with bamboo matting or other suitable material approved by Architects/Engineer. The contractor shall ensure that no dust or construction material falls near/around the existing buildings.

### 3. EXECUTION OF WORK (PRICES TO INCLUDE):

- i) The whole of the work as described in the Contract (including the Schedule of Quantities, the specifications and all drawings pertaining thereto) and as advised by the Architect & employer from time to time is to be carried out and completed in all its parts to the entire satisfaction of the Architect & Employer. Any minor details of construction, which may not have been definitely referred to in this contract, but which are usual in sound building, road and all construction practice and essential to the work, are deemed to be included in this contract. Rates quoted in the Schedule shall be inclusive of all freights, taxes, such as octroi, Sales tax, Royalties, duties, excise, turnover tax, sales tax on works contract, etc., as well as transportation, so as to execute the contract as per the rules and regulations of Local Bodies, State Government and Government of India. Any increase in these taxes and rates, during pendency of contract, shall be borne by the contractor and no extra claim on this account will be entertained.

The rates quoted in the tender should also include all charges for:

- a)     1.     Carrying  
       2.     Hauling  
       3.     Labour  
       4.     Fixing  
       5.     Watering  
       6.     Cleaning  
       7.     Making good  
       8.     Centering, Shuttering & Scaffolding and  
       9.     Maintenance etc.

- b) The contractor should arrange timely at his cost for all required.
- i) Plant, machinery, scaffolding, formwork, ladders, ropes, nails, spikes, shuttering, temporary supports, platforms, tools, all materials etc., required for executing the work, and protecting them from weather and other normal/natural causes.
  - ii) Covering/protecting for the walling and other works, during inclement weather, strikes etc., as and when necessary and or as directed.
  - iii) All temporary canvas covers/covering, lights, tarpaulin, barricades, water shoots etc.
  - iv) All stairs and steps, thresholds and any other requisite protection for the works.
  - v) All required temporary weather-proof sheds at such places and in a manner approved by the Architect, for the storage and protection of materials, against the effects of sun and rain.
  - vi) All required temporary fences, lighting/sign-boards etc., guards, approaches and roads as may be necessary for execution of the contract works and for safeguarding the public.
  - vii) The whole of necessary plant and machinery like bull dozers, graders, road rollers, bitumen heating plants, blowers, pumps, concrete mixers, hoists, vibrators, scaffolding, formwork, tackle, cartage, labour etc., and removal of the same at the completion of works.
  - viii) Dewatering by bailing out or pumping out the water from foundation/trenches during the progress of work anywhere on site, to the satisfaction of the Architect & Employer: and clearing of the site.
- c) The Architect & Employer will be the sole judge in deciding as to the suitability or otherwise of the tools/formwork/machinery or plant that may be brought to the work site by the contractor for the proper execution of the work.
- d) The rates quoted by the tenderer in the Schedule of Probable items of work will be deemed to be for the finished work.

4. **R.C.C.WORKS:**

The contractor shall carry out all the RCC works, including formwork, strictly in accordance with drawings, details, relevant BIS specifications, and instructions of the Architects/Employer/Consulting Engineer. If any changes have to be made in the RCC designs, the contractors shall carry out the same without any extra charge. The Architect & Employer's decision in such cases shall be final and shall not be open to arbitration.

5. **SCHEDULE OF QUANTITIES:**

The Schedule of quantities forms part of the contract, but the Employer reserves the right to modify the same or any part thereof as per variation clause stated herein below. The contractor shall not be allowed any compensation or damages for the work which is so omitted or cancelled or added or substituted by the Architect & Employer.

Please refer clause 4 of General Conditions of Contract.

6.a. **QUANTITIES LIABLE TO VARY:**

This clause applies for unlimited variations (+ or -) for items of foundations and those executed below plinth level. For all other items, only in case where + variations of any item exceeds 100% of Quantities of respective items given in the schedule of quantities of the contract, such additional quantities of those items shall be treated as deviation in Quantities and valued as per clause 45 of special conditions of contract, considering of that rates for these items cannot be derived from the contracted items of work.

The quantities indicated in the bill of quantities are only approximate, and hence may vary on either side (+ or -) for accomplishing the works enunciated under the scope of works, in accordance with designs, drawings and specifications and or instructions of the Architect & Employer. Variations may also occur, consequent upon addition or deletion or substitution of particular items, change of designs or specifications during the course of execution. The contractor, in either case, is bound to carryout the modified quantities upto +100% (plus one hundred percent) variation, without any enhancement in rates and at the same rates as per accepted original tendered rates.

Please refer clause 4, 5 & 6 of General conditions of contract.

b. **FILLING OF TENDERS:**

The rates and amounts for each tendered item should filled in separate columns provided for in the Schedule of quantities and all the amounts should be totaled up in order to show the aggregate value of the entire tender. All rates shall be filled in both words and figures. These figures and words shall be preceded by 'Rs' and 'Ps' as the case may be, and while filling in words, must end with "Only". Example:

- i)
- ii)

The rates quoted in figures should be clearly show the rates in full. While filling rates in words, each line should end in '- ', and if continued further, last line for the rate of each item shall end in "Only". All corrections, by the contractor in the tender schedule shall be duly attested by the initials of the tenderer. Corrections which are not attested or overwritings in rates may entail the rejection of the tender.

In case the rates written in figures/words/amount differ, the following procedure shall be followed:

- a) When there is a difference between the rates in figures and in words, the rates which correspond to the amounts worked out by the contractor will be taken as correct.
- b) When the amount of an item is not worked out by the contractor or it does not correspond with the rate written either in figures or in words, then the rate quoted by the contractors in words shall be taken as correct.
- c) When the rates quoted by the contractor in figures and in word tallies but the amount is not worked out correctly, the rate quoted by the contractor shall be taken as correct and not the amount.

7. **ACCESS OF INSPECTION:**

The contractor is to provide at all times, during the progress of the works and the maintenance period, means of access with ladders, gangways etc., and the necessary attendants to move and adopt the same as directed for the inspection or measurement of the work by the Architect and Employer or any other agency employed by the client.

Refer clause 7 of General Conditions of Contract.

8. **DIMENSIONS:**

In all cases figured dimensions are to be accepted in preference to scaled sizes. Large scale details shall take precedence over small scale details/drawings. In case of any discrepancy, the contractor shall ask for a clarification, before proceeding with the work. Accordingly, if any work is executed without prior clarification, it is liable to be rejected and shall not be paid for,

9. **PROGRAMME OF WORKS:**

The contractor on starting the work shall furnish to the Employer and Architect a PERT/CPM programme, for carrying out the work stage by stage in the stipulated time, for the approval of Architects and Employer, and follow strictly the approved time schedule by incorporating changes, if any, so authorised by the Architect and Employer, to ensure the completion of construction work ins stipulated time. A graph or chart on individual item/group of items/trades of work shall be maintained, showing the progress both in terms of quantities and value, week by week. The contractor shall submit to the Employer and Architect a weekly progress report stating the number of skilled and unskilled labourers employed on the work, working hours done, quantity of cement, steel and other major items of materials (quantity and value wise) used and corresponding place, type and quantity of work done during the period.

The contractor must inform the Architects, 10 days in advance of requirement of respective drawings and details by him, from time to time. The contractor shall strictly adhere to the approved programme and arrange for the materials and labour etc., accordingly.

Despite repeated instructions, if the contractor fails to show satisfactory progress of the work, the Employer/Architect may take suitable action as deemed fit, including levying of liquidated damages not exceeding ½% of contract price for delay of every week or part thereof, subject to a limit of total liquidated damages levied under this clause to 5% of contract price without prejudice to any terms and conditions of the contract.

Please refer clause 31 & 33 of General Conditions of contract.

10. **OFFICES, STORES, SHEDS ETC., ON THE SITE:**

- a. The contractor shall erect and maintain entirely at his own expense properly lighted, ventilated waterproof and lockable aircooled offices for the Architect's/ Employers representatives and for his own staff respectively on such parts as the Architects shall indicate. Separate offices for Architects and Employers representatives shall be constructed having minimum area of 20 Sqm, as per the sketch plan and specifications, which will be given by the Architects before starting the work. Contractor shall also provide and maintain, at his own cost, adequate water supply, closets and sanitary accommodation for exclusive use of Architect & Employer's representatives at site. In case, these offices have been provided with AC/GI sheet roofing, the same shall have false ceiling as directed. These offices shall be provided by the contractor with adequate numbers of windows, tables, chairs, steel cupboards, fans, lights and attendants etc., as directed by the architects. Necessary permission from various authorities will be obtained by the contractor and necessary fees shall be paid by the contractor prior to constructing such offices, and as well for stores, huts for labourers or any other temporary structures required for the due execution of work. Any penalty levied by local authorities, for not following their bye-laws/regulations etc., in the matter, will be borne by the contractor. The contractor shall pay for the Electricity and Water charges consumed. All these offices shall be demolished and the materials shall be taken away from site and ground left in good and proper order on completion of work, as required and directed.
- b. The contractor shall provide for all necessary storage on the site, in a specified area for all materials, in such a manner that all such materials, tools etc., shall be duly protected from damages by weather or any other cause. Stores for storage of cement shall have all weather proof floors, walls and roof and have proper locking arrangements and must be secure. All these must be maintained till the work is completed and so certified by the Architect. Necessary and adequate watch and ward for all such accommodations and stores shall be provided for by the contractor at his cost and same included in the rates/amounts quoted by him. All such stores shall be cleared away and the ground left in good and proper order on completion of this contract unless otherwise expressly mentioned herein.

- c. All materials which are stored on the site such as cement, brick, metal sand etc., shall be stacked in such a manner as to facilitate rapid and easy checking of quantities of such materials and prevent deterioration in quality due to water etc.
- d. In addition to the offices provided to Architect's Employer's representative, contractor shall provide accommodation for Project Management Consultants as specified.

11. **WATER AND ELECTRICITY:**

Contractor shall make his own and adequate arrangements for water required for drinking and construction purposes and also for required electric supply at site for satisfactory execution and completion of the work, at his own cost. If water and Electricity is used from Air india Limited source a recovery at **one percent** will be made from contracors bills against items consuming water and Electricity . The contractor shall get the water used for construction purpose tested periodically as per relevant BIS codes at his cost, and shall get the same approved from Architect and clients before using such water for the work.

12. **PROCUREMENT OF MATERIALS:**

Contractor shall procure all the materials including cement and steel required for the work from the open market. Time is the essence of the contract. Acceptance of the completion date by the contractor shall mean that he has taken into consideration the availability of all materials of approved make and quality in sufficient quantities at respective markets/sources, to enable him to complete the entire work in the stipulated period.

Contractor will get samples of all materials approved by the Architect and employer, before placing order/purchase/procurement. They shall conform to relevant B.I.S. codes and or tender specifications as applicable.

For all materials, the contractor shall quote for the best quality of the materials of best make/source or supply and they should be got approved by the architect and employer, before procurement.

In case sufficient quantities of approved quality materials from approved sources are not available in time, contractor may have to procure the same from neighbouring areas even with longer leads, as required and directed, at no extra cost. In case approved good quality sand is not available consistently throughout the duration of the contract period, best quality of sand locally available may have to be screened and washed, as directed by the Architect and Employer depending upon the use of sand in different items of work, at no extra cost. The materials will be, however as per relevant I.S.S. as and wherever applicable.

Please refer clause 8 & 9 of General Conditions of contract.

13. **SANITARY ACCOMMODATION IN SITE:**

The contractor shall provide and maintain at his own cost and expense adequate closet and sanitary accommodation for the use of his workmen and others in accordance with the rules and regulations of the relevant local authorities.

14. **FACILITIES TO OTHER CONTRACTORS:**

The contractor shall give full facilities and co-operation to all other contractors working at site doing plumbing, Electrical, civil works etc., as directed by the Architect & Employer and shall arrange his programme of work, so as not to hinder the progress of other works. The decision of the Architect & Employer, on any point of disputes between the various contractors, shall be final and binding on all parties concerned.

15. **TESTING:**

The contractor shall, as and when directed by the Architect & Employer, arrange to test materials and/or portions of the work at site in any approved laboratory at his own cost, in order to provide their soundness and efficiency. The contractor shall transport all the materials from site to the approved laboratory at his own cost. The contractor shall carryout all the mandatory tests as per list attached at the frequencies stated therein. Even after such tests, any materials brought to site or incorporated in the works are found to be defective or unsound or not as per approved samples, the contractor shall remove the same and re-erect at his own cost and without any additional time/period for the same, with reference to the date fixed for completing the work. In case these tests are not carried out at the frequencies stated, then proportionate costs of materials not so tested, including cost of testing and quantities of items of work executed with such materials, if otherwise accepted for retention in the work, will be deducted from the dues to the contractor. The deductions will be worked out by the Architect/client and shall be final and binding on him.

Tolerance on various material and items of work shall be allowed laid down in the documents below and the order of precedence shall be:

- a) Relevant Indian Standards Specifications.
- b) CPWD norms.
- c) Manufacturer's Specifications.

In absence of above Architect's decision basing on the general practice being following shall be final.

16. **TESTING OF CONCRETE:**

The contractor shall make his own arrangements for testing of the concrete blocks at site or in any approved laboratory from time to time, as required by the Architects/ Employer and all the costs of testing and conveyance shall be borne by the



Contractor. At least, six blocks of 150 x 150 x 150mm per 20 cum of RCC work or part thereof, for each day's work (subject to the condition that a minimum quantity

of 0.5 cum of particular grade/type of concrete is laid on that day) must be taken in steel moulds as directed and tested. The Architect & Employer reserves the right to test the blocks at the cost of the contractor, in the event of the contractor failing to do so. It shall be contractor's sole responsibility to ensure that the blocks are cast, got tested from specifically approved laboratory/test house etc., in time and results reach the Architect, well before measurements for the corresponding work are to be recorded. For any failure in this regard, shall result in rejection of corresponding work (for which the blocks were not cast and or tested in time) and such work shall be dismantled fully alongwith linked up works and redone to required specifications/quality etc., EXCLUSIVELY at contractor's cost. Without any addition time beyond the stipulated/extended time for completion, as the case may be. Application of clauses 15 above in such cases shall EXCLUSIVELY rest within the discretion of the Architect.

17. **SITE MEETINGS:**

A senior representative of the contractor shall attend weekly meetings at works site; and in additions, meetings as and when arranged by Architect & Employer to discuss the progress of the work and sort out problems, if any, and ensure that the work is completed in the stipulated time.

18. **CUSTODY AND SECURITY OF MATERIALS:**

The contractor shall be responsible for the custody and security of all materials and equipment at site and he will provide full time watchman/watchmen to look after his materials, stores, equipments etc., including cement and steel at site and ensure that at no time unauthorised persons gains any access at works site.

19. **CEMENT:**

Cement shall be procured by the Contractor from the manufacturers only; however in case of urgency smaller quantity of cement say less than one lorry can be purchased from authorised dealers after getting the make and quality approved by the Employer and Architect. The brands shall be L&T / RAASI / KCP / ACC / Coramandal. The contractor should purchase the cement in adequate quantity, quite in advance, in order to have sufficient stocks (not less than the requirement of next fortnight) at site all the time. He will construct cement storage shed of adequate capacity with water tight walls, floor, roof and secure locking arrangements and locking as required and directed. Empty bags will be contractor's property. Contractor's Site Engineer shall maintain cement account at site, showing cement received with details of invoices, etc., quantity used daily (with brief details of items/location of works on which used), and progressive consumption and balance at site. This register will be checked periodically by Architect & Employer representative. Actual cement consumption will be periodically checked with the theoretical cement consumption. 75% secured advance will be paid to the contractor in his corresponding interim bills, for the cement laying unused at site and in good condition. Damaged cement will not be allowed to be used in work. Transportation of cement, within the site, will be carried out by the contractor, as and when

required, at not extra cost. The secured advance paid in any bill will be fully recovered in the next bill.

20. **STEEL:**

Steel shall be procured by the contractor from SAIL/TISCO/VSP or any other manufacturer as approved by Architect. The contractor shall produce necessary cash vouchers in support of the purchases and also test certificates, for conforming the quality. All wastages, rolling margins, site to site transportation shall be borne by the contractor. Contractor shall maintain at site, steel account showing – steel received at site (consignment wise and section wise) and steel used (section wise) for work corresponding to each of the bills, etc., which shall be subject to checking by client/Architect 75% of the value of the steel physically available at site in good

condition and quantities limited to actual requirements of next 30 days (reckoned from date of corresponding bill) plus 1% for wastage and variation will be paid. This exercise is to be section-wise. Theoretical quantity of consumption of steel shall be actual quantities measured plus 10% towards wastages and variations (rolling margins) and on this basis, balance quantities at site may be provisionally arrived at. All scrap steel at site and unused steel at site to the extent not required on the work shall be contractor's property and contractor will be allowed to take it away after measurements/weight, and after getting necessary permission in writing from the Architect & Employer. In case of any discrepancy between the actual quantity of steel lying at site and the balance quantity as per record, the decision of the Architect/client shall be final and binding. The secured advance paid in any bill will be fully recovered in the next bill.

21. **NO PRICE VARIATION ADJUSTMENT (PVA) IS PAYABLE DURING THE EXECUTION OF PROJECT**

22. **TREASURE TROVE:**

Should any treasure, fossils, minerals, or works or art of antiquation interest be found during excavation or while carrying out the works, the same shall be the property of the Employer. The Contractor shall give immediate notice to the Architect & Employer about finding of any such treasure and hand over the same on demand to the Employer.

23. **NOTICES:**

The contractor shall give all notices and pay all necessary and relevant fees and shall comply with all Acts and Regulations, for the successful completion of the contract work.

Please refer clause 8 of General Conditions of Contract.

24. **STATUTORY REGULATIONS:**

The whole of the work including sanitation and electrical is to be complied with, as per the requirements and bylaws of the relevant statutory authorities, including Contract Labour (Regulation and Abolition) Act, 1970, ESI, PF etc.

25. **MEASUREMENT TO BE RECORDED BEFORE WORK IS COVERED UP:**

The contractor shall take joint measurements with the Employer's representative (Project Management Consultant or any Engineer identified by the Air India Ltd.) and Architect's representative before covering up or otherwise placing beyond the reach of measurement any item of work. Should the contractor neglect to do so, the same shall be uncovered at the contractor's expense or in default thereof, no payment or allowance shall be made for such work or the materials with which the same was executed.

Refer clause 21 of General Conditions of Contract.

26. **WORKING AT NIGHT OR ON HOLIDAYS:**

The contractor can carry out major work at night, only with prior permission of the Site Engineer of Employer/Architect and with proper supervision. However, all concrete work will be carried out only during the day light.

**WORKS AT NIGHT:**

If the contractor is required to do preliminary works at night, in order to complete the work within the Time Schedule, the contractor shall provide and maintain at his own cost necessary and sufficient barricades/lights etc., to enable the work to proceed satisfactorily without danger. Approaches to the site also shall be sufficiently lighted by the contractor.

27. **WORKING ON HOLIDAYS:**

No work shall be done on Sunday or other Company holidays that may be notified by the Architect & Employer, without the specific sanction in writing of the Architect & employer or his representatives.

28. **ACTION WHERE THERE IS NO SPECIFICATION:**

In case of any item/class of work, for which there is no specification mentioned (either in part or full), the same will be carried out in accordance with the relevant CPWD specifications (only for the specifications missing in the contract) and if not available even there (either in part or full) in, relevant standards of BIS shall be followed (only for the portions of specifications missing in the contract specifications and CPWD specifications). Indian standard specifications, subject to the approval of the Architect & Employer.

29. **REPORTING OF ACCIDENT TO:**

The contractor shall be responsible for the safety of all persons employed by him on the works and shall report serious accidents to any of them, whenever and wherever occurring on the works, to Employer who shall make every arrangement to render all possible assistance. This shall be without prejudice to the responsibility of the Contractor, under the Insurance clause of the General Conditions. Contractor shall take all the precautions as detailed in the safety code attached separately.

30. **CLEARING THE SITE ON COMPLETION / DETERMINATION OF WORKS:**

The contractor shall clear the site of works as per the instructions of the Architect. The site of works shall be cleared of all men, materials, sheds, huts etc., belonging to the contractor. The site shall be delivered in a clean and neat condition, as required by Architect, within a period one week after the job is completed. In case of failure by the contractor, the Employer, under advice to the Architect, have the right to get the site cleared to his satisfaction at the risk and cost of the contractor.

31. **POSSESSION OF BUILDINGS/WORK COMPLETED:**

The contractor shall hand over to the Employer possession of the completed works in stages, as and when required, and as directed by the Architect & Employer. The Employer will take over the possession of completed works in stages as directed by the Architect, and defects liability period will commence only from the date of final handing over of all the work accordingly. Please refer Appendix to General Conditions of contract.

32. **TYPOGRAPHIC, CLERICAL AND OTHER ERRORS:**

The Architects/Employer's clarification regarding partially omitted particulars or typographical, clerical and other errors shall be final and binding on the contractors.

33. **INFORMATION TO BE SUPPLIED BY THE CONTRACTOR:**

The contractor shall furnish to the architect & Employer the following from time to time:

- a. Detailed industrial statistics regarding the labour employed by him, etc., every month (within 5<sup>th</sup> of succeeding month),
- b. The Power of Attorney, name and signature of his authorised representative, who will be in charge for the execution of work.
- c. The list of technically qualified persons (to be approved by the Architect) employed by him for the execution of the work within 15 days from date of start of work,
- d. The total quantity and quality of materials used for the works, every month within 5<sup>th</sup> of succeeding month.

- e. The list of plant and machinery employed for this work, every month. Copy of log books shall also be submitted every month (within 5<sup>th</sup> of succeeding month).

Last para of clause 33:

Failure to submit any of these details in time, shall be treated as a breach of the contract and likely to result in,

- i) Levying a fine of Rs.500 for each default for each month, and or
- ii) Withholding payments, otherwise due.
- iii) For the periods for which name of technically qualified persons are not given or for which such persons are not employed, recoveries shall be made at Rs.7,500/- per month for each month of default.

In all these matters the decision of the Architect shall be final and binding.

See clause 41 also.

34. **BENCH MARKS:**

The contractor shall construct and maintain proper benches at different places at site as required and directed by the Architect, so that levels can be checked accurately at all times during the progress of work. In case benches are disturbed for any reason whatsoever, necessary rectification shall be carried out by the contractor at his cost as directed by the Architect & Employer.

35. **FORCE MAJEURE :**

Neither party shall be held responsible by the other for breach of any condition of this Agreement, attributable to any “Act of God”, Act of State, Strike, lock-out or control or any other reason, beyond the control of the parties and any breach of clauses arising from such Force Majeure conditions as aforesaid shall not be regarded as breach of the provisions of this Agreement.

36. **ARCHITECT’S DRAWINGS AND INSTRUCTIONS:**

A set of major drawings, along with the contract documents shall be provided to the contractor. If any clarification or further drawings are required by the Contractor during or before the start of construction work, the contractor shall inform the Architects and the Air India Ltd. sufficiently in advance in writing to provide the same. Working details will be given to the Contractor from time to time, during the progress of work, as and when required. In case, any other drawing/detail is required by the contractor, he will give a minimum of fifteen days notice to the Architect.

Refer clause 2 & 3 of General conditions of contract.

37. **COMPLETION OF WORK AND LIQUIDATED DAMAGES:**

The work shall be completed in **3 months**, and reckoned as under:

- (a) The day two weeks from the date of issue of work order.
- or
- (b) The day on which the contractor receives the possession of the site – whichever is later.
- or
- (c) The contractor is asked in writing to take over the possession of the site. Time is the essence of the Contract. The Contractor shall strictly adhere to the programme/chart agreed to. In case the contractor fails to complete the work as mentioned above, the liquidated damages may be imposed at the rate of 0.5% per each week (or part thereof) of delay, subject to a maximum of 10% of contract amount.

Refer clause 31 & 33 of General Conditions of contract.

38. **BILLS OF PAYMENTS:**

The minimum value of work for interim payments will be Rs.10.00 lakhs, as stated in Appendix on Page 10. The contractor shall submit interim bills, once a month on the basis of joint measurements recorded at site by the contractor's Employer's and the Architects representatives. The bill will be certified by the Architect within 15 working days from the date of submission of the bill by the contractor, and the Employer will make payment as stated in the Appendix to General Conditions of Contract. All such interim payments shall not be considered as an admission of the due performance of the contract or any part thereof in any respect and shall not preclude the requiring of bad unsound and imperfect or unskilled work to be removed and taken away and reconstructed or re-erected at contractor's cost, all as per Employer and Architect's instruction and directions.

39. **WORKMANSHIP:**

Quality of materials and workmanship shall conform strictly to specifications given/stipulated in the tender/contract, and contractor will ensure that the best quality of work will be done to the satisfaction of the Architect and Employer, with strict control on the materials, workmanship and supervision.

Refer clause 10 of General Conditions of Contract.

40. **SCHEDULE OF QUANTITIES:**

Quantities mentioned in the Schedule of Quantities, included in the contract, are approximate and are subjected to variations as per actual site conditions & requirements and as directed by the Architect & Employer. The work shall be executed and completed accordingly.

Refer clause 4, 5 and 6 of General Conditions of Contract.

41. **SITE SUPERVISION:**

The contractor shall appoint at his own cost competent and adequate number of qualified Engineers at site, for (1a) joint measurements and preparations of bills. (2b) for testing materials at site and outside laboratory. (c) for concreting and reinforcement work. (d) for other general supervision. Their appointment shall be approved by the Architect & Employer. The site engineers shall not be removed from the site without the written consent of the Architect & Employer.

See clause 33 above also.

42. **ENGAGEMENT OF APPRENTICES:**

The Contractor shall during the currency of the contract, when called upon by the clients, engage and also ensure engagement by sub-contractors and others employed by the contractor in connection with the works such number of apprentices in the categories mentioned in the act and for such period as may be required by the clients. The contractor shall train them as required under the Apprentice Act 1961 and the Rules made thereunder and shall be responsible for all obligations of the clients under the said Act, including the liability to make payment of apprentices, as required under the said Act.

43. **RATES:**

Contractor shall quote all the rates both in figures and in words and any alterations shall have to be initialed by the contractor. Rates quoted by the contractor for the same item in different schedules shall be same, and incase different rates are quoted, the lowest will be taken as correct and the schedule corrected accordingly. In case of discrepancy between rates given in words and figures or in the amount worked out, the following procedure will be followed:

- (a) When there is difference between the rates in figures and in words, the rates which correspond to the amounts worked out will be taken as correct.
- (b) When the amount of an item is not worked out by the contractor or does not correspond with the rate written either in figures or in words, then the rate quoted in words will be taken as correct.
- (c) When the rate quoted by the contractor in figures and words tallies but the amount is not worked out correctly, the rate quoted will be taken as correct and not the amount.

Rates quoted by the contractor shall hold good for all the work carried out upto any height and depth, as shown in detailed drawings and laid down in bill of quantities and or as required and directed by the Architect.

Rates quoted by the contractor shall also hold good for any small works at any place at site.

Minor repairs and works to other existing buildings and services shall also be carried out by the contractor at rates quoted in the tender.

The rates quoted for all items of work shall include all the items of work covered by the specifications for the corresponding item of work, unless otherwise specifically mentioned to the contrary (NOT IMPLIED) elsewhere.

- (d) When contractor does not quote the rate in either figures onwards but fills the column “amount” then the rate will be worked out and considered.

44. **INCOME TAX AND WORKS CONTRACT TAX:**

Income tax and works contract tax shall be deducted at source by the client from the contractor’s interim and final bill payments as required by law.

45. **EXTRA/SUBSTITUTED ITEM RATES:**

Such items shall be executed as per directions/instructions of the Architects of the employer.

The work on extra/substituted items shall be started only after the receipt of written order from the client/Architect. Rates for additional/extra or substituted (altered) items of work, which are not covered in the contract, cannot be derived from the contract item rates either in full or partly, shall be calculated on the basis of actual costs plus 15% for overhead and profit etc., only to the extent not derivable from the contract item rates.

See clause 22 of General Conditions of Contract.

46. **SERVICES DRAWINGS/SHOP DRAWINGS/CATALOGUE:**

After getting approval from the Architect & Employer, the contractor shall submit to the concerned local authorities necessary services drawings showing layouts etc., for getting approval of the schemes. On completion, the contractor shall arrange to get Drainage Completion Certificate and other Certificate necessary for obtaining Building Completion certificate. The contractor shall furnish completion drawings of all services in triplicate, showing the work as actual executed, along with levels. Contractor shall submit for approval 4 copies of shop drawings/ catalogue/ equipment characteristics/ manufacturer’s specifications, drawings etc., as and when required and directed by the Architect & Employer. Costs of all these are deemed to have been included in the respective item rates quoted by the contractor and nothing extra shall be paid on account of any of these requirement/acts.

47. **PAYMENT:**

No payment whatsoever shall be made by the Employer, if the Contractor abandons the work, due to any site difficulties etc.,

See clause 36 & 37 of General conditions of contract.



48. **PERMISSION:**

The contractor shall also obtain necessary permission for using explosive (if required and specifically permitted by the Architect and Employer in writing), as per rules and regulations of relevant authorities, and all other approvals from the relevant authorities shall be obtained by the contractor at no extra cost.

49. **MAINTAINING REGISTERS AT SITE:**

The contractor shall maintain registers for consumption of various specials, testing of materials etc., in the proforma which shall be given by the Architect & Employer from time to time

50. **AGREEMENT:**

The successful contractor shall be required to enter into an agreement in accordance with the Draft Agreement and Schedule of Conditions etc., within 15 days from the date the contractor is advised by the Architect & Employer that his tender has been accepted. The contractor shall pay for all stamps and legal expenses incidental thereto. However, the written acceptance of the tender by the Employer, will constitute as a binding contract between the Employer and contractor, whose tender has been accepted, whether such formal agreement is or is not subsequently executed.

51. **INSURANCE:**

The contractor shall provide insurance in respect of damage to persons and property and firm insurance as per clause 28 and 29 of General conditions of contract. In addition he will also insure against riots and civil commotion. The insurance shall also cover third party and all the persons working at site and visitors including contractors, worker's, Architect's and clients people, other contractor's workers etc. The contractor shall indemnify the Employer against any claim or compensation or mishaps of whatsoever nature at site during the progress of work.

The contractor shall prove to the Architect/Client from time to time that he has taken out all the insurance policies as required and directed and has paid the necessary premium for keeping the policies valid as per clause 28 & 29 of the General Conditions of Contract.

In case of failure by the Contractor or sub-contractor to effect and keep in force the insurance policies, then the client, without being bound to, may pay such premiums as may be necessary and deduct the same from any money due or which may become due to the contractor or recover the same as a debt due from the contractor.

52. **INDEBTEDNESS AND LIENS:**

The contractor agrees to furnish the Employer from time to time, during the progress of the work as requested, verified statement showing the contractor's total outstanding indebtedness in connection with the work covered by the contract. Before final payment is made, the Employer may require the contractor to furnish the Employer with satisfactory proof that there are no outstanding debts or liens in connection with the contract. If during the progress of the work, the contractor shall allow any indebtedness to accrue to sub-contractor or other and shall fail to pay or discharge same within five (5) days after demand, then the Employer may withhold any money due to the contractor until such indebtedness is paid, or apply the same towards the discharge thereof.

53. **WORK PERFORMED AT CONTRACTOR'S RISK:**

The contractor shall take all precautions necessary and shall be responsible for the safety of the work and shall maintain all lights, guards, signs, barricades, temporary passages or other protection necessary for the purpose. All work shall be done at the contractor's risk and if any loss or damage shall result from fire or from any other cause, the contractor shall promptly repair or replace such loss or damage free from all expenses to the Employer. The Contractor shall be responsible for any loss or damage to materials, tools or other articles used or held for use in connection with the work. The work shall be carried on to Employer or of others and without interference with the operation of existing machinery or equipment, if any.

54. **PHOTOGRAPHS:**

The contractor at his own cost shall take photographs of site and individual buildings during the progress of the work as directed by the Architect/Client and submit two copies of each photograph with minimum size 20 cm x 15 cm to the client/Architect.

56. **SPECIAL CONDITIONS OF CONTRACT:**

In the event of any discrepancy with clauses mentioned anywhere else in the tender with the clauses mentioned within special conditions of contract, the clauses mentioned within the special conditions of contract shall supersede there mentioned elsewhere.

57. **BIS CODES**

It is compulsory for the contractor to keep all the B.I.S. codes mentioned in this tender document at his cost at the site to ensure the proper supervision/quality of work and materials.

## TECHNICAL SPECIFICATIONS FOR SCROLLCHILLERS

### 1.0 Quality Assurance Program

- a. Chillers shall be rated in accordance with Parameters indicated. However, rating of the chillers shall be in accordance with design by the contractor. Pressure vessels shall be designed, constructed, tested, stamped and complete with devices in accordance with ANSI/ASHRAE 15-1989 Safety Code and ASME Code.
- b. The chiller shall be designed/manufactured and tested in accordance with the applicable portions of the latest revisions of the following Standards and Codes.

ARI 550 – 98 - Air Conditioning and refrigeration institute standard for specifications, testing & rating.

ARI 575 - Air Conditioning and Refrigeration Institute. Standard Method of Measuring Machinery Sound Within Equipment Rooms (Base of all data presented or field testing of equipment with relation to sound requirements).

ASME CODE - American Society of Mechanical Engineers Code for Unfired Pressure Vessels - Section VIII (Design, construction, testing and certification of pressure vessels).

ANSI-B9.1 - American National Standards Institute. Safety Code for Mechanical Refrigeration (overall general safety requirements, relief device sizing, etc.)

ANSI-B31.5 - American National Standards Institute. Code for Refrigerant Piping.

ISO R281 - Rolling Bearings – Dynamic Load Ratings and Rating for Life.

The chiller package shall be factory built and tested before dispatch. It shall consists of multiple scroll compressors – motor units. Air cooled condenser, chiller, Copper refrigerant piping and fittings, refrigerant feeding devices, valves, strainer, liquid moisture indicator, suction line insulation , first charge of oil and gas starter panel etc. all the components shall be mounted on a rigid welded steel base frame made of galvanized steel, shall be protected with primary coating & finished with acrylic paint. The base frame shall incorporate suitable provisions for the rigging and handling of the machine during erection. The compressors shall be mounted on spring isolators. Chillers shall be suitable for outdoor installation.

The machine mounted control panel and starter panel shall be suitable for Outdoor application. The panel shall contain part winding type motor starter and shall be suitable for single source power supply. It shall incorporate main disconnect switches and fuses for individual motors, contractors, over load relays, single phase preventers, under /over voltage trip, on / off push buttons, auto manual Switches to facilitate automatic operation through DDC System or for manual operation to facility for remote starting & stopping of chiller packages, auxiliary contractors, and etc. if any required. The disconnect switches provided shall be suitable for terminating Aluminium conductor PVC cables.

The control panel shall incorporate an easy-to-use operator interface panel and Shall display all operating and safety codes. The display shall include but shall not be limited to the following operating parameters.

Entering and leaving chilled water temperatures.

Evaporating and condenser refrigerant temperatures and pressures for each circuit.

Compressor suction pressure.

Percentage line voltage (per cent FL amps) of each compressor motor.

Line voltage.

Compressor start and running hours

Chilled water set point

Current limit set point

Part failure diagnostics

Water temperature sensors

Refrigerant

Temperature sensor,

Compressor contactors, etc.

The control system shall guarantee adequate motor protection by monitoring the motor current on each phase of the 3 phases. Protection shall be ensured against:

Overload at start- up and in operation.

Phase loss/ Power loss.

Phase unbalance or reversal

Over / under voltage.

Welded contactors.

## **2.0 COMPRESSOR – MOTOR UNITS:**

The compressor – motor shall be accessible scroll compressor suitable for use with R 134a/ 407C/410 A refrigerant.

The scroll compressor shall be hermetic/semi hermetic type. The compressors shall be suitable for R 134a/ 407c/410a . The compressor speed shall not exceed 3000 rpm. The Compressor rotors shall have reduced tip clearances to improve energy efficiency and reduce the leakages between the high and low pressure sides during compression. A slide valve shall be provided for capacity control. The slide valve shall be positioned over both, male and female rotors. The slide valve shall be capable of controlling capacity from 100% to 20%. Bearings provided for the rotors

shall be designed for the life of the equipment. Adequate protection shall be provided to the motor to protect the motor against high / low voltages; single phasing, voltage imbalances and voltage spikes. Temperature and current sensors (in each phase) shall be provided to protect the motor and increase motor reliability. The compressor shall incorporate an integral oil separator to eliminate oil carryover with the refrigerant. Economizer shall be included to improve the efficiency and reduce power consumption.

### **3.0 CHILLERS:**

Chillers shall be flooded/DX type. The shell be of carbon steel and the tubes of copper. The shell shall be provided with removable end plates. An adequate number of drain points of ample size shall be provided to permit draining and cleaning of the shell side. Chillers shall incorporate segmental baffles in the shell to secure the desired fluid velocity, promote turbulence and hereby achieve efficient heat transfer. The refrigerant heads shall incorporate liquid inlet and suction gas outlet connections, pass divisions, equalizer and oil return connections. Chillers shall be suitable for use with thermostatic / electronic expansion valves as refrigerant feeding device. Provision shall be made for fixing manually rest type antifreeze thermostat. Cori-rubber make rubber bellows shall be provided both at inlets and outlets of all chillers to minimize transmission of vibration to connected piping system. The chiller shall be insulated with 75mm TF polystyrene / polybond material of suitable thickness.

### **4.0 AIR-COOLED CONDENSER UNIT:**

- a) The Air-cooled condenser section shall be a factory fabricated item comprising condenser coils, fan, fan motor, drive, casing, supporting stand (if required), receiver (if required) etc.
- b) The Air-cooled condenser section shall be suitable for outdoor installation. In other words, no weather protection of any kind by way of walls or roof is contemplated.
- c) The Air-cooled condensers section shall be installed on ground or on the terrace. The coils shall be in vertical or V formation. Air flow shall be directed vertically upwards, with fans and fan motors on top of the casing. The condensers shall be mounted in such a manner as to minimize transmission of vibration to the structure using vibration isolators if necessary, to secure satisfactory results.
- d) Noise control - it shall be the contractor's responsibility to ensure that unit operating noise level of equipments is reasonable. Fan curves and sound power data may be requested as part of submittal.
- e) **Casing:**
  - The Heavy Duty Gauge (HDG) casing and structure of the Air-cooled condenser shall be of robust construction. The panels shall be of heavy gauge, hot-dip galvanized steel and they shall be machine-pressed and folded. All joints shall be folded joints. Where and if ferrous materials are used whether for the supporting structure or for any other item or for components, such materials/components/sections shall be qualified to 500 Ltrs. Salt spray testing (or) hot-dip galvanized.

- In the event of importing the chilling units, the tenderer shall bring out to their tender clearly (and in detail) in any case, the details of construction of the equipment offered by them, highlighting in particular, the thickness and kind of materials used, the manufacturing technique employed, finish provided for weather protection etc.

f) **Fan Motor Sets:**

The Air-cooled condensers shall incorporate necessary number of propeller fans of adequate size to obtain the required airflow rate under operating conditions. The high efficient, direct drive, 6 pole 3 phase class F, current over load protected fan motor shall be of TEAO type with double sealed permanently lubricated ball bearings and shall be suitable for mounting with its shaft vertical and for delivery of air in the vertically upward direction. The motor shall incorporate bearings specifically suited for this purpose. The motor shall be suitable for outdoor installation and also for location in the stream of hot air leaving the condenser coil.

The condenser fans shall be divided into two banks per chiller. In case of part load conditions, one Bank would be switched off.

- g) The fan motor sets shall be complete with protective guards.

h) **Condenser Coil:**

The Air-cooled condenser coils shall be constructed of black epoxy coated Aluminium fins to provide corrosion resistance (factory mounted). The condenser coil shall be made out of copper tubes and Aluminium fins. The number of the fins shall not be less than 13 per cm./ (8fpi). The coils shall be sized so as to optimize performance with respect to air flow rate, pressure drop, condensing temperature, power consumption etc. Thus the valves furnished elsewhere for the parameters of the coil shall be regarded as suggested values rather than specified values.

- i) The condenser coils shall include sub-cooling circuits for a minimum of 15 Deg F sub-cooling.

- j) The condenser coils shall be designed to limit the system charge to the minimum, nevertheless, if they do not themselves have adequate capacity to hold the entire charge in the system, receivers shall be provided. If receivers thus become inevitable, the following specifications shall apply.

- The capacity of the receivers shall be adequate to hold the entire charge of the system when filled upto only 80% of its capacity.
- The receiver shall be constructed using MS plates of adequate thickness for the shell; dished ends shall be provided for the ends.
- The receiver shall be complete with the liquid inlet, liquid outlet (with dip tube), safety relief valve, purge valve and other accessories.

- During normal operation, the receiver will be isolated from the refrigerant circuit so that sub-cooling can be obtained. Isolating as well as bypass valves shall be provided for this purpose.
  - The receiver shall be tested for the same pressures as the condensers.
  - The receiver shall be installed either below the condenser (in shade) or in the plant room.
- k) The coils shall be factory tested for a minimum air pressure of 30-kg/sq. cm (420 Psig). In the field, they shall be tested to a pressure of not less than 25 kg/Sqcm (350 Psig).
- l) The coils shall be so positioned with respect to the floor level so that, dust picked up by entering air is minimized.
- m) The coils shall also be provided with GI wire mesh for protection.
- n) **Refrigeration Piping:**

The contracted rate should also include the FRP coating for the refrigeration pipes, which is exposed to atmosphere near the Air-cooled condensers.

- o) Enclosure Panel shall be provided for the entire unit as detailed below:

Welded wire mesh guards mounted on the exterior of the full unit to prevent unauthorized access, yet to provide free air flow (factory or field mounted)

## 5.0 **Micro Computer Control Centre:**

Each unit shall be furnished with microcomputer control centre in a locked enclosure, factory mounted, wired and tested. The control center shall include a 40-character alphanumeric display showing all system parameters in English language with numeric data in English (FPS) units.

Digital programming of essential set points through a colour coded, tactile-feel keypad shall include: entering and leaving chilled water temperature and condensing water temperature; percent loading; pull down demand limiting; seven-day time clock for starting and stopping chiller (complete with local holiday schedule); and remote reset temperature range.

All safety and cycling shutdowns shall be annunciated through the alphanumeric display and consist of day, time, cause of shutdown, and type of restart required. Safety shutdowns shall include: high oil pressure; high compressor discharge temperature; low evaporator pressure; motor controller fault; and sensor malfunctions. Cycling shutdowns shall include: low water temperature; low oil temperature; chiller/condenser water flow interruption; power fault; internal time clock; and entire cycle.

System operating information shall include: return/leaving chilled water temperatures; return/leaving condenser water temperatures; evaporator /condenser

refrigerant pressure; differential oil pressure; percent motor current; evaporator/condenser saturation temperatures; operating hours (Hours Run) and number of compressor starts.

Security access shall be provided to prevent unauthorized change of set points to allow local or remote control of the chiller, and to allow manual operation of the pre-rotation vanes and oil pump.

The chiller shall be provided with an RS-232 port to output all system operating data, shutdown/cycling messages and a record of the last four cycling or safety shutdowns to a remote printer or Building Automation System (BAS). The control center shall be programmable to provide data logs to the BAS/printer at a set time interval.

Control center shall be able to interface with the Building Automation System (BAS) to provide remote chiller start/stop reset of chilled water temperature reset of current limit; and status messages indicating chiller is ready to start, chiller is operating, chiller is shut down on a safety requiring reset, and chiller is shut down on a recycling safety.

6.0 Starter:

The starter shall be soft starter / star delta .

7.0 Performance Rating:

The unit shall be selected for the lowest operating noise level Capacity ratings and power consumption and verified at the time of testing and commissioning of the installation. Capacity shall be ascertained by measurements of chilled water flow rate and temperature of chilled water in and out of the chilling unit.

Power consumption shall be computed from measurements of incoming voltage & input current to the chilling machine.

8.0 Witness Test:

Prior to shipment, chilling machines shall be subjected to inspection and witness of performance tests to verify various performance parameters. Performance test shall be carried out in accordance with procedure laid down by ARI / EUROVENT and in accordance with specified parameter, at 100%, 75% & 50% loading. Client/Consultant Reserve the Right Testing the chiller at Manufactures Place with out any Extra Cost.



## TECHNICAL SPECIFICATIONS FOR PUMPS

### **1.0 SCOPE**

The scope of this section comprises the supply, erection, testing and commissioning of water pumps conforming to these specifications and in accordance with requirements of schedule of quantities.

### **2.0 END SUCTION TOP DISCHARGE PUMPS:**

#### **2.1 Pump:**

Pump shall be end-suction back pull out design directly coupled or connected to motor. The pump casing shall be of cast iron. Impeller shall be of bronze hydraulically balanced and keyed to shaft, stuffing boxes with mechanical seal shall be integral with casing and water sealed. Shaft sleeve shall be of gun metal extending through stuffing boxes.

#### **2.2 Casing**

Pump casing shall be close-grained cast iron of heavy section, Suction passages shall be of volute for prompting smooth entry to impeller and increased efficiency.

#### **2.3 Impeller**

Impeller shall be of bronze , double suction, enclosed types and hydraulically balanced so as not to cause any vibration during operation. Impeller shall be securely keyed to the shaft. Means shall be provided to prevent loosening during operation including rotation in reverse direction. Impeller fastening nuts (if provided) shall be of cap type and shall tighten in the direction of normal rotation.

#### **2.4 Shaft**

Shaft shall be made of steel protected by gunmetal sleeves. It shall be finished to close tolerance at the impeller and bearing diameters. The impellers, and shaft sleeves shall be firmly secured to the shaft by key/nuts. The shaft size shall be calculated on the maximum combined shear stress. This shear stress shall not exceed 30 per cent of the elastic limit in tension or 18 percent of ultimate tensile strength whichever is lower.

#### **2.5 Base Plates**

The common base plate for pump and motor shall be in one piece and it shall be made of cast iron or welded steel, construction. Suitable holes shall be provided for grouting and they shall be so located that the base can be grouted in place without disturbing the pump. All pumps fixing holes shall be properly aligned bolted and doweled to the base plates by contractor.

#### **2.6 Motors:**

Motor shall be of a size suitable for the pump. Motor shall be TEFC Sq Cage induction type suitable for 415V +/- 10% , 3 phase 50 cycles, AC power supply conforming to BIS 12615 of 2004 efficiency 1 values.

2.7 **Installation:**

The pump shall be mounted on a concrete foundation as shown on approved for construction shop drawings.

2.8 **Lubrication:**

Upon installation of the complete system and before testing, the pump shall be lubricated in strict accordance with the manufacturer's instructions.

2.9 **Pump Alignment:**

All pumps prior to testing shall be aligned with a dial indicator within 0.05 mm.

2.10 **Painting:**

All pumps, motors and bases shall be supplied with approved finish. Shop coat of paint that have become marred during shipment or erection shall be cleaned off with mineral spirits, wire brushed and sport primed over the affected areas, then coated with enamel paint to match the adjoining areas.

## **TECHNICAL SPECIFICATIONS FOR AIRHANDLING UNITS**

### **FLOOR MOUNTED AIR HANDLING UNIT**

1.0 **SCOPE**

The scope of this section comprises the supply, erection, testing and commissioning of air handling units in either single or two tier construction, conforming to these specifications and in accordance with Schedule of Quantities.

2.0 **TYPE**

The Air Handling units shall be of double skin construction of approved make comprising of Filter section with pre filters, chilled water coil section with chilled water coil, Fan Section with DIDW backward curved aerofoil impeller, drain pan under fan sections made with SS 304 material. The unit shall be of floor mounted design installed on spring/vibration isolators/mountings for eliminating vibration to the civil structures.

3.0 **CAPACITY**

The air moving capacities and maximum cooling capacity shall be as shown in Schedule of Quantities.

## **1.0 CASING**

The casing shall be of sandwich panels fixed on modular frame design. The frame shall be made of non corrosive extruded aluminum channels fitted with extruded Aluminum/PVC(Polyamide) corner pieces and insulated with 50mm PUF injected insulation. Panels shall be 50mm thick sandwich type with injected polyurethane foam insulation for rigid non-vibrating construction. The insulation shall not absorb moisture and should be rot resistant. The panels shall be flush mounted to the casing with no sharp edges/corners. They shall be rapid access type fitted from inside with Allen screws to have flush finish from outside. The sealing of frame to panel shall be by means of non-hygroscopic seal compressed between the panel and the aluminum frame channels to prevent cold tracking and air leakage between panel & frame. The outer wall and inner wall of the panels shall be of galvanised sheet chemically treated, pre-coated and plastisol top coat to resist nicks and scratches. The AHU shall be provided with electrical power/control junction box on external side of the unit conveniently mounted for cable connections.

## **2.0 FAN SECTION**

Fans shall be backward curved type Centrifugal fan as required for stable operation. The blades shall be made of heavy gauge steel treated and painted after manufacturing. The fans shall be statically & dynamically balanced at the factory Fan/motor assembly shall be mounted on a common framework entirely isolated from the unit by spring isolators to avoid transmission of vibration. The access door to the fan section shall be provided with control interlocks to ensure the fan trips in case the access door is opened. The AHU shall be provided with working light for inspection/working within the AHU.

## **3.0 FILTER SECTION**

The filter section shall be same as that of casing and panels of AHU but with an access door for withdrawal/fixing of filters. A channel made of galvanised sheet shall be provided for inserting/withdrawing the filters in the unit.

## **4.0 COOLING COILS**

Chilled water coils shall be internally hatched copper tubes with coated Aluminum fins firmly bonded to copper tubes assembled in stainless steel frame. The Heat transfer areas shall be such as to ensure rated capacity from each unit and such that the air velocity across each coil shall not exceed 150 meters per minute. The coil shall be pitched in the unit casing for proper drainage. Each coil shall be factory tested. Tubes shall be hydraulically expanded for maximum thermal contact with the fins. Fin spacing shall be 13 fins per inch. (4-5 Fins/CM.). The coil shall be minimum 8 Row cooling coil.

## **5.0 COIL SECTION**

The coil boxes housing cooling coils shall be of the same construction of the Fan casing. The casing shall be of sandwich panels fixed on modular frame design. The frame shall be made of non corrosive extruded aluminum channels fitted with extruded Aluminum/PVC(Polyamide) corner pieces and insulated with 50mm PUF injected insulation. Panels shall be 50mm thick sandwich type with injected

polyurethane foam insulation for rigid non-vibrating construction. The insulation shall not absorb moisture and should be rot resistant. The panels shall be flush mounted to the casing with no sharp edges/corner. They shall be rapid access type fitted from inside with Allen screws to have flush finish from outside. The sealing of frame to panel shall be by means of non-hygroscopic seal compressed between the panel and the aluminum frame channels to prevent cold tracking and air leakage between panel & frame. The outer wall and inner wall of the panels shall be of galvanised sheet chemically treated, pre-coated and plastisol top coat to resist nicks and scratches. The drain pan shall be made of SS304 with ample pitching for easy drain.

## **9.0 MOTOR AND DRIVE:**

Fan motors shall be suitable for 415V + 10%, 50 cycles, 3 phase, AC supply. It shall be squirrel cage, totally enclosed fan cooled motors conforming to BIS12615 of year 2004 efficiency 1 rating. Motors shall be specially designed for quiet operation and motor shall be six poles.

## **6.0 PERFORMANCE DATA**

Air handling units shall be selected for the lowest noise level of the equipment. Fan performance rating and power consumption data with operating points clearly indicated shall be submitted with the tender and verified at the time of testing and commissioning.

## **7.0 TESTING**

Cooling capacity of various Air handling unit models shall be computed from the measurements of air flow and dry and wet bulb temperatures of air entering and leaving the coil. Flow measurements meters shall be accurately calibrated. The temperature gauges shall be mercury-in glass thermometers. Computed results shall conform to the specified capacities and quoted ratings. Power consumption shall be computed from measurements of incoming voltage and input current.

## TECHNICAL SPECIFICATIONS FOR VENTILATION FANS

### 1.0 Centrifugal Fan

*Centrifugal fan shall be DIDW / SISW Class I construction arrangement 3 (i.e. bearings on both the sides) for DIDW fans complete with access door, squirrel-cage induction motor, V-belt drive, belt guard and vibration isolators.*

- a. Housing shall be constructed of 14 gage sheet steel welded construction. It shall be rigidly reinforced and supported by structural angles. Split casing shall be provided on larger sizes of fans, however neoprene / asbestos packing should be provided throughout split joints to make it air-tight.

18 gauge galvanized wire mesh inlet guards of 5 cm sieves shall be provided on both inlets. Housing shall be provided with standard cleanout door with handles and neoprene gasket. Rotation arrow shall be clearly marked on the housing.
- b. Fan Wheel shall be backward-curved non-over loading type. Fan wheel and housing shall be statically and dynamically balanced. For fans up to 450 mm dia, fan outlet velocity shall not exceed 550 meter/minute and maximum fan speed shall not exceed 1450 rpm. For fans above 450 mm dia, the outlet velocity shall be within 700 meter/minute and maximum fan speed shall not exceed 1000 RPM. High static pressure fan speed shall be in accordance with manufacturer.
- c. Shaft shall be constructed of steel, turned, ground and polished.
- d. Bearings: shall be of the sleeve / ball-bearing type mounted directly on the fan housing. Bearings shall be designed especially for quiet operation and shall be of the self-aligning, oil / grease pack pillow block type.
- e. Motor: Fan motor shall be energy efficient and suitable for  $415 \pm 10\%$  volts, 50 cycles, 3 phase AC power supply, squirrel-cage, totally enclosed, fan-cooled motor, provided with class F insulation, and of approved make. Motor name plate horsepower shall exceed brake horsepower by a minimum of 10%. Motor shall be designed specially for quiet operation and motor speed shall not exceed 1440 rpm. The fan and motor combination selected for the particular required performance shall be of the most efficient (smallest horse power), so that sound level is lowest.
- f. **Drive to fan shall be provided through belt with adjustable motor sheave and a standard belt guard. Belts shall be of the oil-resistant type.**
- g. Vibration Isolation: MS base shall be provided for both fan and motor, built as an integral part, and shall be mounted on a concrete foundation through vibration isolators. The concrete foundation shall be at least 15 cm above the finished floor level.

## 2.0 Axial Flow Fan

**Fan shall be complete with motor, motor mount, belt driven (or direct driven) and vibration isolation.**

- a. **Casing:** shall be constructed of heavy gage sheet steel. Fan casing, motor mount and straightening vane shall be of welded steel construction. Motor mounting plate shall be minimum 15 mm thick and machined to receive motor flange.

An inspection door with handle and neoprene gasket shall be provided. Casing shall have flanged connection on both ends for ducted applications. Support brackets for ceiling suspension shall be welded to the casing for connection to hanger bolts. Straightening vanes shall be aerodynamically designed for maximum efficiency by converting velocity pressure to static pressure potential and minimizing turbulence. Casing shall be bonderized, primed and finish coated with enamel paint.

- b. **Rotor:** hub and blades shall be cast aluminium or cast steel construction. Blades shall be die-formed aerofoil shaped for maximum efficiency and shall vary in twist and width from hub to tip to effect equal air distribution along the blade length. Fan blades mounting on the hub shall be statically and dynamically balanced. Extended grease leads for external lubrication shall be provided. The fan pitch control may be manually readjusted at site upon installation, for obtaining actual air flow values, as specified and quoted.
- c. **Motor:** shall be energy efficient squirrel-cage, totally-enclosed, fan cooled, standard frame, constant speed, continuous duty, single winding, suitable for  $415 \pm 10\%$  volts, 50 cycles, 3 phase AC power supply, provided with class 'F' insulation. Motor shall be specially designed for quiet operation. The speed of the fans shall not exceed 1000 RPM for fans with impeller diameter above 450 mm, and 1440 RPM for fans with impeller diameter 450 mm and less. For lowest sound level, fan shall be selected for maximum efficiency or minimum horsepower. Motor conduit box shall be mounted on exterior of fan casing, and lead wires from the motor to the conduit box shall be protected from the air stream by enclosing in a flexible metal conduit.
- d. **Drive:** to fan shall be provided through belt drive with adjustable motor sheave and standard sheet steel belt guard with vented front for heat dissipation. Belts shall be of oil-resistant type.
- e. **Vibration Isolation:** The assembly of fan and motor shall be suspended from the slab by vibration isolation suspension of rubber-in-shear type.
- f. **Accessories:** The following accessories shall be provided with all fans:
- i. Outlet cone for static pressure regain.
  - ii. Inlet cone.

**Fan silencers may be provided where required. Fans shall be factory assembled and shipped with all accessories factory-mounted.**

### 3.0 Propeller Fan

**Propeller fan shall be direct-driven, three or four blade type, mounted on a steel mounting plate with orifice ring.**

- a. Mounting Plate shall be of steel construction, square with streamlined venturi inlet (reversed for supply applications) coated with baked enamel paint. Mounting plate shall be of standard size, constructed of 12 to 16 gauge sheet steel depending upon the fan size. Orifice ring shall be correctly formed by spinning or stamping to provide easy passage of air without turbulence and to direct the air stream.
- b. Fan Blades shall be constructed of Aluminium or steel. Fan hub shall be of heavy welded steel construction with blades bolted to the hub. Fan blades and hub assembly shall be statically and dynamically balanced at the manufacturer's works.
- c. Shaft shall be of steel, accurately ground and shall be of ample size for the load transmitted and shall not pass through first critical speed thru the full range of specified fan speeds.
- d. Motor shall be standard (easily replaceable) permanent split capacitor or shaded pole for small sizes, totally enclosed with prelubricated sleeve or ball bearings, designed for quiet operation with a maximum speed of 1000 rpm for fans 60 cm dia or larger and 1440 rpm for fans 45 cm dia and smaller. Motors for larger fans shall be suitable for  $415 \pm 6\%$  volts, 50 cycles 3 phase power supply, and for smaller fans shall be suitable for  $220 \pm 6\%$  volts, 50 cycles single phase power supply.
- e. Accessories: The following accessories shall be provided with propeller fans:
  - i. Wire guard on inlet side and bird screen at the outlet.
  - ii. Fixed or gravity louvers built into a steel frame at the outlet.
  - iii. Regulator for controlling fan speed for single phase fan motor.
  - iv. Single phase preventors for 3 phase fans.

#### Performance Data

All fans shall be selected for the lowest operating noise level. Capacity ratings, power consumption, with operating points clearly indicated, shall be verified at the time of testing and commissioning of the installation.

#### Testing

Capacity of all fans shall be measured by an anemometer. Measured air flow capacities shall conform to the specified capacities and quoted ratings. Power consumption shall be computed from measurements of incoming voltage and input current.

## TECHNICAL SPECIFICATIONS FOR PIPING & VALVES

### **I. PIPING & VALVES**

#### **1.0 SCOPE**

The scope of this section comprises the supply and laying of pipes, pipe fittings and valves, testing and balancing of all water and refrigerant piping required for the complete installation. All piping inclusive of fittings, expansion tank and valves shall follow the applicable Indian Standards.

#### **2.0 CHILLED WATER PIPING**

- 2.1 All chilled/Hot water piping and fittings shall be ERW of MS class “ C” (heavy class) c Conforming to BIS 1239 for pipe size up to 150mm dia and for pipe size 200mm dia and above shall be as per BIS 3589 having minimum 6mm thickness. All the joints in the piping system shall be done by welding unless otherwise mentioned, or as directed at site. All welding shall be done by qualified welders having welding certification with a minimum experience of 5 years and shall strictly confirm to Indian Standards code of procedure for manual metal arc welding of Mild steel as per BIS 823. The condenser water piping shall also be confirming to the specified standards as above but shall be carried out with MS Class “C” with fittings. The piping shall be subsequently paint finished as per code of colour as recommended in the standards/guidelines of safety.
- 2.2 All pipes and their steel supports shall be thoroughly cleaned and given one primary coat of red oxide paint before being installed. All chilled water piping will rest on treated teakwood. Blocks neatly machined to the radius of pipes and seated on MS angles/channel. All welded piping shall be subjected to the approval at site.
- 2.3 Fittings shall be of malleable casting of pressure rating suitable for the chilled/condenser piping system. Fittings used on welded piping shall be of weld-able type.
- 2.4 Tee-off connection shall be through equal or reducing tees. Otherwise ferrules welded to the main pipe shall be used. Drilling and tapping of the main pipe shall not be resorted to.
- 2.5 Ball valve, Butterfly valves, Balancing valve, globe valve, conforming to the following specifications shall be provided :

SIZE	CONSTRUCTION	ENDS
15 TO 40 mm	Gun Metal	Screwed
50 mm and above	Body cast iron spindle and valve seat of Bronze or Gun metal or Nitrile rubber. (in case of butterfly valve)	Flanged



- 2.6 All valves shall be heavy duty conforming to BIS 5155. BIS 5152, BIS 780 Valves shall have non rising spindles unless otherwise specified and shall be suitable for not less than 15 KG per sq.cm gauge working pressure. Butterfly valve shall perform the function of isolating valves, Butterfly valves shall have cast iron body with black nitrile rubber seat. All Butterfly valves shall be provided with locking devices. Valves above 250 mm dia shall be gear driven.
- 2.7 Flanges shall be of slip on raised face type. The supply of flanges shall also include supply of bolts and nuts and suitable asbestos/fibre rubber insertion gaskets (minimum 3mm thick).
- 2.8 Non-return (check) valves shall be provided conforming to BIS 778 and IS 5312 (Part I ) and in accordance with the following specifications.

SIZE	CONSTRUCTION	ENDS
50 mm and 150	Cast iron/Gun Metal plate	Flanged
200 mm to 450 mm	Body cast iron, plate carbon steel with 13% chrome overlay	Flanged

The spring and hinge/stop pin shall be SS 304 and bearing fine material. Valves shall be suitable for not less than 15 kg per Sqcm. gauge working pressure. Non-return valves shall be disc type. Swing check valves shall normally be used in all water services. Lift type valves may be used in horizontal runs. Valves shall be suitable for not less than 15 kg per sq.cm gauge working pressure.

- 2.9 Strainers shall be of “ Y “ type or pot strainers, with cast bodies designed for the test pressure specified for the gate valves. Strainers shall have bronze screen with 3mm perforations. Screen shall be removable and replaceable without disturbing of the main pipes. All strainers shall be provided with equal size isolating gate valves with non-rising spindle so that the strainer may be cleaned without draining the system. Strainers shall be provided on the inlet side (at suction) of each pump.
- 2.10 All chilled water piping and fittings shall be pressure tested, then insulated as described under the section “Insulation”.
- 2.11 After all chilled/condenser water piping has been installed, the pressure testing run for at least three days of 72 hours. The piping, fittings & supports shall than be painted with one coat of red oxide paint & two finish coats of 30 microns each of approved color of synthetic enamel paint conforming to IS 2379 (In case the chilled water piping, the paint shall be done after insulation of the pipes). The direction of flow of fluid in the pipes shall be visibly marked with identifying arrows.
- 2.12 Auto Air vent/drain valve of suitable size shall be provided in the chilled/condenser water piping at highest point and at lowest points in the risers respectively.
- 2.13 At the building expansion joints suitable copper bellows should be introduced in the piping system to overcome expansion and tension on piping system.

### **3.0 COLD WATER AND DRAIN PIPING:**

- 3.1 All pipes to be used for cold water (makeup) drain, and condensate drain shall be MS Class "C" as per BIS Standards.
- 3.2 All joints in the pipe system shall be by screwed fittings using non-hardening lubricant as sealing material and/or by screwed flanges using 3mm 3-ply rubber gaskets. Pipe threads and flanges shall be as per BS 534 and BS 4504.
- 3.3 All pipe supports shall be of mild steel, thoroughly cleaned and given one primary coat of red oxide paint before being installed.
- 3.4 Fittings shall be of Mild steel 'Medium Class', malleable casting of pressure rating suitable for the piping system. Flanges shall be of approved make. Supply of flanges shall include bolts, washers, gaskets as required. Sufficient number of flanges and unions shall be provided for future cleaning and servicing of piping. Tee-off connections shall be through equal or reducing tees. All equipment and valve connections, or connections to any other mating pipe shall be through unions/screwed flanges up to 50mm dia and through screwed flanges for larger diameters, or as required for the mating connections.
- 3.5 Ball Valves, Butterfly Valves, check valves and strainers shall be similar to those specified for chilled, condensing and hot water piping, except that the smaller valves up to 15mm dia may have screwed female ends.
- 3.6 All condensate drain piping shall be insulated as per the section 'Insulation'. Cold water piping within the building may also be insulated.
- 3.7 After the piping has been installed, tested and run for atleast three days of 72 hours, all piping and pipe supports shall be painted with one coat of red oxide paint & two finish coats of 3 mils each of approved color of synthetic enamel paint conforming to IS 2379.
- 3.8 The direction of flow of fluid in the pipes shall be visibly marked with identifying arrow.
- 3.9 The expansion tank shall be made out of either PVC/Fibre glass/MS sheet of minimum 6mm thick plate. Adequate capacity tank shall be included in the piping for replenishing the losses as required.

#### **4.0 VALVES AND ACCESSORIES**

##### **4.1 MOTORISED MIXING VALVE**

Motorised valves shall be three way, straight through for proportional control of the chilled water. These valves shall act as modulating agents. These valves shall be high pressure tested. The valve shall be housed in a bronze body with female, screwed end connection or flanged connection for a cast iron body. It shall have a self rotating, spring loaded packing material with a SS stem and a disc. The valve shall be mounted with modulating actuation motor on the shaft with control junction box for connecting to automation package. The actuator mounted on the valve shall be actuated either by accepting input signals from variety of sources viz. Resistance controllers, voltage and current inputs. The motor shall have solid state drive circuit, triac switching, electro mechanic travel limits and quick connect wiring terminals.

## 4.2 BALANCING VALVE

The manual balancing valves shall be fitted in to the pipeline system for balancing, control and shut off. The body shall be made up of Gun metal/ cast iron body, that is corrosion resistant. One set of manometer kit shall be supplied along with balancing valves for balancing whether specifically asked in the BOQ or not.

## 4.3 BUTTERFLY VALVE

The Butterfly valve shall comprise of a standard one-piece body casted out of graded Cast iron, the disc shall be made out of casted stainless steel, seat made out of Nitrile rubber for proper isolation/ seal. The coating on the body and disc shall be either epoxy or PTFE material.

## 4.4 GLOBE VALVE

The Globe valve shall have a forged casted brass or bronze body, the packing and the seat shall be made out of teflon material for valve seat tightness. The valve shall have a large flow chamber to enable minimum pressure drop and maximum flow. The seals for the body and bonnet shall be of fully retained gasket.

## 4.5 Y – STRAINER

Y strainer shall have a rigid cast iron body of grade CI 260, a bonnet of the same material, a basket made out of GI perforated sheet of 24 swg with 3 mm perforations, the body and bonnet shall have CAF gasket. The strainer shall have a double flanged body and cover, which are bolted by means of hi tensile bolts.

## 5.0 PIPING INSTALLATION:

5.1 Tender indicates schematically the size and location of pipes. The contractor on the award of the work, shall prepare detailed working, showing the cross-section, longitudinal sections, details of fittings, locations of isolating and control valves, drain and air auto vent valves and all pipe supports. He must keep in view the specific openings in buildings and other structures through which pipes are designed to pass.

5.2 Piping shall be properly supported on or suspended from stands, clamps, hangers as specified and as required. The contractor shall adequately design all the brackets saddles anchors, clamps and hangers, and be responsible for their structural sufficiency.

5.3 The pipe supports shall be galvanised/concrete to avoid corrosion and the spacing of pipe supports shall not exceed the following :

Pipe Size	Space between supports
Upto 12 mm	1.5 meter
15 to 25 mm	2.0 meter
30 to 150 mm	2.0 meter
Over 150 mm	2.5 meter

5.4 Vertical risers shall be parallel to the wall and column lines and shall be straight and to plumb line. Risers passing from floor to floor shall be supported at each floor by clamps or collars attached to pipe and with a 15 mm thick rubber pad or any resilient material. Where pipes pass through the terrace floor, suitable curbing shall

be provided to prevent water leakage. Risers shall have a suitable clean out at the lowest point and air vent at the highest point.

- 5.5 Pipe sleeves, 50 mm larger in diameter than pipes. Shall be provided wherever pipes pass through walls and slabs and the annular space filled with fibreglass and finished with retainer rings.
- 5.6 Insulated piping shall be supported in such a manner as not to put undue pressure on the insulation. 14 gauge metal sheet shall be provided between the insulation and the clamp saddle or roller, extending atleast 15 cm on both sides of the clamp, saddles or roller.
- 5.7 All pipe work shall be carried out in a workman like manner. causing minumum disturbance to the existing services buildings., roads, and structure. The entire piping work shall be organised, in consultation with other agencies work, so that laying of pipe supports pipe and pressure testing for each area shall be carried out in one stretch.
- 5.8 Piping layout shall take due care for expansion and contraction in pipes, and shall include expansion loop wherever required.
- 5.9 Auto/Manual air valves shall be provided at all high points in the piping system for venting. All valves shall be of 32mm pipe size and shall be associated with an equal size gate valve. Discharge from the air valves shall be piped through an equal sized mild steel or galvanised steel pipe to the nearest drain or sump. All pipes shall be pitched towards drain points.

#### **6.0 TESTING & BALANCING:**

- 6.1 All piping shall be tested to hydrostatic test pressure of at least two and half times the maximum operating pressure, but not less than 15 kg per sq.cm gage for a period of not less than 72 hours. All leaks and defects in joints revealed during the testing shall be rectified and got approved at site.
- 6.2 Piping repaired subsequent to the above pressure test shall be re-tested in the same manner.
- 6.3 System may be tested in sections and such sections shall be securely capped and later re-tested along with the entire system.
- 6.4 The contractor shall give sufficient notice to all other agencies at site, of his intention to test a section or sections of piping and all testing shall be witnessed and recorded by Owner's site representative.
- 6.5 The Contractor shall make sure that proper noiseless circulation of fluid is achieved through all coils and other heat exchange equipment in the system concerned. In case of improper circulation, the contractor shall rectify the defective connections. He shall bear all expenses for carrying out the above rectification, including the clearing up and re-finishing of floors and walls as required.
- 6.6 After completion of the installation, all water system shall be adjusted and balanced to deliver the water quantities as specified, quoted or as directed, to individual air handling units and fan coil units cooling coil.

- 6.7 Complete certified balancing report shall be submitted for evaluation and approval. Upon approval, four copies of the balancing report shall be submitted with complete documents.

## 2.0 AIR SEPERATOR:

The centrifuge type air separator will be of MS constructions. It will be adequately sized to achieve maximum air separator. For the chilled water application, it will be insulated with necessary thick insulation to the specification and cladded with Aluminium sheet.

### TECHNICAL SPECIFICATIONS FOR AIR DISTRIBUTION

#### 1.0 GSS DUCTING

##### 1.1 GENERAL

GI Sheets shall be as per IS 217 – class VIII. Fabrication shall be as per IS 655. The ducting shall be made out of Lock former machine or factory fabricated to avoid site work to the minimum.

##### 1.2 RECTANGULAR DUCT

Dimensions of Ducts	Gauge G.I	Alumi-nium	Type of Joints	Type of Bracing's
Upto 600	24	22	G.I Flange at 2.5 Center	Cross Bracing's
601 to 750	24	22	25 x 25 x 3 mm angle frame with 6 mm dia nuts and bolts	25 x 25 x 3 mm MS angles bracing at 1500 mm from joints
751 to 1000	22	20	25 x 25 x 3mm angle frame with 6mm dia nuts and bolts	25 x 25 x 3 mm MS angle bracing at 1500mm from joints
1001 to 1500	22	20	40x40x5 mm angle frame with 8mm dia nuts and bolts	40 x 40 x 3mm MS angle bracing at 1500mm from joints
1501 to 2250	20	16	50x50x3mm angle to be cross braced diagonally with 10mmdia nuts & bolts at 125 center.	40 x 40 x 3mm MS angle bracing at 1200mm from joints or 40x 40 x 3mm MS angle diagnal bracing-

### 1.3 HANGERS/SUPPORTS FOR DUCT

Duct Size (mm)	Spacing (Mtrs.)	Size of G.I angle (mm x mm)	Size of rod dia (mm)
Upto 750	2.5	40 x 3	10
751 to 1500	2.0	40 x 3	12
1501 to 2250	2.0	50 x 3	15
2251 & above	2.0	50 x 3	15

### 1.4 INSTALLATION

All ducts shall be installed generally as per the drawings prepared by the Consultant.

- i) The Contractor shall provide and neatly erect all sheet metal work as may be required to carry out the intent of these specifications. The work shall meet with the approval of consultant/client's site representative in all its parts and details.
- ii) If a duct cannot be run as shown in the drawing, the contractor shall install the duct between the required points by any path available, in accordance with other services and as per approval of consultant / clients site representatives.
- iii) All ductwork shall be independently supported from the building structure. All horizontal ducts shall be rigidly and securely supported, in an approved manner with trapeze hangers formed of galvanized MS rods and angle iron under ducts at not greater than 2 meter centers. All vertical ductwork shall be supported by structural members at 2 Meters intervals. Air conditioning contractor shall supply and install all supports made of galvanized steel material and shall be of hi-tech supports only. The supports shall be designed to prevent vibration to be transmitted to the building structure by providing vibration isolation. If duct is passing through in such areas where space between ceiling slab to false ceiling is more than 1500 mm then duct should be supported by wall mounted brackets of 40 x 40 x 3mm angle.
- iv) Where metal ducts or sleeves terminate in woodwork, tight joints shall be made by means of closely fitted heavy flanged collars. Where ducts pass through brick or masonry opening, wooden frame work shall be provided within the opening and crossing ducts provided with heavy flanged collars on each side of wooden frame work, so that duct crossing is made leak-proof.
- v) All ducts shall be totally free from vibration under all conditions of operation. Whenever duct work is connected to fans, air handling units or blower coil units that may cause vibrations in the ducts, ducts shall be provided of closely woven, rubber impregnated double layer asbestos/canvas or neoprene coated fibre glass fire resistant flexible connection. The flexible connections should be located close to the unit, in mutually perpendicular directions. The flexible sleeve should be at least 15cm long securely bonded

and bolted on both sides. Sleeve shall be made smooth and the connecting ductwork rigidly held by independent supports on both ends. The flexible connection shall be suitable for pressures at the point of installation.

- vi) Air conditioning unit and exhaust fans shall be connected to duct work by inserting at air inlet and air outlet a double canvass sleeve. Each sleeve shall be minimum 150 mm securely bolted to duct and the connecting ductwork rigidly held in line with unit inlet or outlet.

## **2.0 VOLUME CONTROL DAMPERS**

Volume control dampers shall be made out of 18 G GI sheet frame with 20 G opposed blade type. Dampers shall be provided with suitable links, levers and quadrants as required for their proper operation. The operating lever or knob shall have locking arrangement and markings of various positions including open and closed position.

## **3.0 FIRE DAMPERS**

All supply air ducts of the units shall be provided with approved fire dampers of at least 1 1/2 hour fire rating. These shall be of approved make. The damper shall be fabricated of 16gauge GSS housing with blades formed out of 1.6 mm sheets. The damper shall be pivoted on both ends using chrome plated spindles in bronze bushes. The stop seals shall be provided on top and bottom of the damper housing. The damper blades shall close in the event of fire and shall have a fusible link as contingency to ensure that the link fails at the time of hazard.

## **4.0 FRESH AIR INTAKE AND EXTRACT LOUVERS:**

All the louvers shall be rain protection type and shall be fabricated from galvanized section. The louvers shall additionally be provided with heavy duty expanded metal bird screen and Cowl. They shall be factory made with powder coating finish. The louvers shall be provided with control damper with lever for operation and control of fresh air.

## **5.0 ACCOUSTIC INSULATION OF DUCT:**

Acoustic lining of ducts shall be carried 12 mm thick, 48 kg/m<sup>3</sup> density rigid board fiberglass, and RP tissue covered with 28 G aluminum perforated sheet. Acoustic insulation shall be fixed with 6 mm GI bolt, nut and washers at every one feet distance.

### Application

- Clean the inner surface of duct, which is to be lined with wire brush to remove the dirt.
- Apply Black Japan paint over the frame of the duct
- The adhesive shall be non-flammable and having vapour barrier property.

- Fix insulation material of 25mm thickness covered with RP tissue. The insulation material will be covered with 28G perforated aluminum sheet having 2mm dia perforation at 300 mm center-to-center distance with the help of nuts and bolts. It shall be neatly finished to give true surface finish.

## **6.0 THERMAL INSULATION OF DUCT:**

Thermal insulation of ducts shall be carried 25 mm thick, 24 Kg/m<sup>3</sup> density aluminum faced fiberglass wrapped tightly. Insulation shall be finished properly around the collars etc. After the insulation 25 mm PVC strapping shall be carried out at an interval of every three feet.

### Application

- Clean the external surface of duct, which is to be lined with wire brush to remove the dirt.
- Apply Black Japan paint over the frame of the duct
- The adhesive shall be non-flammable and having vapour barrier property.

## **7.0 THERMAL INSULATION OF DUCT WITH NITRILE RUBBER INSULATION**

Thermal insulation of ducts shall be carried 13 mm thick, 48 Kg/m<sup>3</sup> density with class ' O ' nitrile rubber insulation. Insulation shall be finished properly around the collars etc

### Application

- Clean the external surface of duct, which is to be lined with wire brush to remove the dirt.
- Apply Black Japan paint over the frame of the duct
- The adhesive shall be non-flammable and having vapour barrier property.

## **8.0 CHILLED WATER PIPE INSULATION:**

The insulation for chilled water and drain piping shall be carried out with EPS finished with Aluminium cladding specified below.

Thickness of insulation shall be as follows:

- |    |                       |   |            |
|----|-----------------------|---|------------|
| 1) | upto 80mm dia         | = | 50 mm thk. |
| 2) | from 100 to 250mm dia | = | 75 mm thk. |



## 8.1 Application:

All chilled water and drain piping shall be insulated after pressure testing, as follows:

- Brush and clean all piping and fittings to remove all dust, dirt, mortar and oil. Then provide 2 coats of zinc chromate primer
- Apply 2 coats of Black Japan paint.
- Apply pre-formed pipe sections over the pipe before the adhesive dries up and seal all longitudinal and transverse joints. All joints along the circumference of the pipe sections shall be covered with Bitumen tar.
- Cover the pipe sections with vapour barrier of Polythene sheet with minimum overlap of 75mm near the joints.
- The vapour barrier shall be covered with Tar felt sheets and fixed with G.I wire of 22swg. The felt sheet shall be stuck with Bitumen Grade 85/25 applied at the rate of 1.6 Kg/Sqm.
- Finally applying sand cement plaster in ratio 1:3 in two layers each 15mm thick and covered with 26 G Aluminium sheet cladding.

## 9.0 PUMP INSULATION:

All chilled water pumps shall be insulated with Expanded Polystyrene in the manner specified herein. Two sectionalised boxes made of 20 gauge Galvanized steel sheet shall be provided around each horizontally split casing pump. All sheet joints shall be sealed with bitumen from inside, the insulation impaled over pins welded/riveted to GI sheet and secured with spring washers. The insulation shall be finally covered on top with GI sheet cladding for smooth finish.

## 10.0 CHILLER INSULATION:

The chiller shall be factory insulated in accordance with the manufacturer's instructions, with a minimum of 75mm thick Polypropylene foam. No insulation of the chiller shall be carried out at site and it should mandatorily be factory insulated before shipment.

## 7.0 EXPANSION TANK INSULATION:

Expansion tank shall be insulated with 50mm thick EPS and finished with Sand cement plaster in two layers of 15mm each. The plastered surface shall be painted with approved colour Distemper finish.

**TECHNICAL DATA SHEET**  
(To be filled by the Tendering Agencies)

**1.0 AIR HANDLING UNITS**

Manufacturer :  
Type :  
Air Quantity :  
Capacity (TR) :  
Material and thickness of casing (gauge) :  
Material and thickness of drain pan (gauge) :  
Air Handling Unit Weight (Kgs) :  
Air Handling Unit Overall dimensions(mm) :

**2.0 COOLING COIL:**

Manufacturer of coil :  
Coil Geometry with inside surface type :  
Tube Arrangement type :  
Sn Value :  
Sp Value :  
Number of Rows :  
Number of Columns :  
Diameter of Tube :  
Thickness of Tube :  
Entering temperature of Air :  
Leaving temperature of Air :  
Air Quantity :  
Entering Velocity of Air :  
Air pressure drop :  
Capacity of cooling coil :  
Centrifugal Fan :  
Fan type :  
Impeller profile :  
Fan Blast Area :  
Impeller tip speed :  
Inlet cone/ Impeller Clearance :  
Inlet Area :  
Arrangement type :  
Type of Bearing :  
Fan scroll thickness :  
Back Plate thickness :  
Impeller blade thickness :  
Fan Capacity :  
Fan Static pressure :  
Fan speed :  
Peak pressure point at the above speed :  
Fan first critical speed :  
Power Consumption at above parameter :  
Drive losses considered :

Suggested Motor power :  
 Fan Static efficiency :  
 Fan total efficiency :  
 Fan sound power level (db) :  
 Fan sound pressure level at 1.5M distance :  
 Fan Testing as per AMCA considered :  
 Fan performance curve :  
 Fan overall dimensions :  
 Fan static weight :  
 Fan operating weight :

**3.0 MOTOR:**

Manufacturer :  
 Model :  
 Type of Motor :  
 Method of cooling :  
 IS 12615 efficiency value Considered :  
 Efficiency Value :  
 Power factor at above efficiency :  
 Power factor at 75% load :  
 Power factor at 50% load :  
 Rated Voltage :  
 Rated Frequency :  
 Starting Current :  
 Running Current at full load :  
 Rated out put :  
 Frame designation :  
 Motor Protection insulation class :  
 Motor Synchronous speed :  
 Motor Actual speed :  
 Percentage of Slip :

**4.0 FILTERS:**

Make :  
 Filter type :  
 Type of Filter Media :  
 Material of outer casing :  
 Method of holding filter media in casing :  
 Velocity across filter considered :  
 Maximum permissible velocity across filter for maximum life :  
 Life of Filter :  
 Air quantity Handled by each filter :  
 Pressure Drop across filter in clean condition :  
 Pressure drop across filter in dirty condition :  
 Efficiency :  
 Rating of filters :  
 Filtration level :  
 Method of testing :  
 Gross filter area :  
 Number of filters :

Filtration Method :  
Method of Cleaning :  
Type of filter fixing arrangement :

#### 5.0 COMPRESSORS:

Make :  
Model :  
Compressor type :  
Refrigerant used :  
No. of Compressors :  
Saturated Suction temperature in Def F :  
Saturated Discharge temperature in Def F :  
Compressor capacity delivered at above conditions :  
Input KW at 100% :  
Rated Voltage :  
Rated Frequency :  
Compressor Speed :  
Starting Current :  
Running Current :  
Starting current of each compressor(Amps) :  
Locked Rotor Amps :

#### 6.0 MOTOR

Manufacturer :  
Model :  
Type of Motor :  
Method of cooling :  
Efficiency Value :  
Power factor at above efficiency :  
Power factor at 75% load :  
Power factor at 50% load :  
Rated Voltage :  
Rated Frequency :  
Starting Current :  
Running Current at full load :  
Motor Protection :  
Insulation class :  
Motor Synchronous speed :  
Motor Actual speed :  
Rated output :  
Frame designation :  
Percentage of Slip :

#### 7.0 CONDENSER COIL:

Manufacturer :  
Model No. :  
Coil Geometry with inside surface type :  
Tube Arrangement type :  
Type of Heat rejection :  
Type of flow :

Effective temperature difference :  
 Heat capacity of hot stream :  
 Heat capacity of cold stream :  
 Effectiveness of heat exchanger :  
 Number of pass :  
 Diameter of Tube :  
 Thickness of Tube :  
 Entering temperature of water :  
 Leaving temperature of water :  
 pressure drop water side :

**8.0 CONDENSER FANS**

Manufacturer :  
 Fan Type :  
 Impeller Dia :  
 Impeller profile :  
 Fan Blast area :  
 Impeller tip Speed :  
 Inlet cone / impeller Clearance :  
 Inlet Area :  
 Arrangement type :  
 Type of bearing :  
 Fan Scroll thickness :  
 Hub thickness :  
 Impeller blade thickness :  
 Fan capacity :  
 Fan static pressure :  
 Fan Speed :  
 Peak Pressure at the above speed :  
 Fan first critical speed :  
 Power consumption :  
 Suggested motor power :  
 Drive losses considered :  
 Fan Static efficiency :  
 Fan total Efficiency :  
 Fan sound power level (db) :  
 Fan sound pressure level at 1.5M distance :  
 Fan testing as per AMCA considered or not :  
 Number of fans :  
 Performance curves enclosed :

**9.0 GENERAL:**

Over all Dimension (M) :  
 Length (mm) :  
 Width (mm) :  
 Height (mm) :  
 Shipment Weight (Kg) :  
 Operating Weight (Kg) :

**10.0 COLLAR DAMPERS:**

Make :  
 Material :  
 Blade profile :  
 Blade type :  
 Bush material :  
 Linkage material :  
 Type of gasket :  
 Torque required :  
 Thickness of outer casing :  
 Thickness of blade :  
 Thickness of gasket :  
 Method of opening :  
 Free area at full opening :  
 Free area at 50% opening :  
 NC Value :

**11.0 DUCT DAMPERS:**

Make :  
 Material :  
 Blade profile :  
 Blade type :  
 Bush material :  
 Linkage material :  
 Type of gasket :  
 Torque required :  
 Thickness of outer casing :  
 Thickness of blade :  
 Thickness of gasket :  
 Method of opening :  
 Free area at full opening :  
 Free area at 50% opening :  
 NC Value :

**12.0 FIRE DAMPERS:**

Make :  
 Material :  
 Blade profile :  
 Blade type :  
 Bush material :  
 Linkage arrangement :  
 Linkage material :  
 Type of gasket :  
 Torque required: :  
 Thickness of outer casing :  
 Thickness of blade :  
 Thickness of gasket :  
 Fire rating Class :  
 Method of operation :  
 Temperature rating :

### 13.0 INSULATION:

Manufacturer	:	
Materials	:	
Density	:	
Temperature range	:	
Thermal Conductivity	:	
Thickness of material	:	
Compressive strength at % deformation	:	
Cell Structure	:	
	Permeability	:
Moisture absorption	:	
Vapor barrier Type	:	
Vapor barrier grade	:	
Insulation Finish		
Type of Finish	:	
Material	:	
Thickness	:	
Emissivity	:	
Absorptivity	:	
Tensile Strength	:	
Tape Material	:	
Tensile Strength	:	

### LIST OF APPROVED MAKES / AGENCIES

The Tenderer shall quote his rates on the basis of the price of the brand/make stipulated in the item of works as described in BOQ, Specifications and furnished in Technical data. The client reserves the right to select any of the brands indicated in the “List of Approved Makes/Agencies,” incase of delay in delivery of ordered ‘make of item’. The contractor cannot claim anything extra if the client changes the make/agencies but within the list of approved make.

S.NO	ITEM	ACCEPTABLE MAKES
1.0	CHILLERS	: Carrier, Trane, York, Bluestar, Voltas
2.0	AHU	: Zeco / Bluestrar /York /Ventura
3.0	PUMPS:	: Grundfoss/ITT-Bell&Gosset / armstrong
4.0	M.S.PIPES:	: TATA, Jindal
5.0	Globe valves	: Leader, Devine, Sant, Audco
6.0	Butterfly valve	: Audco, Intervolve
7.0	Balancing valve	: Advance, Arrow
8.0	Non-return valve	: Audco, Intervolve
9.0	Refrigerant valve	: Brassomatic, Danfoss
10.0	‘ Y ‘ Strainer	: Emerald , Sant, DS Engineering
11.0	3way way mixing valve	: Honeywell, Johnson, Sauter, Siemens
12.0	Temp/ Pressure Gauge	: H guru,Forbes Marshall
13.0	Auto Air Vent	: Amtrol, Anergy, Flammco
14.0	Cooling Coils / Heating Coils	: Zeco,Caryaire, Suvidha
15.0	Centrifugal Fans	: Kruger, Nicotra,Nadi
16.0	V Belts/Pulleys	: Fenner, Dunlop or equivalent
17.0	Electric Motors	: Siemens, Kirloskar, Crompton, ABB
18.0	Aluminum Grilles Diffusers/ Linear Grilles, Dampers	: Caryaire, Air Master



19.0	Filters	:	Klenzaid, Spectrum, Pyramid, Aerosol
20.0	volume control dampers, Fire Damper:		Caryaire, Air Master, Ravistar
21.0	GI Sheets	:	TATA, SAIL, Jindal,
22.0	Vibration Isolators/Flexible Connectors	:	Resistoflex , Dunlop or equivalent
23.0	Nitrile Rubber	:	armaflex ,k flex
24.0	Fibre glass	:	UP Twiga, Kimmco, Owens Corning
25.0	Expanded Polyesterene	:	Beardsell, Stypack, Hyderabad EPS
26.0	Power Cables	:	Universal,FotGloster,Finolex, polycab
27.0	Control Cables	:	Delton, Mylar, Finolex, polycab
28.0	Glands( Double Compresson)	:	Comex,Comet or equivalent
29.0	PVC Glands	:	Kabel or equivalent
30.0	Lugs	:	Dowell or equivalent