

**PRASAR BHARATI**  
**(BROADCASTING CORPORATION OF INDIA)**  
**OFFICE OF THE ADG(E)(SOUTH ZONE)**  
**ALL INDIA RADIO & DOORDARSHAN**  
**SWAMY SIVANANDA SALAI, CHENNAI - 600 005**

No. ADG(E)(SZ)/PUR/ NIT-18/ACP/2011-12/

Date: 28-10-2011

**SUB.:** ENQUIRY FOR THE NOTICE INVITING TENDER FOR THE **SITC** of Water cooled Packaged type Airconditioning Plant 6x15 Ton at AIR, Avadi (CHENNAI).

Sir,

Please find enclosed herewith the enquiry for the Supply, Installation, Testing and Commissioning (SITC) of Water cooled Packaged type Airconditioning Plant 6x15 Ton at AIR, Avadi (CHENNAI).

Tender documents can be collected from this office from 28.10.2011 to 18.11.2011 on all working days between 11.00Hrs to 16.00Hrs, on payment of required tender cost in the form of cash/demand draft or the tender documents can be down- loaded from the website mentioned below. Demand Draft for Rs. 530/- drawn in favour of the ADG(E) (South Zone) AIR & TV, Chennai-5, shall be enclosed in separate cover along with the tender otherwise the tender shall be rejected.

[www.cesairdd.org.in/tenders.html](http://www.cesairdd.org.in/tenders.html),  
[www.allindiaradio.org/tender.html](http://www.allindiaradio.org/tender.html),  
[www.tenders.gov.in](http://www.tenders.gov.in)

The tenders will be received at the Office of The ADG(E) (SZ), AIR & TV, Swamy Sivananda Salai, Chennai-5, up to 12.30 Hrs on **22.11.2011**. The Technical bid and E.M.D. will be opened on the same day at 15.00 Hrs. The Commercial bid of technically qualified tenders will be opened at a later date that will be intimated to the qualified tenderers.

Yours faithfully,

(T.SHANMUGARAJU)  
DY. DIRECTOR (ENGG)(PURCHASE)  
for Addl. Director General (E)(SZ)

PRASAR BHARATI  
(BROADCASTING CORPORATION OF INDIA)  
OFFICE OF THE ADG(E)(SOUTH ZONE)  
ALL INDIA RADIO & DOORDARSHAN  
SWAMI SIVANANDA SALAI  
CHENNAI 600 005

TENDER No. ADG(E)(SZ)/PUR/ NIT-18/ACP/2011-12/

Date: 28-10-2011.

SITC of Water cooled Packaged type Airconditioning Plant 6x15 Ton at AIR,  
Avadi (CHENNAI).



PRASAR BHARATI  
(BROADCASTING CORPORATION OF INDIA)  
OFFICE OF THE ADDL.DIRECTOR GENERAL (E)(SZ)  
ALL INDIA RADIO & DOORDARSHAN  
SWAMI SIVANANDA SALAI  
CHENNAI 600 005

File No. ADG(E)(SZ)/PUR/ NIT-18/ACP/2011-12/

Date: 28-10-2011.

To:

.....  
.....  
.....  
.....

**INVITATION TO BID**

On behalf of the Prasar Bharti (B.C.I.), sealed tenders are invited by this Organisation in the prescribed Bid Forms at Appendices, 2 to 7 of "Instructions to Bidders" enclosed at Annexure-I. The details of tender are given in the schedule below:

1. Tender No. : **ADG(E)(SZ)/PUR/ NIT-18/ACP/2011-12/**
2. Description and quantity of stores : **NOTICE INVITING TENDER FOR SITC of Water cooled Packaged type Airconditioning Plant 6x15 Ton at AIR, Avadi (CHENNAI)**
3. Delivery Period: : **3 Months after the placement of Order.**
4. Tender Fee: : **Rs. 530/-**
5. Earnest Money: : **Rs.1,50,000 /-**
6. Bid Validity up to: : **120 (One Hundred and twenty) days from the date of opening of Technical Bid.**

**NOTE:** Tender documents may be downloaded from the following websites:

[www.cesairdd.org.in/tenders.html](http://www.cesairdd.org.in/tenders.html)

[www.allindiaradio.org/tender.html](http://www.allindiaradio.org/tender.html)

[www.tenders.gov.in](http://www.tenders.gov.in)

7. Warranty : Required as per clause 8 of Annexure-II, General Terms & Conditions & as per Specs.
8. Performance Security Deposit : Required as per Annexure-II, (General Terms & Conditions).
- (i) Amount : 10% of the order value in form of Demand Draft / Bank Guarantee / FDR
- (ii) Validity : 60 (sixty) days beyond the date of expiry of Warranty / Guarantee
9. Correspondence Address: Dy .Director (Purchase) O/o  
Addl. Director General (E)(SZ)  
All India Radio &  
Doordarshan  
Chennai-600005
10. Paying Authority : Addl. Director General (E)(SZ)  
All India Radio & Doordarshan  
Chennai-600005.
11. Tender Opening Date: **22.11-2011 Time 15:00 hr**
12. Terms of Delivery : Delivery at Consignees' place.

**DDG(E)/ Installation Officer,  
All India Radio, Transmitting Centre ,  
HPT, Avadi, Chennai-600062.**

**13. Important Instructions:**

The tender will be governed by the "Instructions to the Bidder" as per Annexure-I; "General Terms & Conditions" placed at Annexure-II, and "Technical Specifications" placed at Annexure-IV.

Deviations/Exceptions to the clause, if any, should be explicitly recorded seriatim as a separate Annexure (Appendix 4 of Annexure-I), in your offer, failing which, all the clauses shall be deemed to have been accepted by you.

**Two Bid System** shall be followed for this tender. Tenderers should take due care to submit tenders in accordance with requirement in sealed covers as specified in clause 2 of **“Instructions to Bidders” (Annexure-I)**. Bid evaluation criteria at Annexure-III shall be the basis for evaluation of tenders.

**The Technical & Commercial Bid should be submitted in Separate Sealed Cover.**

**The EMD should be enclosed with the Technical Bid. (see annexure-I SI.No-15)**

The tenderer while submitting their bid, must adhere to the following instructions of Central Vigilance Commission, otherwise their offer is likely to be ignored.

1. One Agent / Dealer / Supplier shall not represent two manufacturers of quote on their behalf in a particular tender i.e. one bidder shall quote one type of equipment in a particular tender.

2. Tender documents submitted by the tenderer shall be neatly tied and each page numbered and signed and stamped by them.

**NOTE: The following documents must be submitted along with the tender failing which the offer may be liable to rejection and no further correspondence will be entertained in this regard.**

- (a) **Original Equipment Manufacturer’s Authorisation for equipment quoted.**
- (b) **Past Performance along with the user certificate in respect of timely and good quality supply of equipment / execution SITC / SETC ( Especially, the equipments should be supplied and installed at RF fields like AIR/DD Transmitter sites. ).**

Kindly refer item No.8 under Annexure-I.

[ .....]  
Dy Director(Purchase)  
for Addl. Director General (E) (SZ)

<b>LIST OF ANNEXURES</b>	<b>DETAILS</b>	<b>PAGES</b>
Annexure - I	Instructions to Bidders	6 - 14
Appendix - 1	Bid Document Acknowledgement	15
Appendix – 2 & 2A	Bid submission Form and Agreement	16 - 17
Appendix - 3	Exception / Deviations PROFORMA	18
Appendix - 4	Past Supplies / SITC / SETC Proforma	19
Appendix – 5	Bidders Information Proforma	20
Appendix – 6 & 6A	Price Bid Proforma	21 - 25
Appendix - 7	Authorization Letter for attending tender opening.	26
Annexure - II	General terms & Conditions (GTC)	27 - 38
Annexure - III	Bid Evaluation Criteria	39-40
Annexure - IV	Description of Stores / SITC / SETC & Technical specifications	41-91
	Drawings	92-93

**\* THIS TENDER DOCUMENT CONSISTS OF -93- PAGES.**

**INSTRUCTIONS TO BIDDERS**

(Please sign each page of these conditions and send it with your offer)

**1. PREPARATION OF TENDER:**

i) The bid shall be submitted in the prescribed proforma as per Appendices 2 to 6. The bid document duly filled in and signed should be returned whether you are quoting for any item or not. When items are not being tendered for, the corresponding space should be defaced by some such words as "Not quoting".

ii) In the event of the space on the bid document being insufficient for the required purpose, additional pages may be added. Each such additional page must be numbered consecutively showing the Tender Number and duly signed. In such cases, reference to the additional page must be made in the tender form.

iii) The bid document referred to above, if not returned or if returned but not duly filled-in, will be liable to result in rejection of the tender.

iv) Bidders are advised in their own interest to ensure that all the points brought out in the checklist enclosed at Appendix 3 are complied with in their offer, failing which, the offer is liable to be rejected.

v) The Bids can only be submitted in the name of the bidder in whose name the bid documents were issued. The tender papers filled-in and completed in all respects shall be submitted together with requisite information and Annexures. It shall be complete and free from ambiguity, change or interlineations.

The tender submitted by bidders and any annotations or accompanying documentation submitted along with the tender, shall be in English language.

Bidders should indicate at the time of quoting against this tender their full postal/ fax / E-mail addresses.

Bidders shall sign their proposal with the exact name of the firm to whom the contract is to be issued. The tender shall be duly signed and sealed by an executive officer of the bidder's organisation.

Each page of the tender shall be signed by a duly authorised officer and in the case of a Corporation the same shall be sealed with the Corporation seal or otherwise appropriately executed under seal.

Bidders shall clearly indicate their legal constitution and the person signing the tender shall state his capacity and source of his ability to bind the bidder.

The Power of Attorney or authorisation, or any other document consisting of adequate proof of the ability of the signatory to bind the bidder, shall be annexed to the tender. This organisation may reject outright any tender unsupported by the adequate proof of the signatory's authority.

vi) It must be ensured that each page of the tender including terms and conditions, Bid Evaluation Criteria and specification (Annexures I, II, III and IV) are signed by bidder and returned to this office along with offer.

## 2. DELIVERY OF TENDER

2.1 The tender will be on the basis of **"Two Bid System"** and offers are to be submitted in separate sealed covers.

The first inner sealed cover will contain **"Technical Bid"** having all details including the list of equipment to be supplied / SITC / SETC to be executed, but with price column blanked out. There will be no mention of price anywhere in the **"Technical Bid"** and **EMD** will also be sent in the above first inner cover. This cover will clearly be super- scripted with **"Technical Bid"** along with tender number and item description.

The second inner-cover will contain the price schedule duly filled-in and signed and contain all the commercial details of the bid and will be clearly super-scripted with **"Commercial Bid"** along with tender number. These two covers shall be put into an outer cover and sealed. The outer cover should duly bear the tender number and date of closing / opening prominently underlined along with the address of this office.

All General Terms and Conditions (GTC) attached with the invitation to tender are sacrosanct for considering any offer as a complete offer. It is therefore, important that all documents duly completed and signed are returned with your offer.

2.2 The right to ignore any offer, which, fails to comply with the above instructions is reserved. Only one tender should be included in one cover.

2.3 Your offer must reach this office not later than 12:30 hr. on the notified date of closing of the tender. Offers sent by hand delivery should be put in the Tender Box in this office before 12:30 hr. on the specified date. All outstation tenders , if sent by post, should be sent under registered cover.

2.4 **Any change in quotation after opening of tender will not be considered.**

2.5 This organisation will not be responsible for the loss of tender form or for the delay in postal transit.

2.6 Tenderer is advised in his own interest to ensure that his offer reaches this office well before the closing date and time of the tender as **the offers received after the closing date and time of the tender, will not be considered.**

2.7 TELEGRAPHIC/TELEFAX/E-MAIL offers, received directly by this organisation, will not be considered.

## 3. VAGUE AND INDEFINITE EXPRESSION

Tenders qualified by vague and indefinite expressions such as "subject to immediate acceptance" or "Subject to prior sale" etc. will not be considered.

## 4. VALIDITY PERIOD OF OFFER

4.1 The tender shall be valid for acceptance for the period as indicated in the "Invitation to Bid" (hereinafter referred to as validity period) and shall not be withdrawn on or after the opening of tenders till the expiration of the validity period or any extension thereof.

The offers of those tenderers who have not kept the validity open till the period stipulated in the tender will be treated as un-responsive and will be ignored without making any reference to the tenderer.

4.2 The tenderer will undertake not to vary/modify the tender during the validity period or any extension thereof.

## **5. OPENING OF TENDERS**

5.1 The tenders will be opened at **15.00 hours** on the date of opening indicated in the "Invitation to Bid". The tenderer or his authorised representative may be present at the time of opening of tender on the specified date, but a letter in the form annexed as Appendix-7 hereto must be forwarded to this office along with tender document and a copy of this letter must be produced in the office by the person attending the opening of tender. Unless this letter is presented by him, he may not be allowed to attend the opening of tender.

5.2 In case of unscheduled holiday on the closing / opening day of tender, the next working day will be treated as scheduled prescribed day of closing / opening of tender, the time notified remaining the same.

## **6. PRICE:**

6.1 The price quoted must be net for per unit and must include packing and delivery charges.

6.2 The tenderers are requested to quote their firm prices. Any change or modification to the offer after opening of the tender will not be considered at all.

6.3 The bidder/tenderer is advised to quote rates keeping in mind that repeat order can also be placed upto 50% of the original quantity of any item(s) on the same terms and conditions as stipulated in the original purchase order during the validity of the order, or within six months of original supply order, whichever, is later. It will be obligatory on the part of the supplier / contractor to execute such repeat order (s) also.

6.4 Spares, Annual Maintenance Contract and Optional Items shall be quoted separately in the price bid, wherever asked for. Spares, AMC, and optional items will not form the part of commercial bid and will not count for deciding the lowest bidder.

### **6.5 Payment of excise duty and sales tax / VAT (on ultimate products)**

Payment of excise duty and sales tax/VAT (on ultimate products), as applicable on the closing date of tender will be to the supplier's / contractor's account. Any statutory variation (both plus and minus) in the rate of excise duty/sales tax/VAT after closing date of tender/revised price bid but before the expiry of the contractual delivery / completion period will be to the account of the office.

The bidder(s) will indicate, in their bid, the amount with exact rate of the Excise and Sales tax/VAT on ultimate finished product, as applicable at tendering stage, separately in the bid. In case the above information subsequently proves wrong, incorrect or misleading (a) this Organisation will have no liability to reimburse the excess in the difference in rates of the item under which the duty/tax assessed finally (b) this Organisation will have the right to recover the difference in case the rate of duty / tax finally assessed is on the lower side.

Any increase in excise duty, sales tax / VAT during extended period of the contract / supply order will be to supplier's / contractor's account where such extension in delivery of the materials/completion of the project was on the request of supplier / contractor. However, any decrease in excise duty/sales tax/ VAT during extended period of the contract / supply order, will be to the account of this Organisation.

6.6 As the material, which is to be transported to the consignee, belongs to the Government of India / Prasar Bharati and therefore is exempted from entry tax / octroi duty / toll tax. However, if the State Governments / Statutory Local Bodies are bound to levy such taxes, the taxes will be paid by supplier / contractor. Supplier/Contractor may raise its claim, for reimbursement of such duties / taxes paid, with Organisation, along with original receipt of the payment.

6.7 In case of SITC of / SETC tenders, prorata breakup details of cost of all the identifiable store items of supply and ITC / ETC charges shall be given along with a price bid.

6.8 The taxes like excise duty, sale tax / VAT, service tax etc. as applicable on the goods / services shall be quoted separately in the price bids.

## **7. Trade/Volume Discount**

Bidders will not indicate separate discount. Discount, if any, should be merged in the rates against the quoted item(s). Discount of any type indicated separately will not be taken into account for evaluation purposes.

## **8. Eligibility:**

Bids should be from actual manufacturers. Bid from sole selling agents / authorised distributors / Authorised dealers/ Authorised contractors can also be considered provided such bids are accompanied with necessary supporting documents / authority letter from concerned actual manufacturers who authorised them to market their products, provided further, such an authority letter is valid at the time of bidding. The supplier / contractor shall ensure that the required warranty cover is provided by the original manufacturer of the product. In case of SITC / SETC and specialised work, the contractor should also have sufficient experience and shall submit the experience certificate of satisfactory completion of atleast three similar works, each of value not less than 40% of the estimated cost put to tender, or two similar works, each of value not less than 60% of the estimated cost, or one similar work of value not less than 80% of the estimated cost, all amounts rounded off to the convenient full figure, in the last seven years ending on the last day of the month previous to the one in which the tenders are invited.

## **9. Purchase Preference for Product of Public Enterprises:**

The Organisation reserves the right to allow to the public enterprises, purchase preference facilities as admissible under the existing policy of the Government of India and not to accept the lowest rate quoted by the tenderer.

## **10. Scope of Supply of Equipments / SITC / SETC:**

The delivery of stores / execution of SITC / SETC is required as stated in Invitation to Bid on terms specified in clause 2 of General Terms & Conditions at Annexure-II. Any deviation must be clearly mentioned.

## **11. Samples**

11.1 Samples are not required unless specifically called for.

11.2 The samples when called for should be sent to the purchasing authority along with the offer. The cost and freight of sending the samples shall be borne by the tenderer and there will be no obligation on the part of receiving officer for their safe custody.

Samples received late are liable to be ignored. If the samples are sent by Railway Parcel, The Railway Receipt (RR) should be posted separately to the addressee to which the samples are sent (under covering letter giving the particulars of tender number and due date) well in advance to enable the addressee to get the parcel released before the date of opening of tender. The RR should not be sent along with the offer. Samples submitted with the tenders, which have not been accepted; will, if it has not been destroyed during testing, be delivered at your cost provided the application for return is made to the officer to whom the samples are sent, within one month of the date fixed for the opening of tender or after modification / cancellation of demand. This organisation will not be liable for loss, damage, or breakage in respect of samples. If no application is received within the due date, samples will be disposed of by public auction and the sale proceeds credited to this Organisation.

#### **12. Consideration of offer in full or in part:**

This Organisation may reject / accept or prefer any tender without having to assign any reason whatsoever. This Organisation also reserves to itself the right to accept any tender in part or split the order between two or more bidders. Tenderers are at liberty to quote separate rates for the whole quantity as well as reduced quantity.

#### **13. Acceptance of Offer by Telegram / Fax/E-mail**

Acceptance by the purchaser will be normally communicated by Telegram/Fax/E-mail. In case where acceptance is communicated by Telegram/Fax/E-mail, the regular order will be forwarded as soon as possible but the instructions contained in the Telegram/Fax/E-mail should be acted upon immediately. With the issue of Telegram/Fax/E-mail of acceptance, the contract shall be deemed to have concluded. Contract shall mean and include the invitation to tender / instructions to tenderers, acceptance of tender, supply of stores / SITC / SETC particulars and the general and special conditions specified in the acceptance of tender.

#### **14. Specifications:**

i) Unless otherwise asked for, the offers of "Makers design or for alternative specifications, the tenderer must note that his offer, will be rejected in case the tender stipulations are not complied with strictly or the goods offered do not conform to the required specifications indicated therein. The lowest tender will be determined from among those tenders, which are in full conformity with the required specifications.

ii) In case the offers have been asked for "Makers design" or for alternative specifications, the tender will clearly indicate as to how the materials being offered will serve this Organisation's purpose and in what respect the offer differs from the required specifications.

iii) If this Organisation finds that materials supplied / works carried out are not of correct quality and are not according to required specifications or otherwise not satisfactory owing to any reason of which the Organisation will be the sole judge, The Organisation will be entitled to cancel the contract for supply of stores / SITC / SETC and meets its requirements of stores / SITC / SETC from the open market at the risk and cost of the supplier / contractor, reserving always to itself the right to forfeit the security deposit placed by the supplier / contractor for fulfilment of the contract.

## 15. Earnest Money Deposit / Performance Security Deposit

### 15.1 Earnest Money Deposit :

The bidders must enclose with their technical bid along with EMD in the form of Demand Draft in favour of Addl. Director General (E)(SZ), All India Radio & Doordarshan, Chennai-600 005, from a Commercial Bank . EMD by means of Bank guarantee or any other mode of payment other than DD shall not be accepted.

15.2 Offers without EMD will be ignored.

15.3 The Earnest Money deposited by the tenderer shall be forfeited by this Organisation in the following events:

- (a) If tender is withdrawn during the validity period or any extension thereof.
- (b) If tender is varied or modified in a manner not acceptable to this Organisation during the validity period or any extension of the validity duly agreed by the bidder.
- (c) If a tenderer, whose tender has been accepted, fails to furnish Security Deposit within 2 weeks from the issue of the acceptance offer of the tender, the offer is likely to be cancelled.

15.4 The EMD of unsuccessful bidders will be returned on finalization of the tender. The EMD of successful bidder will be returned on receipt of security deposit or it may be adjusted in the security deposit if requested by the tenderer.

### 15.5 Performance Security Deposit:

The contractor shall furnish the security deposit within 2 weeks of placement of order at the rate of 10% of the total contract value at the time of signing the contract. The Security deposit shall be furnished in favour of The Addl. Director General (E) (South Zone), AIR & Doordarshan, Chennai-5 in any one of the forms: Fixed Deposit Receipt from a Commercial Bank/DD Payable at Chennai / Bank Guarantee from a Commercial Bank valid up to the end of warranty period as per contract.

16. **Transfer of Tender Documents:** The tender is non-transferable.

### 17. Correspondence:

- i) Our Fax / Email address is:  
Fax: 044-25381147 Email : 1. [ceszpurchz@gmail.com](mailto:ceszpurchz@gmail.com)  
2. [purchase@ceszairdd.org.in](mailto:purchase@ceszairdd.org.in)
- ii) All correspondence from tenderer / contractor shall be made to the Purchase Authority (by name), who has issued this tender.
- iii) All correspondence shall bear reference to Tender No. / Purchase Order.

### 18. Order on Higher Tenderer:

It should be noted that if an order is placed for supply of stores / SITC / SETC on a higher tenderer in preference to the lowest acceptable offer in consideration of an earlier delivery, the tenderer will be liable to pay to the Purchaser, the difference between the contract rate quoted by the lowest acceptable tenderer, in case he fails to complete the supply of stores / SITC / SETC in terms of such contract within the specified date of delivery. This is without prejudice to other rights under terms of contract.

## **19. Payment Terms:**

### **(i) For Supply Contracts:**

(a) The supplier will submit its bill for 90% of the material cost along with copy of Inspection Certificate to the consignees. On receipt of stores in good condition, consignee will complete necessary formalities at his end and verify the bill and submit to the paying authority along with measurement book for making payment.

(b) The bill for balance 10% of material cost will be submitted by the suppliers along with proof of the deposit of performance security money for guarantee/warranty period to the consignee. Consignee will verify the bill and submit the same to the paying authority for release of payment.

### **(ii) For SITC/SETC (Supply, Installation /Erection, Testing & Commissioning) Contracts:**

(a) 80 % of the contract price for the equipments/materials inclusive of excise duty and Sales tax shall be paid on initial inspection and delivery of equipments at site in good condition. The consignee will complete necessary formalities at his end and verify the bill and submit to the paying authority along with measurement book for making payment.

(b) 20 % of the contract price for equipments and 100 % of installation charges on satisfactory completion of installation, testing, commissioning and handing over. The consignee will complete necessary formalities at his end and verify the bill and submit to the paying authority along with measurement book for making payment.

## **20. Unsolicited Post Tender Modification:**

In case certain clarifications are sought by this Organisation after opening of tenders, then the reply of the Bidder should be restricted to the clarifications sought. Any Bidder who modifies his Bid (including a modification, which has the effect of altering the value of his offer) after the closing date without specific reference by this Organisation shall render the bid liable to be ignored and rejected without notice and without further reference to the Bidder. Canvassing in any form by the Bidders shall also render the bid liable to be ignored and rejected without notice and without further reference to the Bidder.

## **21. Clarification in respect of Incomplete offer:**

This Organisation has to finalize its purchase within a limited time schedule. Therefore, it may not be feasible in all cases for this Organisation to seek clarification in respect of incomplete offers. Prospective Bidders are advised to ensure that their bids are complete in all respects and conform to our terms and conditions and Bid Evaluation Criteria of the tender. Bids not complying with this Organisation's requirements may be rejected without seeking any clarifications.

## **22. Income Tax/Trade Tax / Work Contract Tax Liability:**

(i) The Bidder will have to bear all Income Tax liability both corporate and personal tax. Income tax on the contract value, as applicable, will be deducted at source by the paying authority.

(ii) Some State Governments levy work contract tax/trade tax. These taxes are to be borne by the supplier / contractor, wherever applicable. These taxes will be deducted by the paying authority.

(iii) Bidder must give the TIN / PAN, VAT / Sale Tax, Service Tax, Registration no. in Appendix – 5, failing which the offer will not be considered.

### **23. After Sales Service and Training:**

The tenderer must furnish complete details of after sales service arrangement including training to be provided in respect of the equipment. After sales service arrangements should include details of infrastructure facilities available in the country. The training should be made available free of cost at sites. Failure to give this information, will lead to automatic rejection of the offer, without any reference to the Bidder.

### **24. Replacement/Rectification:**

In the event the stores supplied or SITC / SETC carried out against the contract are found to be defective, the supplier / contractor will have to take back the defective materials at his own cost and replace / rectify the defects of the Stores / SITC / SETC free of charge without loss of time. The supplier / contractor will not be entitled to dispose of the Store / Equipment / Material given for replacement / rectification without the prior permission of this Organisation. All charges concerned with the rectification including freight charges will be borne by the supplier / contractor.

### **25. Tender Fee: ( If applicable)**

- (i) Tender to be paid by Bidders is as indicated in the Invitation to Bid.
- (ii) The offers will not be considered without Tender Fee.

### **26. Evaluation / Security of bids:**

Technical / Commercial evaluation of bids shall be undertaken in accordance with the prescribed procedure by a Committee of the Organisation duly constituted for this purpose. The technical evaluation would be based on:

- (i) assessment of technical capability of tenderer to manufacture tendered items of stores / carry out SITC / SETC;
- (ii) capability of tenderer to effect supply of stores / carry out SITC / SETC in stipulated time as assessed on the basis of installed capacity for manufacturing and turnover of tendered items in preceding three years; and
- (iii) past record of timely and good quality supply of tendered items of store / execution of SITC / SETC by tenderer in preceding three years.

### **27. Employment by firms to officials of this Organisation:**

Firms / Companies, who have or had business relations with this Organisation, are advised not to employ serving employees of this Organisation without its prior permission or within the initial two years period after the retirement / resignation / severance from the service without specific permission of this Organisation. This Organisation may decide not to deal with such firms who fail to comply with the above advice.

## **28. Arbitration :**

If any dispute, difference, question or disagreement shall at any time, hereafter arise, between the parties hereto or the respective representatives or assignees in connection with or arising out of the contract or in respect of meaning of specifications, design, drawings, estimates, schedules, annexure, orders, instructions the construction, interpretation of this agreement, application of provisions thereof or anything hereunder contained or arising hereunder or as to the rights, liabilities or duties of the said parties hereunder or any matter whatsoever incidental to his contract or otherwise concerning the works of execution or failure to execute the same, whether during the progress or work of stipulated/extended period or before or after the completion or abandonment thereof, it shall be referred to the sole arbitration of the person appointed by the Addl. Director(E) (SZ), All India Radio & Doordarshan, Chennai. There will be no objection to any such appointment that the arbitrator so appointed is an employee of this Organisation or that he had to deal with the matters to which contract relates and that in the course of his duties as this Organisation's employees he had expressed views of all or any of the matters in dispute or difference. If an arbitrator to whom the matter is referred dies or refuse to act or resigns for any reason from the position of arbitrator, it shall be lawful for the Addl. Director(E) (SZ), All India Radio & Doordarshan, Chennai to appoint another person to act as arbitrator in the manner aforesaid. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor if both the parties consent to Addl. Director(E) (SZ), All India Radio & Doordarshan, Chennai to this effect failing which the arbitrator will be entitled to proceed de-novo.

It is a further term of this contract that no person other than the person appointed by the Addl. Director(E) (SZ), All India Radio & Doordarshan, Chennai as aforesaid shall act as arbitrator and that, if for any reason that is not possible, the matter is not to be referred to the arbitration at all. The arbitrator(s) may from time to time, with the written consent of all the parties to the contract enlarge the time for making and Publishing the award. It is a term of the contract that the party invoking arbitration shall specify the disputes to be referred to arbitration under the clause.

It is also term of the contract that the contractor shall not stop the work under this contract and work shall continue as expected to continue whether the arbitration proceedings have commenced or not.

The arbitrator shall give reasoned award in respect or each dispute or difference referred to him. The award as aforesaid shall be final and binding on all the parties to the contract in accordance with the law.

The Venue of the arbitration shall be at New Delhi (India). Subject to as aforesaid, the provision of the Indian Arbitration Act, 1940 and any statutory modifications or re-enactments thereof and rules made there under and for the time being in force shall apply to the arbitration proceedings under this clause.

**PROFORMA FOR BIDDERS TO ACKNOWLEDGE THE BID DOCUMENT**

Dated:

Dear Sirs,

We hereby acknowledge receipt of a complete set of Bid Documents pertaining to Procurement / SITC/SETC of \_\_\_\_\_ Against \_\_\_\_\_

We have noted that the closing date for receipt of the tender by you is the time specified in the tender document and opening at specified time and date.

We guarantee that the contents of the above said Bid Package will be kept confidential within our company and text of the said package shall remain the property of your Organisation and that the said documents are to be used only for the purpose intended by your Organisation.

Our address for further correspondence on this tender will be as under:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Fax No :  
Telephone No :  
E-Mail No :  
Personal Attention of (If required):

Yours faithfully

**BID SUBMISSION FORM AND AGREEMENT**

Tender. No ADG(E)(SZ)/PUR/ NIT-18/ACP/2011-12/

**The Addl. Director(E)(SZ),  
All India Radio & Doordarshan,  
Chennai - 600005.**

Dear Sirs,

1. I/We hereby offer to supply the stores detailed in schedule hereto or such portion thereof as you specify in the Acceptance of Tender at the price given in the said schedule and agree to hold this offer open till.....I/We shall be bound by the communications of acceptance dispatched within the prescribed time.
2. I/We have understood the "Instructions to Bidders", specifically the instructions to the tenderers in the booklet DGS&D-229 and accepted the "conditions of contract" and specifically the conditions of the contracts as contained in DGS&D-68 (R) for Supply/SITC/SETC and have thoroughly examined the specifications, drawings and/or pattern quoted in the schedule hereto and am/are fully aware of the nature of the stores required and my/our offer is to supply stores strictly in accordance with the requirements.
3. The following pages annexure-II-to-annexure-IV have been added to and form part of this tender.
4. Agreement at Appendix 2A on purchase of Tender documents and submission of Tender has been duly signed and returned herewith.

Yours faithfully,

Signature of witness

Address

Date

Signature of witness

Address

Date

**PRASAR BHARTI  
(BROADCASTING CORPORATION OF INDIA)  
OFFICE OF ADDL.DIRECTOR(E) (SZ),  
All India Radio & DOORDARSHAN  
CHENNAI – 600 005.**

**APPENDIX-2A**

**AGREEMENT**

Tender **No. ADG(E)(SZ)/PUR/ NIT-18/ACP/2011-12/**

To  
PRASAR BHARTI (B.C.I.)  
The Addl.Director(E) (SZ), All India Radio & Doordarshan,  
Chennai – 600005.

Sub:- Purchase Of Tender Documents

Ref:- Tender No. ADG(E)(SZ)/

The Addl.Director(E)(SZ), All India Radio & Doordarshan, Swami Sivananda Salai, Chennai – 600005, acting on behalf of Prasar Bharti (B.C.I.) and the Tenderer agree that the Tenders is an offer made on the condition that the Tender would be kept open in its original form without variation or modification for a period as the mention in the invitation bid ,the last date for the receipt of tenders stated in the SITC/SETC/NIT AND THE MAKING OF THE TENDER SHALL BE REGARDED AS AN UNCONDITIONAL AND ABSOLUTE ACCEPTANCE of this condition of the Tender. We further agree that the contract consisting of the above conditions of Tender as the offer and the submission of Tender as the Acceptance shall be separate and distinct from the contract which will come into existence when tender is finally accepted by this Organisation. The consideration for this separate initial contract proceeding the main contract is that this Organisation is not agreeable to sell the Tender to the Tenderer and to consider the tender to be made except on the condition that tender shall be kept open for ..... days after the last date fixed for the receipt of tenders and the Tenderer desires to make tender on this condition after entering into this separate initial contract with this Organisation. This Organisation promised to consider the tender on this condition and the tenderer agrees to keep the tender open for the required period. These reciprocal promises form the consideration for this separate initial contract between the parties.

If Tenderer fails to honour the above terms and conditions this Organisation shall have unqualified, absolute and unfettered right to en cash the earnest money submitted on this behalf.

Yours faithfully,

(BIDDER)

(PURCHASER)  
on behalf of the Prasar Bharti Corporation of India

(One copy of this agreement duly signed must be returned along with the Technical Bid)

**EXCEPTION / DEVIATION PROFORMA**

This organisation expects the bidders to fully accept the terms and conditions of the tender document. However, should the bidder still envisage some exception/ deviations to the terms and conditions of the tender documents, the same should be indicated here and put in unpriced bid i.e. "Technical Bids". The price effect for withdrawal of such exception(s) to be indicated in the price bids only. If this proforma is left blank, then it would be presumed that bidder has not taken any exception / deviations to the terms and conditions of the tender documents.

Clause No. of Tender document	Full compliance not agreed	Exception/ deviation taken by Bidder	Confirmation if price effect for withdrawal of this exception has been specified in the Price Bid	Remarks

Signature of the Bidder /Tenderer

Name

Seal of the Company

**BIDDERS PAST SUPPLIES PROFORMA**

Sl. No.	Name & Address of client	Period from..... To.....	Description of stores / works in details	Total quantity supplied successfully	Remarks

**Note:** Certificate from clients to be enclosed along with this proforma.

**BIDDERS INFORMATION PROFORMA**

Tenderer must give specific answers against each of the following questions.

Tender No. **ADG(E)(SZ)/PUR/ NIT-18/ACP/2011-12/** Due for opening -----  
-----

1. Whether stores offered / SITC/SETC conform to specification at Annexure-IV, if not, details of deviations must be stated here.
2. Date by which delivery of stores / execution of work can be completed.
3. Business name and constitution of tendering firm. Is the firm registered under?
  - (i) Indian companies Act, 1913.
  - (ii) The Indian Companies Act, 1932/1956
  - (iii) Any other Act, if not who are owners?  
(Please give a full name).
4. VAT / Sales tax Registration No.
5. Central Sales Tax Registration No.
6. Service Tax Registration No.
7. PAN No / TIN No.
8. Annual turnover for last 3 years.
9. Present worth of tendering firm.
10. Fax No.:
11. E-mail :
12. Valid Electrical License number of contractor, Attested copy of the License to be submitted. **(For Electrical Works)**

Signature of Tenderer

Date \_\_\_\_\_

PRICE BID

Schedule of Rates

(To Be Filled In By Tenderers)

Tender No. **ADG(E)(SZ)/PUR/ NIT-18/ACP/2011-12/**

Tender's Name \_\_\_\_\_

Due Date\_\_\_\_\_

Delivery Period:

Tenderer's Quotation No. ----- Validity of Quotation-----

**SCHEDULE OF REQUIREMENT FOR WATER COOLED 6x15TR. AIR-CONDITIONING PLANTS**

Name of the Station : All India Radio-- CHENNAI 'A'

S.N O	DESCRIPTION OF THE EQUIPMENT	CAPACITY OF EACH UNIT	QTY.	REMARKS.
4.0.	SITC of 6X15 Ton Packaged type Water cooled Air conditioning plant Consisting of the following:-	15 Ton	06 Nos per site	i) 04 Nos. of plants, will run at a time, remaining 02 Nos plants shall be standby. ii) Tentative Layout of A/C Eqpt. layout enclosed for reference. <b>TC-16183</b>
4.1.	Package type, water cooled 15 Ton on ASHRE design conditions with R-22 or R134a refrigerant comprising semi-hermetic type Reciprocating compressor complete with microprocessor controller, water cooled condenser, cooling tower and piping with first charge of refrigerant as per following design conditions:	45360 Kcal/Hr.	6 units per site	Ref. para-1.0 of sec.-I
4.1.1	End suction condenser Water pump sets with Bronze impeller for condenser water re-circulation complete with TEFC squirrel cage motor with accessories as given in sec.-II and as per following parameters --- i) Capacity of each pump net head ii) Efficiency	900 LMP to suit the system requirement. 80%	Two Units per site	Ref. para-2.4 of sec.-II
4.1.2	<b>Air Handling unit</b> complete with fan section with motor Cooling coils with coil section Air filter section, stainless Steel drain pan etc. Confirming to specifications given in section-II and as per following parameters:		06 units per site	Ref. para-2.7 of sec.-II
a)	Total refrigeration capacity of cooling coils per unit	Shall not be less than 45360Kcal./hr./unit		
b)	Nominal fan discharge per unit.	6,000 CFM/102,00 CMH		

4.1.3	Housing/cabinet for the above equipment complete with air outlet port/ports at the top and air suction grill in the front Of the plant, with Thermal /acoustic Lining inside and attractively finished with corrosion resistant paint from outside along with ant vibration mounts.	The design & size of the Cabinet shall allow adequate space around Each component, mounted inside the cabinet, for ease of maintenance/ serviceability	One set of cabinet per unit.	
4.1.4	Induced Draft Cross Flow Type water cooling fire Retardant FRP/HDG Steel tower with accessories	Total heat rejection capacity shall be not less than 271250.KCal/Hr	02 units per site	Ref.para–2.6 of Section-II. One unit as stanby.
4.1.5	Make-up water tank PVC, Sintex Type With accessories.	Not less than 2000 ltrs.	1 unit per site	Ref. para 2.7 of Section-II
4.1.6	MS'C' Class Condenser water pipes and accessories	To match the requirements of water circuits	1 lot	Ref. para 2.10 of Section-II.
4.1.7				
(a)	Cubical Type sectionalized floor standing switchboard by CPRI approved firms of 31 MVA fault capacity,3-phase,415 Volt, 4-wire switch board .	As required for various Electrical machines of A/C System.	1 lot	Ref.para 2.13 of Section-II
(b)	SITC of earth pits for the above equipment. ( As per CPWD general Specification for electrical works, 1994(Part-I-internal)		2Nos	
(c)	Electrical power cables and Control wires.	As required		
4.1.8	On-Line water scale Preventer / Water softening system. (The tenderer may study the Quality of water to recommend and quote suitable on-line scale preventer/ water Softening system.)	As required	01No	Ref. Para-2.3 of sec.-II
4.2	Training of AIR Personnel.			Ref. Para- 1.10, sec.- 1
4.3.	Civil works: Foundation staging etc. for equipment, making Openings in walls/slabs and making good thereof. Painting of equipment.	As per requirement of the equipment.	1 Job	Ref.para. 13 sec. 2
4.4	Supply of Manuals for operation, maintenance and servicing for all the equipment supplied and detailed drawings of electrical and interlocking circuits.		03 sets for each site	
4.5.	Dismantling of existing A/c plants		One job	

4.6.	Remote Status Panel		01No.for each site	Ref. Para-2.11of sec-2
<b>OPTIONAL ITEMS</b>				
1)	Operation charges for 1st 6 months After commissioning of AC Plants		Lump sum	
2)	Charges for comprehensive AMC per year.		Lump sum	
3)	Spares		1set for each site	Ref..Para 1.13,of sec.-I N.B: The cost of spares shall not be considered for ranking of the bid.
4.)	Tools	1 set for each site		Ref. Para 1.14 of sec.-I

**SITE CONDITIONS:-**

**Ambient design conditions**

S.NO.	STATION	POWER	TEMP.IN SUMMER		TEMP.IN MONSOON		TEMP.IN WINTER	
			DB( <sup>o</sup> C)	WB( <sup>o</sup> C)	DB( <sup>o</sup> C)	WB( <sup>o</sup> C)	DB( <sup>o</sup> C)	WB( <sup>o</sup> C)
1	CHENNAI 'A'	200 kW	40	36.5	28	26	21	19

Tenderer's Signature

Date

Seal

**Note**

1. Please indicate prorata break up details of all identifiable items of supply of stores and ITC / ETC cost in proforma Appendix - 6A enclosed.
2. The statutory charges like Excise Duty, VAT/Sale Tax, Service Tax etc which will not be borne by the bidder must be indicated with % rates as applicable in column 7 above, failing which this Organisation will not be liable for payment of any such charges.
3. State Entry Tax, Toll Tax and other taxes which are collected by statutory bodies on the way during transportation of materials **shall not be included in the price bid**. These taxes, if paid, may be reimbursed as per actual on claim with original receipt of payment.

**PRICE BID**  
**Prorata Break Up Details Of The Identifiable Items of Supply**  
**And ITC / ETC cost**

(To Be Filled In By Tenderers)

Supply, Installation, Testing and Commissioning (SITC) of Water cooled  
 Packaged type Airconditioning Plant 6x15 Ton at AIR, Avadi (CHENNAI).

Tender No **ADG(E)(SZ)/PUR/ NIT-18/ACP/2011-12/**

Tender's Name -----

Due Date-----

Delivery Period:-----

Tenderer's Quotation No. \_

Validity of Quotation\_

SI No.	Description of items/works	Quantity	Unit	Rate per unit (both in figures and words)	Total (both in figures and words)	Taxes if any (rate & amount)
1.						
2.						
3						
4						
5						

**Grand Total (1+2+3+4+5) in Rs.**  
 (Both in words & figures)

Tenderer's Signature

Date

Seal

No.

To,

PRASAR BHARATI (BCI),  
The Addl. Director(E)(SZ),  
All India Radio & Doordarshan,  
Chennai – 600005.

SUBJECT : Tender No. \_\_\_\_\_ due on  
\_\_\_\_\_

Sir,

Sri \_\_\_\_\_ has been  
authorised to be present at the time of opening of above tender due on  
\_\_\_\_\_ at Chennai-5 on my/our behalf.

Yours faithfully,

Signature of Tenderer

Copy to : Shri \_\_\_\_\_ for  
information and for production before the time of opening of tenders.

**General Terms And Conditions  
(GTC)**

(Each page must be signed and returned along with your offer)

**1. Definitions**

Unless inconsistent with or otherwise indicated by the context, following terms stipulated in this ORDER shall have the meaning as defined hereunder.

**1.1 Order**

Shall mean written purchase order issued by this organisation to the successful bidder including subsequent amendments to ORDER in writing thereof.

**1.2 The Organisation /Purchaser**

Shall mean PRASAR BHARATI (BCI), ADDL.DIRECTOR GENERAL(E) (SZ) All India Radio & DOORDARSHAN, CHENNAI -600005, acting on behalf of President of India shall include all their legal representatives, successors and assignees.

**1.3 Supplier/Contractor**

Shall mean any person or persons of firm or company in India whose bid has been accepted by this Organisation and the legal representation, representatives, successors and permitted assignee of such person, persons, firm or company.

**1.4 Sub-Contract**

Shall mean ORDER placed by the Supplier/Contractor for any portion, of the ORDER or work Sublette with necessary written consent of this Organisation on third party. Such sub-letting shall not relieve the contractor from any obligation, duty or responsibility under the Contract.

**1.5 Sub-Contractor**

Shall mean any person or persons or firm or their legal representatives, successors, assignees to whom part of ORDER has been sub-letter by the Supplier/Contractor after necessary consent of this Organisation.

**1.6 ORDER PRICE**

Shall mean the sum accepted or the sum calculated in accordance with the rates accepted by this Organisation and amendments thereof and shall include all fees, registration and other charges paid to statutory authorities without any liability on the Organisation for any of these charges unless specially agreed to, in writing by this Organisation.

**1.7 DELIVERY PERIOD**

Shall mean dispatch of the stores or receipt of the stores or installation and commissioning or erection and commissioning or fabrication and erection of the stores depending on the type of contract (Supply of Stores / SITC / SETC) by the date specified in the ORDER.

## **1.8 DESTINATION**

Shall mean the location of the consignees for which this ORDER has been issued.

## **1.9 EQUIPMENTS/MATERIALS**

Shall mean and include any equipment, instruments, stores and goods to be supplied for under the ORDER and amendments thereto.

## **1.10 DRAWINGS**

Shall mean and include all Engineering sketches, general arrangements, layout drawing, Sectional plans, all elevations etc., related to the ORDER together with modification and revision thereto.

## **1.11 SPECIFICATIONS**

Shall mean and include detailed description, statements to technical data, performance characteristic and standards (Indian as well as as applicable and as specified in the ORDER).

## **1.12 INSPECTION OFFICER**

Shall mean any person or outside Agency nominated by this Organisation to inspect equipment, materials and services, if any, in the contract stage-wise as well as final before dispatch at Suppliers Works and on receipt at destination as per the terms of the ORDER.

## **1.13 TESTS**

Shall mean such process or processes to be carried out by the Suppliers/Contractor as prescribed in the ORDER, are considered necessary by this Organisation or their representative in order to ascertain quality, workmanship, performance and efficiency of equipment or part thereof

## **1.14 APPROVAL**

Shall mean and include the written consent either manuscript, typewritten or printed statement under or over signature or seal as the case may be of this Organisation or the representative or documents or other particulars in relation to the ORDER.

## **2. SCOPE OF ORDER**

2.1 Scope of the order shall be as defined in the ORDER, specifications, drawings and annexure thereto.

2.2 Completeness of the EQUIPMENT/SITC/SETC shall be the responsibility of the Suppliers/Contractors. Any equipment fittings and accessories, which may be specifically mentioned in the specification or drawing (s) but which are usual or necessary for the satisfactory functioning of the EQUIPMENTS (successful operation and functioning of the equipment being Suppliers/Contractors responsibility shall be provided by the SUPPLIER without any extra cost).

2.3 The Suppliers/Contractors shall follow the best modern practice in the manufacture of high grade EQUIPMENT notwithstanding any omission in that, the Supplier/Contractor shall in all respect design, engineer, manufacture and supply the same within delivery period to the entire satisfaction of the Organisation.

2.4 WORK TO BE CARRIED OUT UNDER THE ORDER

All equipment to be supplied/SITC/SETC to be executed under the ORDER shall conform to and comply with the provision of relevant regulations/Acts (State Govt. or Central Govt.) as may be applicable to the type of equipment/work carried out and necessary certificate shall be furnished.

**3. SPECIFICATION, DRAWING, TECHNICAL MANUALS**

3.1 The Suppliers/Contractors shall furnish four copies and such additional no. of copies as required by this organisation of technical documents final drawing, preservation instructions, operation and maintenance manuals, test certificates, spare parts catalogue before dispatch of the equipment as under:

- (i) Inspection Officer
- (ii) Consignee (2 copies)
- (iii) Purchaser

3.2 The Suppliers/Contractors shall be responsible for any loss to this Organisation consequent to the furnishing of the incorrect data/drawings.

3.3 The Suppliers/Contractors shall provide Cross Sectional Drawing to identify the spare parts numbers and their location.

3.4 Specifications, design and drawings issued by this Organisation to the supplier/contractor along with tender specification and ORDER are not to be sold or given on loan. These documents continue to remain property of this Organisation. OR THEIR ASSIGNEE AND ARE SUBJECT TO RECALL BY this Organisation. The Suppliers/Contractors and its employees shall not make use of the drawings, specification and technical information for any purpose any time and shall not disclose the same to any person, firm or corporate authorities without written permission of the Organisation. All such details shall be kept confidential.

3.5 In order to facilitate quick disposal, copies of the drawing for approval shall be sent directly and simultaneously to the authorities specified in the order in addition to the sets submitted to authority issuing order.

**4. ACCEPTANCE OF ORDER**

4.1 Within fifteen (15) days from date of mailing of ORDER, SUPPLIER/CONTRACTOR shall confirm acceptance of the order in its entirety.

4.2 The ORDER is accepted unconditionally by Suppliers/Contractors by returning to this Organisation copy of the ORDER duly signed.

4.3 When Suppliers/Contractors has accepted the order with all its terms and conditions, tenderer's bid with general sales conditions and all his previous correspondences are considered superseded and void.

- 4.4 Should Suppliers/Contractors not respect the time limit for the Confirmation of the order or in case Suppliers/Contractors cannot accept the ORDER, this Organisation reserves the right to cancel in writing without prejudice to other terms, the entire ORDER or part of it, without notice. Under these circumstances the earnest money given by the supplier/contractor will be forfeited in full.

## **5. MODIFICATION IN ORDER**

- 5.1 All modifications leading to changes in the order with respect to technical and /or commercial aspects, including terms of delivery, shall be considered valid only when accepted in writing by this Organisation by issuing amendment to the ORDER.
- 5.2 This Organisation shall not be bound by any printed conditions, provision in the SUPPLIER BID, forms of acknowledgement of ORDER, invoice, packing list and other document, which purport to impose any condition at variance with or supplement to ORDER.

## **6. JOINT AND SEVERAL RESPONSIBILITY**

- 6.1 Where Suppliers'/Contractor's Equipment or any part thereof are to be used jointly with the equipment supplied by another manufacturer (the name of the manufacturer will be communicated separately to supplier) this Organisation will hold supplier and the manufacturer jointly and severally responsible for the perfect operation of the entire group or section of equipment as regard the technical and mechanical characteristics stipulated in the specification. Such responsibility shall include the mechanical coupling as well as dynamic and starting moment.
- 6.2 Consequently, Suppliers/Contractors shall establish and maintain all necessary contract with the manufacturer to be indicated by the organisation with a view to ensuring the exchange of all relevant data and information.

## **7. PERFORMANCE SECURITY DEPOSIT**

- 7.1 To ensure due performance of the contract, Performance Security is to be obtained from the successful bidder awarded the contract. The successful bidder, 2 weeks from the date of the issue of the letter of indent will be required to deposit Performance Security Deposit in the form of Fixed Deposit Receipt from a Commercial Bank/Demand Draft / Bank Guarantee from a Commercial Bank for an amount as indicated in the letter of indent. The Performance Security Deposit shall be 10 % of cost of the order / contract value.
- 7.2 The Security money may be deposited in the form of Fixed Deposit Receipt/Demand Draft/Bank Guarantee from a Commercial Bank. It should remain valid for a period of 60 days beyond the date of completion of all contractual obligations of the supplier, including warranty/guarantee obligations.
- 7.3 This Organisation shall not be liable to pay any Bank Charges, Commissions or interest on the amount of Performance security deposit.

- 7.4 Performance Security deposit shall be refunded to the supplier/contractor after completion of all contractual obligations of the supplier, including warranty/guarantee obligations. If the materials are supplied in the extended delivery period, the supplier/contractor will extend the validity of Demand Draft/Bank Guarantee/ FDR accordingly and the Security Deposit / Performance Guarantee will be released after extended validity expires.
- 7.5 For release of Performance security deposit, supplier/contractor shall submit a certificate from the consignee to the effect that the equipment has performed satisfactorily during the guarantee period as stipulated in the order and organisation has not suffered any loss or inconvenience on this account.

## **8. WARRANTIES AND GUARANTEES.**

### **8.1 MATERIALS AND WORKMANSHIP**

- 8.2 Unless some special warranty/Guarantee clause has been stipulated elsewhere in the invitation to the tender or any of its Annexure, the following warranty shall form part of the contract placed on successful tender:-
- 8.2.1 Suppliers/Contractors shall fully warrant that all the stores, Equipment and components supplied under the ORDER shall be new and of first quality according to the specifications and shall be free from defects (even concealed fault, deficiency in design, materials and workmanship).
- 8.2.2 Should any defects be noticed in design, material and/or workmanship within 15 months from the date of shipment/dispatch of last consignment or 12 months from the date of receipt/commissioning of the equipment, or the guarantee/warranty period as specified in specifications (Annexure IV) whichever is later, the organisation shall inform Supplier/Contractor and Supplier/contractor shall immediately on receipt of such intimation, depute their personnel within 14 days to investigate the causes of defects and arrange rectification /replacement/modification of the defective equipment at site without any cost to the Organisation within a reasonable period. If the supplier/contractor fails to take proper corrective action to repair/replace the defects satisfactorily within the reasonable period, this Organisation shall be free to take such corrective action as may be deemed necessary at contractor's risk and cost after giving notice to the Supplier/Contractor.
- 8.2.3 Damage to the machinery and/or equipment due to incomplete and erroneous instructions issued by Supplier/Contractor will be the responsibility of the supplier/contractor and will be treated according to the provisions of warranty clause. Normal wear & tear shall not come under purview of this clause.
- 8.2.4 In case defects are of such nature that equipment shall have to be taken to suppliers/Contractor's works for rectification etc. Supplier/Contractor shall take the equipment at his cost after giving necessary undertaking or security as may be required by the Organisation. This Organisation shall, if so required by the supplier/contractor, dispatch the equipment by quickest mode on "Freight-to pay" basis to the supplier's/contractor's works. After repairs suppliers/contractors shall deliver the equipment at site on freight pre-paid basis. All risks in transit to and fro shall be borne by the supplier/contractor.

- 8.2.5 Equipment or spare parts thereof replaced shall have further warranty for a period of 12 months from the date of acceptance.
- 8.2.6 The supplier/contractor shall guarantee that they will supply spare parts if and when required on agreed price. The agreed price should include but without any limitation to agreed discount on the published catalogue price or on agreed percentage of profit on the landed cost.
- 8.2.7 The supplier will warranty that before going out of production for any of spare parts, they will give adequate advance notice to the purchaser so that the latter may undertake to procure, if necessary, the balance of the life time requirements.
- 8.2.8 If the repairs, replacement or modification referred are of such nature as may affect the efficiency of the EQUIPMENT this Organisation shall have the right to give to the Supplier/Contractor within one month of such replacement / renewal notice in writing to carry out test as may be required for acceptance of the equipment.
- 8.2.9 If the supplier/contractor fails to honour his obligation to repair or replace defective goods within a reasonable period of time, or if supplier/contractor refuses to carry out work under the guarantee clause and implied guarantee condition, if danger is anticipated or in case of severe urgency, the Organisation shall be entitled to carry out, at Supplier's/Contractor's cost and risk, repair work or replacement deliveries or have it done by a third party. In case not all goods have been delivered by Supplier/Contractor, this Organisation is entitled to procure the remaining goods/services at Supplier's/Contractor's cost and risk. This does not relieve Supplier's/Contractor's of any of his guarantee obligations. Taxes and duties of any kind whatever imposed by the authorities of the country of the supplier or his sub contractors until delivery shall be borne by supplier//contractor.

## **9. PERFORMANCE GUARANTEE**

- 9.1 Supplier/Contractor shall guarantee that the performance of the Equipment /Material supplied under the order shall be strictly in conformity with specification and shall perform the duties specified under the ORDER.
- 9.2 The Supplier/Contractor shall guarantee that the materials / equipment that shall be purchased from the sub-contractor(s) shall be such as to fulfil the requirements laid down vide para 8.1 to 8.10 above and shall undertake to ensure fulfilment of these requirement.

## **10 REJECTION**

If the ORGANISATION finds that the goods supplied are not in accordance with the specification and other condition stated in the order or its sample (s) are received in damaged conditions (of which matters this Organisation will be the sole judge), this Organisation shall be entitled to reject the whole of the goods or the part, as the case may be and intimate to the Supplier/Contractor the rejection without prejudice to the Organisation other rights and remedies to recover from the Supplier/Contractor any loss which the ORGANISATION may be put to, also reserving the right to forfeit the performance security deposit if any made for the due fulfilment of the contract.

The goods shall be removed by the supplier/contractor and if not removed within 14 days of the date of communication of the rejection the Organisation will be entitled to dispose-off the same on account and at the risk of the Supplier/Contractor and after recovering the storage charges at the rate of 5% of the value of goods of each month or part of month and loss and expense if any caused to the Organisation pay balance to the Supplier/Contractor.

**11. FAILURE AND TERMINATION CLAUSE**

Time and date of delivery shall be essence of the contract. If the Contractor/Supplier fails to deliver the stores / execute SITC / SETC, or any instalment thereof within the period fixed for such delivery in the schedule or at any time repudiates the contract before the expiry of such periods, the purchaser may without prejudice to any other right or remedy, available to him to recover demurrages for breach of the contract:-

- a) Recover from the Supplier/Contractor as agreed, liquidated demurrages including Administrative expenses and not by way of penalty, a sum equivalent to 0.5% per week upto maximum limit of 10% of the contract value for such delay or part thereof (this is an agreed, genuine pre-estimate of demurrages duly agreed by the parties) which the supplier/contractor has failed to deliver thereof is accepted after expiry of the aforesaid period, provided that the total demurrages so claimed shall not exceed 10% of the contract price of the stores / SITC / SETC. After full period of extension, termination of the contract will be considered by the Organisation.
- b) Purchase or authorise the purchase elsewhere on the account and at the risk of the contractor/supplier, of the stores not so delivered / SITC / SETC not carried out or other of a similar description (where stores exactly complying with the particulars are not in the opinion of the purchaser, which shall be final, readily procurable) by serving prior notice to the contractor/supplier without cancelling the contract in respect of the instalment not yet due for delivery or,
- c) Cancel the contract or a portion thereof by serving prior notice to the Contractor/Supplier and if so desired purchase or authorise the purchase of the stores not so delivered / SITC / SETC not carried out, or others of a similar description (where stores not delivered / SITC / SETC not carried out, exactly complying with particulars are not in the opinion of the purchaser, which shall be final readily procurable) at the risk and cost of the Contractor/Supplier. If the Contractor/Supplier had defaulted in the performance of the original contract, the purchaser shall have the right to ignore his tender for risk purchase even though the lowest, where the contract is terminated at the risk and cost of the firm under the provisions of this clause, it shall be in the discretion of the purchaser to exercise his discretion to collect or not, the Security deposit from the firm on whom the contract is placed, at the risk and expense of the defaulted firm.
- d) Where action is taken under sub-clause (b) or sub-clause (c) above, the contractor shall be liable for any loss which the purchaser may sustain on that account, provided the purchase or if there is an agreement, to purchase, such agreement is made in case of failure to deliver the Stores/Services, within 6 months from the date of such failure and in case of repudiation of contract the Contractor/Supplier shall not be entitled to any gain on such the entire discretion of the purchaser to serve a notice of such purchase on the Contractor/Supplier.

- (e) It may further be noted that clause (a) above provides for recovery of liquidated demurrages on the cost of contract price of delayed supplies (whole unit) at the rate of 0.5% per week up to maximum limit of 10% of the contract value for such delay or part thereof. Liquidated demurrages for delay in supplies thus accrued will be recovered by the paying authority on instruction as specified in the supply order, from the bill for payment of the cost of materials / works submitted by the supplier / contractor in accordance with terms of supply order on instruction from Purchaser regarding liquidated demurrages amount.
- (f) Notwithstanding anything stated above, equipment and materials will be deemed to have been delivered / SITC / SETC will be deemed to have been carried out only when all its components, parts are also delivered. If certain components of stores are not delivered in time / SITC / SETC not carried out in time, the stores / SITC / SETC will be considered as delayed until such time all the missing parts are also delivered.

## 12. **INSPECTING/TESTING OF MATERIAL**

The inspection of stores/services/works will be carried out by the authority specified in the purchase order. The stores/works will be accepted only after the same has been found satisfactory after inspection and duly marked and sealed by the inspection authority.

- 12.1 The Supplier/Contractor shall ensure that the stores/services/works to be supplied/executed against this order shall be individually inspected, tested and analysed in terms of the specifications attached to the tender and the relevant codes and practices specified therein by expression or implication. Necessary test reports shall be provided as required.
- 12.2 The Supplier/Contractor should make available to the Organisation and any other individual/agency authorised by the Organisation for the purpose of inspection all its records and results in respect of inspection, test and analysis conducted by it as part of their manufacturing and testing operation under the applicable codes and practices specified by expression or implication in the tender.
- 12.3 Inspection tests and analysis shall be carried out/conducted at the Supplier's/Contractor's works by the authorised representative of the Organisation and the cost of to and fro air fare, accommodation and cash allowances payable to the authorised representative of the Organisation shall be borne by the Organisation.
- 12.4 The Supplier/Contractor shall provide and deliver free of charge for tests/analysis by an independent authority at any such place or places as the Organisation or its authorised inspector may reasonably require such raw material (s) used or intended to be used for the contracted work by the Supplier/Contractor as the Organisation/Inspector shall consider necessary. The cost of such tests/analysis shall be borne by the Contractor.
- 12.5 This Organisation shall be entitled at all times, whether prior to, during or after the completion of inspection by itself and/or through inspectors appointed by the Organisation at the Organisation's cost, to inspect, test and/or analyses and/or to direct the Contractor in all respect of any store(s) or materials processes used or proposed to be used in the fabrication of the product of any of them.

The said inspection, tests and analysis as far as required, is to be conducted in the presence of the inspectors. The contractor shall ensure that the inspecting personnel referred to above are given free access to all the required places and information connected with their work, besides working facilities to carry out their function.

- 12.6 Should the supplier/contractor fail to comply with any of the provisions aforesaid relating to inspection, testing and /analysis the Organisation shall be entitled by itself and/or through inspectors to conduct or have conducted the inspection, test and/or analysis at the risk and expense of the supplier/contractor in all respects.
- 12.7 No rejected raw materials shall be used for the contracted work or re-tendered for inspection and/or test except with the prior permission of concerned Inspectors.
- 12.8 Unless otherwise specifically authorised by the Organisation in writing, the contractor shall not dispatch the stores under the contract entered into, any material which has not been properly inspected/tested marked and in respect of which a certificate of quality has not been issued or signed by the inspectors.
- 12.9 In addition to the general conditions of the inspection stated above, the supplier/contractor shall also satisfy all the specific conditions of inspection as enumerated in the specification attached.
- 12.10 In addition to inspector(s) the Organisation shall be entitled to nominate, depute or designate a representative to be stationed at the supplier's/contractor's factory in order to supervise and/or coordinate operations related to the contract. In the event of there being more than one factory involved in the work entrusted to the Supplier/Contractor, the Organisation shall be entitled to nominate/depute or appoint such representative(s) as necessary in respect of each such factory.
- 12.11 The Supplier/Contractor shall at his cost afford and ensure proper working facilities to the said representative(s) at the factory (i.e.) to enable him to perform his functions, and shall furnish him with all such information, data and assistance as he may require for the proper performance of his functions.
- 12.12 The posting of such a representative by the Organisation or his actions in any manner does not absolve the contractor of any liability, and/or responsibility under this contract. The representative's posting shall be treated as advisory to the Organisation.
- 12.13 For false calls for the cases where material is rejected on inspection the supplier will bear the actual cost of inspection incurred/suffered by the Organisation.
- 12.14 Place of inspections specified in supply order will not be changed without written confirmation from Purchase Authority.

13. **SUB-STANDARD MATERIAL/REPLACEMENT OF REJECTED GOODS**

13.1 If the Organisation finds that MATERIAL supplied / SITC/SETC executed are not of the correct quality or not according to specification required or otherwise not satisfactory owing to any reason of which the Organisation will be the sole judge, the Organisation will be entitled to reject materials, cancel the contract and buy its requirement in the open market at the risk and cost of supplier, reserving always to itself the right to forfeit the performance security deposit placed by the supplier for the due fulfilment of the contract.

13.2 Rejected goods should be removed and replaced within 14 days of the date of communication of rejection.

14. **SUBLETTING AND ASSIGNMENT**

The Supplier/Contractor shall not, save with the previous consent in writing of the purchase Authority, sublet, transfer or assign the contract or any part thereof or interest therein or benefit or advantage thereof in any manner whatsoever, provided nevertheless that any such consent shall not relieve the contractor from any obligation, duty or responsibility under the contract.

15. **BREAKAGE/SHORTAGE**

Claim in respect of breakage/shortages, if any, shall be preferred on the supplier within thirty days from the date of receipt of stores at destination by the consignee which shall be replaced/made good by the supplier at his own cost.

All risk or loss or damage to the material shall be upon the Supplier/Contractor till it is delivered in accordance with the terms and conditions of the supply order.

16. **DESIGNS, PATENTS AND ROYALTIES**

If any material used or methods or processes practiced or employed in the manufacture of items to conform with the requirement of the contract is/are covered by a patent(s) in respect of which contractor is not licensed, the supplier/contractor shall before using the material, method or process, as the case may be, obtain such license(s) and pay such royalty(ies) and license fee(s) as may be necessary. The supplier/contractor shall keep the Organisation indemnified from and against any and all claims, actions demand and proceedings whatsoever brought or made against the organisation on the basis of any patent or infringement thereof claimed or otherwise relating to and arising from any method or process employed or matter or thing done to or in connection with any work executed by the supplier/contractor shall at their own risk and defend any suit for infringement or patent or like suit brought against the Organisation (whether with or without the contractor being a party thereto and shall pay demurrages and costs awarded in such suit and keep the Organisation indemnified from and against all consequence thereof.

17. **FORCE MAJEURE**

In the event of either party being rendered unable by force majeure to perform any obligation required to be performed by them under the contract, if any concluded, the relative obligation of the party affected by such force majeure lasts.

The terms "Force Majeure" as implied herein shall mean acts of God, War, Civil riots, fire directly affecting the performance of the contract, floods and Acts and Regulations of respective Government of the two parties, namely the Organisation and the contractor. Both upon the occurrence of such cause and upon its termination, the party alleging that it has been rendered unable as aforesaid shall within seventy two hours of the alleged beginning and ending thereof giving full particulars and satisfactory evidence in support of its claim. If deliveries are suspended by force majeure conditions lasting for more than 2(two) months, the Organisation shall have the option of cancelling this contract in whole or part at its discretion without any liability on its part.

18 **LANGUAGE/TERMINOLOGY**

The Supplier/Contractor shall ensure the Language/Terminology/description of goods/Services/Works used in the Supply Order/Bill/Invoice/any other documents dispatched by the Supplier/Contractor is **verbatim in English**.

19 **REPEAT ORDER**

Repeat order can also be placed with the supplier up to 50% of the quantity of this order on the same terms and conditions as stipulated in the original supply order, during the validity of the supply order or within six months from the date of this supply order, whichever is later. It is a condition of this order and it will be obligatory on the part of Supplier/Contractor to execute such repeat order(s) also as the consideration for this option on favour of the purchase forms part of the main consideration under this order.

20 **PACKING & MARKING**

20.1 The supplier shall consign / Ship the stores in Sea worthy / Airworthy / Roadworthy packing confirming to the prescribed standards in force to withstand air / Ocean / Land journey and ensuring the safety of cargo en-route and also arrival of material at ultimate destination in good condition. The consignment shall be comprehensively insured against all risks by the Suppliers / Contractors from Supplier's / Contractor's warehouse up to destination . Each packing case should have proper identification like name of suppliers, name of consignee, gross weight, TOP / do not turn over / handle with care.

20.2 Each package shall have a detailed packing list.

21. **INSURANCE**

The contractor shall insure entire equipment during Transit, Storage, Installation, Testing, Commissioning until handing over to the consignee against losses, damages due to fire, earthquake, war, flood/ thefts etc. No claim will be admissible on this account.

22. **SHORT / DAMAGED / DEFECTIVE / NON RECEIPT OF MATERIAL**

The Supplier / Contractor is responsible for safe arrival of the material up to destination. Should there be any shortage / breakage of material found, the consignee, within a period of 30 days of receipt of material at destination, will lodge claim with the Supplier / Contractor and carriers under intimation to the Purchaser. The purchaser in question will also take up the matter with the supplier to make good the deficiency.

23. **Extension of Delivery Period**

In case where only portion of the stores ordered is tendered for inspection at the fag end of the delivery period and also in case where inspection is not completed in respect of the portion of the stores tendered for inspection during the delivery period ,the purchaser reserves right to cancel the balance quantity not tendered for inspection within the delivery fixed in the A/T at the risk and expenses of the contractor without further reference to him. If these stores for inspection during the fag end of the delivery period are not found acceptable after carrying out the inspection the purchaser is entitled to cancel the contract in respect of the same at the risk and expenses of the contractor. If, however the stores tendered for inspection and found acceptable, the purchaser may grant an extension of the delivery period subject to the following conditions.

- (i) The purchaser has the right to recover from the contractor under provision of clause 11 Annexure-II of the general condition of the contract liquidated demurrages on the stores which the contractor has failed to deliver within the DP/ refixed delivery period.
- (ii) That no increase in price on account of any statutory increase in or fresh imposition of customs duty, excise duty sales tax or on account of any other tax or duty leviable in respect of the stores specified in the A/T which takes place after the date of the delivery period stipulated in the A/T shall be admissible on such of the said stores as or delivered after the date of the delivery stipulated in A/T.
- (iii) That not with standing any stipulation in the contract for increase in price on any other ground, no such increase which take place after the date of the delivery stipulated in the A/T shall be admissible on such of the said stores as are delivered after the expiry of the D/P stipulated in A/T.
- (iv) But nevertheless, the purchaser shall be entitled to the benefit of any decrease in price on account of reduction in of remission of custom duty, excise duty, sales tax or on account of any other tax or duty or on any other grounds as stipulated in the price variation clause which takes place after the expiry of the date of delivery stipulated in the acceptance of tender.
- (v) The contractor shall not dispatch the stores, till such time an extension in terms of para (i) to (ii) above is granted by the purchaser and accepted by the supplier. If the stores are dispatched by the supplier before obtaining an extension letter from the purchaser, he would be doing so at his risk and no claim for payment shall lie against the purchaser either in respect of the cost of the stores dispatched or any other expenses which the supplier may have incurred. The purchaser shall however have a right to cancel the contract in terms of clause 11 Annexure II General terms & conditions . It shall be no defence that the consignee has taken delivery of the stores dispatched by the supplier without getting an extension letter and therefore the contract has been kept alive.
- (vi) In case where the entire quantity has not been tendered for inspection within the Delivery period stipulated in the A/T and the purchaser agrees to grant extension in the period the same would be subject to the conditions (i) to (iv) as mentioned paragraph above.

**BID EVALUATION CRITERIA**

1.	SALIENT FEATURES	BIDDERS CONFIRMATION
1.1	Open Tender No.	<b>ADG(E)(SZ)/PUR/ NIT-18/ACP/2011-12/</b>
1.2	Two Bid System	Yes
1.3	Tender Fee	As per clause 4 of Invitation to Bid
1.4	Validity period of Bid	120 days from the date of opening i.e. up to and inclusive of date of opening
1.5	Earnest Money	As per clause 5 of Invitation to Bid
1.6	Performance Security Deposit	Would be required on placement of Letter of indent i.e. 10% of the ordered value and shall be valid for 60 days from the date of expiry of guarantee / warranty
1.7	Delivery Period	As specified in the "Invitation to Bid"
1.8	Closing date of tender	<b>12.30 Hrs. on 22.11.2011</b>
1.9	Opening date of Technical bid	<b>15.00 Hrs. on 22.11.2011</b>
1.10	Opening date of Price bid	Date as may be separately notified later.

**2. VITAL COMMERCIAL CRITERIA FOR ACCEPTANCE**

The following vital commercial conditions should be strictly complied with failing which the bid will not be considered.

2.1 Bids should be from actual manufacturers, public sector undertakings, supply houses / representatives / distributors / dealers / authorised agents / contractors with required experience in the field.

## 2.2 SUBMISSION OF EARNEST MONEY ALONGWITH BID

The bidders must enclose with their technical bid along with EMD in the form of Demand Draft in favour of Addl. Director General(E) (SZ), All India Radio & Doordarshan, Chennai-600 005, from a Commercial Bank . EMD by means of Bank guarantee or any other mode of payment other than DD shall not be accepted. The amount of Earnest Money Deposit should be as per Clause 5 of "Invitation to Bid".The offers without earnest money will not be considered and summarily rejected.

2.3 Submission of Performance Security Deposit for execution of contract as well as for satisfactory performance of equipment during warranty period by the successful bidders

2.4 Acceptance of "Failure and Termination Clause", No. 11 (GTC) of Tender documents.

2.5 Acceptance of "Arbitration Clause", No.28 (Annexure-I) of tender document.

2.6 Acceptance of "Warranty and Guarantee Clause", No.8 (GTC) of tender document.

## 3. CRITERIA FOR LOADING OF BIDS

The following criteria will be adopted for evaluation of bid :-

3.1 For delivery/completion periods quoted longer than that specified in the bid document, the quoted price shall be loaded ½% per extra week or part there of. Offers with delivery/completion period longer than 3 months beyond the stipulated delivery completion period will be rejected.

3.2 Bidders will not indicate separate discount. Discount if any should be merged in the rates against the quoted items. Discount, if any, indicated separately will not be taken into account for evaluation purposes.

## 4. VITAL TECHNICAL CRITERIA FOR ACCEPTANCE OF BIDS

4.1 Quotation in original must be from the manufacturers/authorised supply house.

4.2 In case, the bidder is an authorised dealer/supply house/contractor with requisite work experience, he should name the original manufacturer. Bidder should furnish warranty from the original manufacturer and also furnish a certificate from the manufacturer that the bidder can quote items of the original manufacturer directly. Offers not complying with these requirements will be rejected, without any notice/back reference.

4.3 Past performance report of similar items earlier supplied / similar works earlier carried out for this Organisation will be taken into consideration while evaluating this bid. The bid shall be rejected, if the past performance of the similar item earlier supplied/similar work earlier carried out for the Organisation is found to be unsatisfactory.

DESCRIPTION OF STORES & TECHNICAL SPECIFICATIONS

Tender No **ADG(E)(SZ)/PUR/ NIT-18/ACP/2011-12/**

Due Date\_\_\_\_\_

---

<b>Sl.</b>	<b>Description of Stores/SITC/SETC Specification No. No.</b>	<b>Qty.</b>
------------	--	-------------

---

Kindly refer Technical Specification (52) pages enclosed.

**P R A S A R   B H A R A T I**

**DIRECTORATE GENERAL : ALL INDIA RADIO**

**(PLANNING & DEVELOPMENT UNIT)**

**NEW DELHI – 110 001**

**SPECIFICATION DOCUMENT FOR SITC OF 6x15 TON, WATER COOLED,  
PACKAGED TYPE, AIR CONDITIONING PLANTS, FOR MW HIGH POWER  
TRANSMITTER INSTALLATIONS OF ALL INDIA RADIO.**

SPECIFICATION NO. : XAC-1/2011  
DATE OF APPROVAL : 23.09.2011  
DATE OF ISSUE :  
NO. OF PAGES : 52  
APPROVAL FILE No. : 14(12)2010- D(TD/MW)/300kW

**GENERAL:-**

These specifications covers supply, installation, testing and commissioning of 3X15Ton,4x15Ton, 6X15 Ton, package type, water cooled A/C Plants at the High Power Transmitter installations of All India Radio.

**SUMMARY OF CONTENTS:-**

1. SECTION I	: General Conditions	Page No. 43-47
2. SECTION II	: Technical Specifications	- Page No.-48-64
3. SECTION III	: Inspection Procedure and schedule of measurements	- Page No.—65-88
4. SECTION IV	: Schedule of Requirements	- Page No.89 -91
5. Drawings		Page No.92 -93

**N.B. :**

1. The Tenderer should go through all the Sections of the Specifications carefully and should confirm clause by clause compliance to all the Sections clearly. Tenders without clause by clause compliance shall be rejected outrightly.
2. The Tenderer should mention the list of items offered as per schedule of requirements in Section-III, without indicating the Price to assess the completeness of the Offer in the Technical Bid if there is separate Commercial Bid.

**(SK SAXENA)  
DIRECTOR ENGINEERING (TD)**

**1.0 GENERAL****1.1 SCOPE**

This specification for water-cooled 6x15 TR Packaged Type, air-conditioning plants covers supply at site, installation, testing and commissioning of complete equipment after dismantling of existing plants and its associated equipments at MW Transmitter sites as specified in section-IV(Schedule of Requirements). The plants shall work on HCFC (R-22 or R134a) refrigerant. Detailed technical requirements are given in section-II .The plants shall be able to deliver the specified tonnage, both in summer and monsoon seasons under site conditions given in section- IV.

**1.2 GENERAL CONDITIONS OF CONTRACT**

Payment terms, insurance cover, SITC schedule and time of delivery, inspection at manufacturer's/ tenderer's works (as per Annex- III of section III), testing and commissioning of equipment and guaranty terms, penalty for delay etc. would be applicable as per AIR terms and conditions on the subject framed by the indentor. The schedule of measurements would be applicable as given in section-III.

**1.3 Site visit**

In case the tenderers desire to have guidance regarding the electrical, and water piping schematic location for C.T., Make-up water tank etc and existing layout of equipment in plant room, they are advised to inspect the site before submitting their tender.

**1.4 DESCRIPTIVE TECHNICAL LITERATURE AND DRAWINGS****1.4.1 Tender Documents**

The tenderers shall submit the following in duplicate along with their tender (as a part of technical bid).

Descriptive and technical leaflets giving complete mechanical details in Plan, Elevation and Sectional view and electrical data about the equipment offered including detailed dimensions of the equipment make ,model etc.

b) The statement of bill of quantities, technical particulars (see Annexure-I) and performance specifications of the equipment offered in the proforma as per Section-II and Section-III of the specifications.

c) Tentative details showing cable sizes and length, equipment capacities, switchgear number rating and, control components.

d) A schedule in the form of bar chart giving time period from start to finish of the complete work.

**1.4.2 Installation Drawings**

In the event of an order being placed, the tenderer shall supply to the indentor 3 copies each of the following for approval within one month from the date of placement of the order.

- a) Dimensional drawings (including sections) giving complete details for erection of plants including foundation.
- b) Electrical wiring diagram and control circuits drg. of all electrical equipment showing cable sizes and electrical rating of the related equipment.

- c) Instruction manuals of various equipment of the A/C plants detailing all adjustment, operation & maintenance/servicing procedures.

**NOTE:-**

Before taking up the installation work at site, the tenderer shall ensure that the indenter approves the installation drawings. The plants are to be replaced in consultation with indenter and Engineering head of the station, so that there is no disruption in service due to replacement work as ventilating air is circulated all the time the transmitter is functioning. On account of this requirement, plants shall be erected in winter and completed commenced by Feb.

**1.4.3 COMPLETION DRAWINGS AND OTHER INFORMATION**

Two sets of complete drawings comprising the following shall be submitted by the tenderer while handing over the installation:

- (a) Electrical drawings for the entire electrical equipment showing cable sizes, equipment capacities, switchgear ratings, control components, & control wiring.
- (b) Schematic control ckt. drawings giving detailed notes to explain the sequence of operation of the control circuit.
- (c) Piping drawings showing layout for the entire piping with all diameters, lengths, sizes and number of valves etc. shown clearly. Isometric drawings showing each of the equipment/ units shall also be supplied.
- (d) Detailed drawings and specifications in respect of wearing parts and parts likely to be damaged.
- (e) Lists of components like thermostats, other control components, relays, timers, contactors etc. giving their type, designation, function etc.
- (f) Schedule of items of which the tenderer is not the manufacturer/ the manufacturer's authorized dealer. This should contain the specifications of each item and the agency from which these items are procured.
- (g) Two sets of Instruction, Operation and Service Manuals.

**1.5 EXCLUSIONS:**

The following items of work shall be provided by the indenter and need not therefore be included in the tender.

- (a) All supply and return ducts including the plenum chamber & the R.S. Joists for the plenum chamber.
- (b) Main power supply connection terminated in a cable box at the switchboard of the tenderer.
- (c) Main electrical earth up to the tenderer's switch boards.
- (d) Water supply at one point in the A/C plant room for the purpose of installation, testing and commissioning. Water supply at the location of makeup water tank and expansion tank.

**1.6 ERECTION**

1.6.1 This specification provides for dismantling of the existing plants & the complete erection including all the associated civil works like staging, R.S. Joist for cooling tower and water makeup tank, foundation for equipments of the air conditioning plants at site etc by tenderer. The entire work shall be carried out as per codes, regulations, detailed in Annexure-2 and as per following terms and conditions.

1.6.2 The dismantling of old plants and erection of new plants should be planned in such a way as to have minimum interruption in the cooling system of the transmitter. Also should be done in non transmission hours in consultation with station authorities.

1.6.3 The tenderer shall make his own arrangement for storage of all equipment and materials brought to site from time to time and their safe custody at site with no obligation to AIR on account of theft/loss/damage to the store till the plants are taken over by the indenter/his representative. The tenderer shall make his own arrangements for providing accommodation for his workmen at site. Tents may, however, be pitched in the site compound at places to be decided upon by the indenter or his representative at site.

1.6.4 The tenderer shall make his own arrangements for procuring necessary labour, skilled and unskilled. He should conform to all local government laws and regulations covering labour and their employment.

1.6.5. The tenderer shall indemnify and hold harmless the purchaser against all claims in respect of injury to any person howsoever arising out of the erection of the equipment in the course of such installation. The tenderer shall discharge all his obligations under the Indian workman's compensation act in as far as it affects workmen in his employment.

1.6.6 The tenderer and his employees shall comply with the regulations in force for controlled entry into the premises where the air-conditioning equipment is to be installed.

#### **1.7 TENDERER'S LIABILITY FOR DAMAGES CAUSED DURING INSTALLATION WORK AND IMPERFECTIONS NOTICED WITHIN THE GUARANTY PERIOD**

If the tenderer or his/her workmen or servants shall break, deface, injure or destroy any part of the building in which they may be working or any building, road, road kerb, fence, enclosure, water pipe, cable, drains, electric or telephone posts or wires, trees, grass or grasslands in the premises on which the work or any part of it is being executed, or if any damage shall happen to the work while in progress from any cause whatsoever, or if any defect, shrinkage or other faults appear in the work within 12 months (after final certificate or otherwise of its completion given by the indenter) arising out of defective or improper materials or workmanship, the tenderer shall, upon receipt of a notice in writing on that behalf, make good at his/her own expense, or in default, the indenter may get the same rectified and deduct the expenses from any amount that may be then due or at any time thereafter may become due to the tenderer or from his security deposit.

#### **1.8 INSPECTION AND TESTS :-**

**1.8.1 Pre Dispatch Inspection:** The equipment will be inspected by the indenter or his authorized representative at manufacturer's works before dispatch in accordance with various standards/procedures specified in Annexure-3 in Section-III or modifications thereof that may be carried out by the indenter in consultation with the tenderer before issuing A/T. The tenderer should intimate the indenter at least 03 weeks in advance about readiness of the equipment for inspection at a date mutually agreed upon by the indenter and tenderer. Before giving a call for inspection, the tenderer shall submit the photocopies of the Test certificates as per relevant IS to the indenter and must satisfy himself that the SITC of A/C plants is as per AIR specifications. The tenderer shall quote testing charges, if any levied by the manufacturer / contractor. The expenditure towards travel & stay of the inspectors shall be borne by the indenter. If during inspection, any component /parts found defective, the same shall be replaced by the tenderer at his cost.

**1.8.2 Site Acceptance Tests:-** Soon after erection of the plants at site, inspection of the plants before carrying out Acceptance Tests shall be carried out jointly by the Inspecting Officer and the representative of Indentor/consignee in the presence of tenderer's representative. The acceptance tests are to be carried out as per Annexure-IV of Section-III of the specification. Separate capacity tests shall be carried out during summer months (preferably during April to mid July) and monsoon (mid July to end of August). Before offering the plant for capacity test, the tenderer will conduct trial run of the plant for 20 days subject to minimum aggregate of 120 hours for each plant so as to be sure that the plants are running satisfactorily. In case of a major problem being noticed during initial test run, the period of 15 days/80 hours will start afresh.

**1.9 GUARANTY/ WARANTEE:-**

The Reciprocating semi-hermetic compressors, water cooled condensers and cooling tower shall be provided with on site guaranty for satisfactory working for a minimum period of five years. The remaining air-conditioning equipment shall be guaranteed for a minimum period of one year. For this purpose the guarantee period shall be counted from the date of satisfactorily completion of first performance test. Various defects arising/reported within the guaranty period as stated above will be rectified by repairs/replacement at site by the tenderer free of charge. This shall also include free supply of the refrigerant and compressor oil etc., if required, by the tenderer for optimum running of the plant during the guarantee period of the compressor and for the remaining part of the plant as stated above. In this regard, the tenderers may also refer to other conditions specified in clause 1.6 above. The guarantee shall come into force after continuous running of plants for a period of 20 days as per para 1.8.2.

**1.10 TRAINING OF PERSONNEL :-**

The tenderer shall undertake to extend free training in operation & maintenance of air-conditioning plants offered by them to 04 technical personnel from AIR, for each site. Details of the training offered with period (not less than 3 days) is to be indicated along with tender.

**1.11 DELIVERY PERIOD:-**

The Installation, testing and commissioning of the plant shall be completed within three months from the date of order placed to the firm. No request for extension of delivery period shall normally be entertained except in extraordinary circumstances beyond the control of the tenderer and acceptable to AIR.

**1.12 Quotation In MKS/S.I.UNITS:-**

Values for performance figures given in these specifications are MKS/SI Units. Full particulars of all figures of performance of the equipment offered shall also be furnished in MKS/SI Units only. The technical data in any other unit is liable to be rejected. The technical data should be typed or in capitals only.

**1.13 SPARES:-**

Tenderer shall enclosed a list of necessary spares (without price) based on experience. with the tender document.

**1.14 TOOLS:-**

Tenderer shall enclosed a list of free tools (along with make) to be supplied by the tenderer along with tender. The tools shall be of reputed make.

**1.15 MISCELLANEOUS:-**

In order to avoid correspondence on clarifications etc., tenderers are advised to fill in Annexure-VI attached to this specification. In case tenderers wish to offer equipment etc. not strictly complying with AIR specifications, they may do so but must submit a separate statement incorporating deviations offered

### 1.16 Past Experience :-

1. The tenderer shall furnish detailed data regarding his/her past experience in design, manufacturing, supply, erection and commissioning of equipment of similar capacity and type. Only those tenderers who have successfully installed and commissioned AC Plants of same/ similar type in the preceding three years from the date of NIT, in State Govt./Central Govt. Public Sector Undertaking/ Autonomous Bodies will be considered. The indenter or his representative will have the option of visiting the installed plants or the manufacturing facility at mutually convenient date and time before acceptance of the tender.

2. Completion Certificate issued by the client dept. Of the rank of Executive Engineers and above will have to be furnished along with the tender. The completion certificate must clearly indicate

- a) No. and capacity of A/c plants
- b) The date of completion of work
- c) Nature and quality of work
- d) That the work has been completed satisfactorily
- e) That the work was completed within schedule DP.

### 1.17 After Sales Service:-

1. The tenderer shall quote charges for comprehensive AMC of the plants in section IV(SCHEDULE OF REQUIREMENT) for a period of two years after expiry of the warrantee period. Details of items covered under AMC for repairs/ replacement, routine inspection/ checking/ adjustments/ measurements and periodic maintenance schedule intended to be adopted by the tenderer shall be annexed to the technical bid.

2. The tenderer shall ensure adequate and prompt after sales service in the form of maintenance/servicing personnel, service centers and spares as and when required with a view to minimizing the break down period. Particular attention shall be given to ensure that all spares are easily available for a period of at least 10 years after the installation. In this regard tenderer shall have to submit an undertaking with tender.

3. Complete details of after sales and service network available shall be given indicating The locations of service centres (including the one nearest to the place where the present intended A/C plants are to be installed).

### 1.18 Dismantling of Old A/C Plants:-

Net price may be quoted by the tenderer after taking into consideration and deducting the self evaluated cost of existing dismantled items of old AC plants at site.

No. of Plants at present	Make	Tonnage	Working condition
3	Kirloskar AC 417	27 TR each	satisfactory

END OF THIS SECTION

**TECHNICAL SPECIFICATIONS OF AIR-CONDITIONING EQUIPMENT OF 3x15/4x15/6X15 TR CAPACITY FOR 300KW MW TRANSMITTER AT AIR STATIONS**

SL. NO	PARTICULARS	A.I.R.'S REQUIREMENTS	TENDERER'S OFFER
<b>2.1</b>	<b><u>COMPRESSOR</u></b>		
2.1.1	Type & Model	Reciprocating Semi-hermetically sealed.	
	Make	To select one out of approved Make as in Annex.-V	
2.1.2	Capacity of each unit:-	15 Ton of each unit	
	a) Under "ASHRAE" Conditions	45360Kcal./hr.	
	(b) Under site conditions.	See para 4.1 of section-IV	
	(c) Working speed	To be quoted by the tenderer	
	(d) Number of compressor used in each unit.	not more than 02nos	
2.1.3	Design (Mechanical)	Reciprocating type multi cylinder	
	a) No. of cylinders	To be stated by the tenderer	
	b) Bore (in mm)	-do-	
	c) Stroke (in mm)	-do-	
	d) Speed of operation	-do-	
2.1.4	Working Noise.	Silent and smooth-noise level not to exceed 85 dB at a distance 1 mtr. from the machine.	
2.1.5	Lubrication.	Through self contained pump and forced feed as per manufacturer's design	
2.1.6	Bearings	Self-alignment type.	
2.1.7	Refrigerant		
	a) Type	R.22 or R134a to be indicated by tenderer.	
	b) Quantity for each unit	To be indicated by the tenderer	
	c) Cooling of compressor	To be indicated by the tenderer	
2.1.8	Power consumption KW/TR:	To be indicated by the tenderer Full load and part load (at 75%, 50% and 25% as per compressor design)	
2.1.9	Other Essential Accessories of the compressor		
	(a) Suction and Discharge Shut off valve	Provision to be confirmed. by the tenderer.	
	(b) Low pressure cut-out	Type Danfoss MP-1 or similar	
	(c) High pressure cut-out	--do--	
	(d) Oil pressure protection	--do--	
	(e) Pressure Gauges		
	(i) Low pressure	Range from -2Kg/cm <sup>2</sup> to 12.5Kg/cm <sup>2</sup> similar to Fiebig /Emerald /Japsin/H. Guru make	
	(ii) High pressure	Range from -2Kg/cm <sup>2</sup> to 25 Kg/cm <sup>2</sup> similar to Fiebig /Emerald /Japsin/H. Guru make	

	(iii) Oil pressure	Range from 0 Kg/cm <sup>2</sup> to 14 Kg/cm <sup>2</sup> similar to Fiebig /Emerald /Japsin/H. Guru make	
	(f) High pressure to low pressure side relief (safety valve)	Preferably built-in feature of the compressor causing no loss of the refrigerant.	
	(g) Suction scale trap	Easily removable for cleaning	
	(h) Crank case heater	Automatic. Will be ON when compressor is off and vice versa.	
	(i) Multi stage Automatic capacity Control mechanism	Steps of capacity control including full load not less than 2.Capacity control should be through thermostat and solenoid valve etc. with separate thermostat for each step of capacity control.	
	(j) Automatic unloading for starting	To unload the compressor by at least 75% of the full load for starting purpose.	
	(k) Vibration isolator for compressor and motor:-		
	(i) Type	Resistoflex pads/ribbed neoprene rubber	
	(ii) Transmissibility factor at operating speed	Shall not be more than 10%.	
	(l) Any other item	Applicable as per type of compressor	
<b>2.2.</b>	<b><u>COMPRESSOR MOTOR</u></b>		
2.2.1	Type	To be quoted by the tenderer	
	Make	(See Annex.-V )	
	Power rating (H.P.) and speed (r.p.m.)	To be quoted by the tenderer after consideration overloads, derating & other factors as per relevant IS.	
2.2.2	Power supply	3 Ph, 415 V,+/- 10%, 50 Hz+/- 3%, AC Supply	
2.2.3	Starting Current (Amp)	To be quoted by the tenderer. Not to exceed the limits stipulated by the local electric supply company. Provision of reduced inrush starting system to be confirmed by the tenderer.	
2.2.4	Full load current	To be specified by the tenderer.	
2.2.5	Insulation	Class B or better(To be specified by the tenderer)	
2.2.6	Specifications	Shall conform to IS-325/96 and subsequent amendment thereof.	
2.2.7	Accessories for motor:-		
	(a) Starter	--Fully automatic star/delta --	
	(b) Protective devices:-		
	(i)Against overload	May be part of the starter	
	(ii) Against under voltage	---do---	
	(iii) Single phasing preventer	current sensing (series) type	
	iv) Oil sump heater interlock	To be confirmed by the tenderer.	

2.3.	<b>Water Condenser Unit</b>		
2.3.1	Heat Rejection capacity	Shall not be less than 58,968Kcal/Hr for each 15TR A/c Packaged unit.	
2.3.2	Rating	For fluid refrigerant under full load conditions for 2.8 deg. C sub-cooling.	
2.3.3	Type	Shell and tube type tube arranged to have multi-pass(2/4 flow)	
2.3.4	Make & Model	By reputed manufacturers- (See Annex.-V )	
a)			
b)	No. of condenser units	Not more than 02 units In each package unit	
2.3.5	Type of cooling	Water cooled	
2.3.6	Material of shell/tube	Steel shell, seamless copper tubes with integral fins, Condenser tubes shall preferably be individually replaceable.	
2.3.7	Quantity of water flow	Not less than 225 LPM for each package Unit.	
2.3.8	Fouling Factor (0.00075 h.sq.ft.deg. f/8tu)	Not less than 0.00013 sq.m. deg. C/W	
2.3.9	Head loss( at the max. water velocity through the condenser 2.5metre/sec.)	To be stated by the tenderer	
2.3.10	Working pressure	To be stated by the tenderer	
	i) Water side		
	ii)Refrigerant side		
2.3.11	Testing pressure		
	i)Water side	1.5 items of working pressure on full load	
	ii)Refrigerant side	-do-	
2.3.12	Whether Water flow switch has been provided with each condenser for safety of compressor	To be quoted by the tenderer	
2.3.13	Online water scale Preventer/ water Softening system.	To be quoted as a part of A/C Plant , capacity to match condenser water requirement. Capable of handling the hardness of water as per site conditions. The tenderer may examine the quality of water at site and quote a suitable On Line scale preventer / water softening system requiring no power together with its guaranteed life and workability level of hardness.	
	a) Type	Non-chemical type	
	b) Make	To be confirmed by tenderer	
	c) Brief constructional details	To be confirmed by tenderer	
	d) Principle of operation	To be confirmed by tenderer	
	e) Type of connections and mounting arrangement required.	To be confirmed by tenderer	
2.3.14	Essential accessories		
	a)Companion flanges for/ refrigerant and water connection	With suitable values at inlet & outlet of refrigerant & water	

	b) Safety relief valve	Typically set at 21Kg/cm.sq	
	c) Water drain connection	To be confirmed by tenderer	
	d) Purge valve	To be confirmed by tenderer	
	e) Fusible plug for protection against high temp	Sealed lead type	
	f) Facilities for clearing the tubes & removal of scales	Condensers should be of removable and covers type. Suitable connection should be provided for descaling the tubes by circulating chemical cleaning solution.	
<b>2.4.</b>	<b><u>Pump Sets</u></b>		
2.4.1	a) Type & specifications	The pump set shall be vertical split casing type with end suction and top discharge, Continuous duty. Electric motor driven, centrifugal mono block type. Details to be specified by tenderer.	
	b) Capacity of motor (in BHP) required	To be specified by the tenderer.	
2.4.2	Make & Model	See Annex.-V	
2.4.3	Capacity (Even after usual deterioration in plumbing, spray nozzles, addition to pressure drop pump itself in plumping & condenser)	<b>See para 4.1.1 of section IV</b> (specified by the tenderer)	
2.4.4	Head	To be suitable for following requirements:-Cooling towers shall be placed on the G. Floor of building near A/C Plant room at suitable height from Plant room floor, on RCC frame work /on the roof of AC Plant room .	
2.4.5	Suction lift	Approximately 5 mts (water)	
2.4.6	Discharge Pressure(LMP)	To be specified by tenderer	
2.4.7	R.P.M	To be specified by tenderer and at this speed should not generate excessive high pitch noise.	
2.4.8	Degree of protection design	IP 24 in accordance with IS 4691 (1985)	
2.4.9	Working Noise	Noise level not to exceed 85 dBA at distance of 1mt from the pump set.	
2.4.10	Essential Accessories/fittings for pump sets.		
	a) Suction and discharge shut off valves	Valve should be of butterfly type (AUDCO/ADVANCE/CASTLE) (AUDCO/ADVANCE/CASTLE)	
	b) Check valves (Discharge)	Provision to be confirmed by tenderer (Of standard make-advance/LAT/CASTLE)	
	c) Water Pressure Gauges (150mm dia) i) Suction side ii) Discharge side	Gauges should be of standard make such as Marshall Fiebrag/EMERALD type (of reputed make) such as Emerald/Sant)	
	d) Strainer in suction line of each pump	Strainer, easily cleanable of reputed make.	

	e) Water Meter (Dial type at combined output of pumps)	Round integrating type of dial, make such as Emerald/Sant)	
	f) By-Pass arrangement for the water meter	To be provided by the tenderer	
	g) Gland drain	Typically 25mm	
	h) Spilled Water collection pan.	Provision is to be confirmed by the tenderer including provision for drainage out of the building.	
2.4.11	Vibration isolation pads	Suitable vibration isolation pads for each pump sandwiched between foundation and pumps to be provided by the tenderer, along with concrete foundation.	
2.4.12	Efficiency	To be specified by tenderer	
<b>2.5.</b>	<b><u>PUMP MOTOR</u></b>		
2.5.1	Type and Rating	To be select one out of approved make (Annex-V) Continuous duty, squirrel cage induction motor. 10% more than that of the B.H.P required by the pump.	
2.5.2	HP	To be specified by the tenderer	
2.5.3	Starting current	To be specified by the tenderer	
2.5.4	Running current	-do-	
2.5.5	Efficiency	> 80%	
2.5.6	Insulation	Class E or better	
2.5.7	Essential Accessories of pump motor		
	a) Starter	DOL type	
	b) Protection against over load	May be built-in in the starter	
	c) Protection against under voltages	To be confirmed by the tenderer	
	d) Single phasing preventer	Series type (current sensing)	
	e) Interlocking	Auxiliary contact in the starter for interlocking with the compressor circuit	
<b>2.6.</b>	<b><u>Cooling Tower</u></b>		
2.6.1	a) Type	Induced draft cross flow fire-retardant FRP/HDG cooling tower with PVC fill type fill. Variable speed drive of reputed make for CT Fan shall be provided. The tenderer shall supply Cooling Tower Characteristic curves for motor output Vs wet bulb ambient temperature as per CTI requirement.	
	b) Make	As per approved makes(See Annex.-V)	
	c) Model	To be specified by the tenderer	
2.6.2	Thermal Performance	CTI Certified. Certificate to be enclosed with tender	
2.6.3	Total Heat rejection capacity	Not less than as shown in para 4.1.4 at ambient conditions mentioned under section IV	
2.6.4	a) Water flow rate (Lit./min.)	To be specified by the tenderer and should be suitable range of 4.2 <sup>0</sup> C and approach of 3.8 <sup>0</sup> C.	
	b) Consumption of water in L/Hr.	To be specified by the tenderer.	

2.6.5	Material and construction	Except where otherwise specified, all mechanical equipment support Structure, fan guards and all bolts, nuts fasteners used in the construction of tower shall be fabricated of hot dipped galvanized(HDG) steel .(Quantity of galvanization in grams per Sq.Mt. to be indicated by the tenderers)	
<b>2.6.6</b>	<b>Mechanical Equipment</b>		
	A) Fan	Fan shall be propeller-type incorporating heavy-duty blades of aluminum alloy or oriented-strand Fiberglass-reinforced epoxy. Blades shall be Individually adjustable. Fan shall not generate Sound level exceeding 80dBA at a distance of 2(two) Meters from fan discharge.	
	B)Motor		
	i)Type	Motor shall be TEFC, variable torque and specially 'insulated for cooling tower duty and contacts for interlocking circuit shall be provided. Name plate horse power shall not be exceeded at design operation.	
	ii) Degree Of Protection	To be specified by the tenderer	
	iii) H.P	To be specified by the tenderer	
	iv) Running current		
	v) Speed	-do-	
	vi) Insulation	-do-	
	vii) Make	As per approved makes(See Annex.-V)	
	viii) Essential Accessories:		
	b) Protection against over load	May be built-in in the starter	
	c) Protection against under voltages	May be built-in in the starter	
	d) Protection against Single phasing	Series type (current sensing)	
	e) Interlocking	Auxiliary contact in the starter for interlocking with the compressor circuit shall be provided	
	C) Assembly	The complete mechanical equipment assembly shall be supported by a rigid, welded, hot dipped galvanized steel structural support .The mechanical equipment assembly shall be warranted against any failure caused by defects in materials and workmanship for not less than five years following installation and commissioning. This warranty shall cover the fan, drive shaft and couplings, and mechanical equipment support (s). The electrical motor shall carry a Manufacturer's warranty of at least one year.	

2.6.7	Fill, Louvers and Draft	Fill shall be film-type, thermoformed of 15 mil (0.38mm) Thick PVC, with louvers formed as part of each fill sheet. Fill shall be suspended from hot-dip galvanized structural tubing supported from the tower structure, and shall be elevated at least 2" (50.8mm) above the floor of the cold water basin to facilitate cleaning. Air inlet faces of the tower shall be free of water splash out. Drift Eliminators Shall be PVC, triple-pass and shall limit drift losses to no More than 0.01% of the design GPM flow rate.	
2.6.8	Casing, Fan Deck, Fan & cylinder	The casing, fan deck and fan cylinder shall be heavy gauge galvanized steel. The top of the fan cylinder shall be equipped with a conical, non-sagging, removable fan guard, fabricated of welded 5/16" (7.94mm) and 7 gauge fabrication.	
2.6.9	Cold water collection Basin	The cold water basin shall be heavy-gauge galvanized steel, and shall include the number and type of suction connections required to accommodate the outflow piping system. Suction connections shall be equipped with galvanized debris screens. A factory installed, float operated mechanical make-up valve shall be included. A suitable overflow pipe shall be provided. The basin shall include a depressed centre section for accumulating silt that can be flushed out for cleaning of the basin. The basin floor adjacent to the depressed section shall slope towards the depressed section to prevent build-up of silt under the fill area.	
2.6.10	Accessories	The cooling tower shall be provided with following minimum essential accessories.	
		a) Automatic float valve with a stop valve for continuous make up water flow.	
		b) Butterfly valve at inlet and outlet	
		c) Quick fill arrangement with stop valve.	
		d) Overflow connection	
		e) Drain connection in the cold water basin with stop valve.	
	f) Temperature meters for measurement of hot and cold water temp. Type of meters to be mentioned clearly by the tenderer.		

		g)A hot water bleed connection to the drain line (below the drain stop) through a stop valve.	
2.6.11	Supporting structure	The cooling tower shall be mounted over the roof of A/c plant room on cement concrete foundation pillars. The tenderer may however specify a different arrangement for mounting of the cooling tower as per site condition and as required by the type and design of the CT offered and quote accordingly. The bottom of the cooling tower shall have adequate clearance for any maintenance, if required,	
2.6.12	Level Switch	Magnetic or an appropriate type level switch shall be provided for giving audible alarm and visual indication on control panel in A/c plant room in case of low level in the cooling tower.	
2.6.13	Access	An 400mm wide aluminium ladder with suitable side rails and rungs/steps shall be permanently attached to the end wall casing of the tower, rising from the base of the tower to the top of the hand rail/tower.	
2.6.14	Size of Cooling Tower	To be specified by the tenderer	
<b>2.7.</b>	<b><u>MAKEUP WATER TANK</u></b>		
2.7.1	Capacity	2000 ltrs made of PVC. The tank shall be complete with all piping, valves and connections from makeup water tank to cooling tower cold water basin. Complete details of the makeup water tank to be specified by the tenderer.	
2.7.2	Material used	PVC.	
2.7.3	Size of Cooling Tower	To be specified by the tenderer	
<b>2.8</b>	<b><u>Air Handling Unit / Packaged Unit</u></b>	The unit shall be Horizontal Type	
2.8.1	a) <u>Casing of each unit</u>	a) The casing shall be made of double skinned panels.. The supply and return air duct connection and overall size is to suit site condition. The entire frame work shall be mounted on channel base. The panels shall be sealed to the frame work by heavy duty gaskets held captive in the framed extrusions. The entire panel shall be detachable or hinged. Hinges shall be made of die cast aluminum/ engineering Plastic with stainless steel pivots. Handles shall be provided with cam type adjustable seating arrangement to ensure perfect sealing and be operational from both inside and outside the unit. Units supplied shall be suitable for on-site assembly.	
b)	Over All Size of Packaged Unit	To be specified by the tenderer	

C)	Supply & Return Duct connection	The supply duct connection shall be vertical and on the top face of the unit. The AC Room will act as return air chamber. Provision of fresh air intake shall be 10% during summer /monsoon/ winter and 100 % during moderate seasons in the return chamber area. The tenderer shall provide connection from return air opening to the return air chamber and from supply air opening to the supply plenum chamber Connection.	
<b>2.8.2</b>	<b><u>Blower/Fan Section</u></b>		
2.8.2.1	Type of fan	Forward-curved Centrifugal fans, multi blade construction, made out of heavy gauge steel sheets ,separate motor and drive mounted on a floating base.	
2.8.2.2	Make	Similar to NICOTRA/COMEFRI/ make	
2.8.2.3	Balancing	Static and dynamic (both).	
2.8.2.4	Direction of discharge	Vertical	
2.8.2.5	Nominal fan discharge (CFM and Speed to be quoted)	6,000 CFM/102,00 CMH	
2.8.2.6	Static pressure at nominal discharge.	At least 30mm W.G.	
2.8.2.7	Noise level	Not to exceed 80 dBA at a distance of one meter	
2.8.2.8	Fan Bearings	Ball bearings shall be pre-greased self-aligning type. Sealing should ensure containment of the lubricant and exclusion of contaminates.	
2.8.2.9	Fan Shaft	Tubular fan shaft made from a high grade forged steel tubing.	
2.8.2.10	BHP required for fan	To be specified by the tenderer	
2.8.2.11	GENERAL	The fan section shall be complete with multi-'V' belt drive and adjustable motor mounting base. Belts shall be of the oil resistant type.	
<b>2.8.3</b>	<b><u>Fan Motor</u></b>		
2.8.3.1	Type and make	3 - phase, induction, squirrel cage, totally enclosed, internally fan cooled type, continuous duty similar to ABB/ NGEF/ Crompton / Siemens make	
2.8.3.2	Power rating(H.P)	To be specified by the tenderer. Should be at least 20% more than the fan BHP.	
2.8.3.3	Speed(R.P.M)	To be specified by the tenderer.	
2.8.3.4	Starting Current	To be specified by the tenderer.	
2.8.3.5	Running Current	-do-	
2.8.3.6	Insulation	Class F or better conforming to IS 325; with IP 55 protection.	

2.8.3.7	Essential Accessories:-		
	a) Starter.	DOL/Star-Delta	
	b) Overload protection	To be built-in in the starter	
	c) Under Voltage protection	To be built-in in the starter. Auxiliary contact in the starter for interlocking with the compressor circuit shall be provided.	
	d) Interlocking		
	e) Protection against single phasing	Current sensing type.	
	f) Butterfly valve at inlet and outlet and pressure gauges & thermostats-I set at inlet and outlet.		
2.8.3.8	Mounting	Both fan and motor shall be mounted on deep section aluminum alloy or galvanized steel base frame. Isolation shall be provided from the unit casing suitably either by spring isolator or rubber anti-vibration mounts and flame retardant, flexible connection on the fan discharge.	
<b>2.8.4</b>	<b><u>COIL SECTION</u></b>		
2.8.4.1	Capacity of cooling Coil	Total refrigeration capacity of cooling (in K.cal/hr) coil/coils per package unit shall not be less than 45360Kcal./hr.	
2.8.4.2	No. of coils per unit	To be stated by the tenderer	
2.8.4.3	No. of rows of the cooling coil	-do-	
2.8.4.4	Number of fins/cm	To be stated by the tenderer	
2.8.4.5	Velocity of air through cooling coil face	Cooling coils shall be arranged in the unit for Horizontal air flow and selected for a face velocity not exceeding 152 meters/minute	
2.8.4.6	Construction Material used in bonding gauge	Seamless not less than 9.5 mm (outside diameter round Copper tubes min.24 gauge thick with aluminum fins(not to exceed 5 fins/cm) mechanically/ hydraulically bonded and assembled in zinc coated steel frame. Face and surface areas shall be such as to ensure rated capacity without exceeding specified velocity of air through cooling coil face. The cooling coil shall be factory tested at 21 kg/ cm <sup>2</sup> air pressure under water.	
2.8.4.7	Face area of each cooling coil	To be indicated by the tenderer	
2.8.4.8	Provision for face & by-pass damper.	To be indicated by the tenderer.	
2.8.4.9	Mounting	The cooling coil assembly shall be on aluminum rails and nylon rollers for easy withdrawal on either side.	
<b>2.8.5</b>	<b><u>AIR FILTER</u></b>		
2.8.5.1	Type	50 mm thick dry synthetic woven. Easily removable & washable type air filters.	
2.8.5.2	Efficiency	Approximately 85% down to 20 microns .	

2.8.5.3	Pressure drop when Used in dry condition	To be specified by the tenderer.	
2.8.5.4	Air velocity through the Filters	To be specified by the tenderer.	
2.8.5.5	Frame	Filter frame work shall be fully sealed and constructed from aluminium alloy. Filter bank shall be easily accessible and designed for easy withdrawal and renewal of filter cells.	
2.8.5.6	Capacity	To match the rated air flow capacity of the Blower/Blowers even with 50% clogging of Filters.	
<b>2.8.6</b>	<b><u>MISCELLANEOUS ACCESSORIES AND PROVISIONS</u></b>		
2.8.6.1	Vibration Isolators for the complete unit	To be used , if necessary, as per manufacturer's recommendation.	
2.8.6.2	Drip trays with draining arrangement	The condensate drain pan shall be made out of 18 gauge thick stainless steel with welded corner joints and drain connection. The drain pan should extend beyond the coil section with uniform slope from all side leading to drain point providing complete condensate drainage. It should be fully insulated from bottom floor panels with suitable insulating material for eliminating panel seating.	
2.8.6.3	Access Doors/panels	The unit shall have hinged, quick operating air tight access door in the fan and filter sections. Access doors shall be double skin type.	
<b>2.9</b>	<b><u>REFRIGERANT CIRCUIT</u></b>		
2.9.1	Strainers :-		
	i) Liquid Line	Provision to be confirmed by the tenderer.	
	ii) Suction	Provision to be confirmed by the tenderer.	
2.9.2	Drier	Replaceable type silica-gel with isolating valves to be provided.	
2.9.3	Isolating valves (For isolation of various controls in ref. circuit)	Provision to be confirmed by the tenderer .	
2.9.4	Oil trap	-do-	
2.9.5	Temp. Wells for measuring suction and discharge temp	Provision to be confirmed by the tenderer.	
2.9.6	Thermostatic expansion valve (Capacity matching with compressor)	-do-	
2.9.7	Solenoid Valves	-do-	
<b>2.10.</b>	<b><u>WATER PIPING &amp; PLUMBING</u></b>		
2.10.1	Type & make	Galvanized mild steel(of Tata Steel/ Jindal Hissar make)	
2.10.2	Class	Medium class confirming to IS-1239/1990-92	

2.10.3	Size	Sizing of the pipe shall be liberal taking in to consideration deterioration in time	
2.10.4	Quality selection	The piping & fittings shall be from fresh stock.	
2.10.5	Installation, testing & quality of work.	As per details given in Appendix-i	
2.10.6	Expansion Valve		
	a) Type	Direct expansion	
	b) Capacity	To match the refrigeration capacity of 81648K.Cal./hr.	
	c) Make	Denfoss	
<b>2.10.7</b>	<b><u>VALVES MAKES</u></b>	As per approved makes	
	a) Check Valve make	To be specified by the tenderer	
	b) Butterfly Valve make	To be specified by the tenderer	
	c) Y-Strainer Make	To be specified by the tenderer	
	d) Pot - Strainer make	To be specified by the tenderer	
	e) Manufacturer's name	To be specified by the tenderer	
	f) Material	To be specified by the tenderer	
	g) Density Kg. /m <sup>3</sup>	To be specified by the tenderer	
	h) Thermal conductivity (9K cal/hr.m Deg.C)	To be specified by the tenderer	
<b>2.11</b>	<b><u>CONTROLS</u></b>		
2.11.1	Thermostat for shutting off the plant	A separate thermostat to be provided in the return air circuit.	
Note:-			
1. The thermostats will be operative in the temperature range within +/- 5.5 deg.C of the return air temp.			
2. Each plant shall have separate set of thermostats.			
3. Thermostat shall be of adjustable type.			
4. Accuracy shall be within +/- 1 deg.C.			
5. Thermostat shall be from reputed manufacturer.			
2.11.2	Liquid line solenoid valve	Shall be installed between each condenser & corresponding expansion valve & shall be operated by the thermostat provided for complete shutdown of the plant.	
2.11.3	Oil failure switch	Shall be provided in the control circuit.	
2.11.4	Interlocking & control ckt	It shall be ensured that only three AC Plants are operative at a time. All safety controls like water failure switch, LP,HP,OP, Cut out etc shall be part of interlock ckt.	
2.11.5	Remote Status Indication Panel	A panel with status indications of the working of Blowers, Compressors, etc. shall be wired and installed in transmitter hall. The panel shall have indication lamps i.e. Green for OFF & Red for ON conditions of the above equipments. The control wiring for the panel between A/c plant room and/transmitter hall shall also be supplied and laid by the tenderer.	

2.11.6	<b>MAKES</b>	As per approved makes(See Annex.-V)	
	a) Flow Switch	To be specified by the tenderer.	
	b) Pressure gauge	To be specified by the tenderer.	
	c) Thermometers	To be specified by the tenderer.	
	d) Solenoid Valve	To be specified by the tenderer.	
<b>2.12.</b>	<b>MICROPROCESSOR</b>	Each packaged unit shall be equipped CONTROLLER: (in built) with Microprocessor Controller, which shall monitor and control the operation of compressor, condenser, pumps & CT etc. Controls shall be based on direct sensing of control variables that govern the operation of the each plant . Microprocessor controller should have the following features---	
		Protect the compressor motor from under load, phase reversal, phase imbalance, single phasing and overload.	
		Electronic temperature sensor to ensure precise control on temperature	
		Auto Re-start of unit as soon as power restored.	
		Provision of Anti-Recycle timer to start the compressor after asset delay.	
		Switches off the condenser pump motor, when the compressor cuts off.	
<b>2.13</b>	<b><u>ELECTRICAL INSTALLATION</u></b>	All material used in electrical panel shall be of make specified in annex.-5	
2.13.1	Type of switch board	This switch board shall be installed in A/C Plant room to supply the power to packaged plants, Pumps & CT Fan. The switch board shall be totally enclosed sheet steel cubicle, indoor floor mounted and free standing type. It shall be of good quality, dust and vermin proof. All CRCA steel sheets used in construction of panel shall be 2 mm thick. Minimum clear space of 200 mm between the floor of Electrical Panel and bottom most unit shall be provided. The enclosure shall provide a degree of protection as specified in IP-55 of IS-2147	
2.13.2	Type of cables & wires	Shall be: (i) PVC insulated PVC sheathed aluminium /copper conductor and armoured conforming to IS 1554 Part I/1998 with latest amendments/ revisions thereof.	
		ii) Aluminium conductor PVC cable for wiring of various equipment units.	

		(iii)Copper conductor PVC cables for all power wiring inside the panel, interlocking and indicating circuits.	
		(iv) Provided with lugs of ferrules as may be necessary for easy identification.	
2.13.3	Grade of cables & wires	The cables & wires shall be of requisite current carrying capacity conforming to the relevant BIS-standard.	
		(i) Al conductor cable shall be of 1100V grade4sq.mm mini. Size, pvc insulated.	
		(ii)Copper conductor shall be of 600V grade. 1.5sq.mm minimum size, pvc insulated.	
2.13.4	Conduits & Cable tray	The tenderer shall provide the conduits & cable tray necessary for various electrical wiring ckts.	
2.13.5	Installing details of the switch board	The maximum operative height of the switch board from the floor level will not exceed1600mm. The installation gear & control gear with SB shall be installed according to IS-4237/82.	
2.13.6	Type of switch fuse units	Shall be heavy duty conforming to IS-13947/93. Shall be front operated type & adequate Capacity to withstand the fault currents. Fuses Shall be of HRC type conforming to IS-2208.	
2.13.7	Type of bus bars	Three phase and Neutral Bus bar shall be of high conductivity aluminium of rectangular cross section and shall confirm to IS-5082 .The cross section of the neutral bus bar shall be the same as that of phase bus bar of capacities up to 200 A, for hither capacity, the neutral bus- bar must not be less than half the cross-section of that of the phase bus bars and bus bars shall be extendible on either side. The bus bars shall be colour coded. All bus bars shall be supported on unbreakable, non-hygroscopic insulated supports at regular intervals. All bus bars shall be provided in a separate chamber and properly ventilated. Clearance for bus bars shall be not less than 32 mm for phase to phase and 26 mm.	
2.13.8	Type of motors	All motors shall be of totally enclosed type with insulation of class-E/B or better as specified against individual case conforming generally to IS-325. Insulation of the motor shall be done according to IS-900/92.	

2.13.9	Type of motor starters	Shall confirm to IS-1822 & shall be of heavy duty type of adequate capacity. It shall be of reputed manufacture such as L&T. Siemens etc it shall be manufacture such as L&T. Siemens etc it shall be fully automatic/ DOL or star/delta type depending upon the ratings of the motor it is controlling. In general for all motors above 7.5HP star/delta starter shall be used. Each starter shall have thermal over load protection on all three phases. Operating coil of contactors shall be suitable For 240/415 volts A.C.supply.	
2.13.10	Details of indicators& instruments to be provided in the switch board.	The switch board shall be provided with at least the following minimum facilities/indicators/ instruments etc.	
		1. Voltmeter & ammeter with three-way & off selector switch for measuring the voltage /current of all the three phases.	
		2. Separate ammeter of suitable range with each electrical motor.	
		3. The switch board shall be provided with neon lamp type phase indicator in each phase with suitable Amps fuse.	
		4. Indicators shall be provided on the switch board at various control circuit points to indicate the positive function of each electrical equipment/ accessory.	
		5. Name plates to indicate the equipments or circuits controlled by the switches shall be fixed on the SB panel	
<p>Note:</p> <p>The general requirements of these indicating instruments shall be as per IS:1248/83-84(BS- 37 &amp; BS-39) &amp; they shall be of reputed make.</p> <p>The instruments shall be flush mounted and draw out type.</p>			
2.13.11	Interlocking of various circuits	The equipment interlocking for sequential operating shall be done by the tenderer and interlocking circuit given after acceptance of the tender. The interlock circuit shall include all the accessories to ensure proper and foolproof functioning of automatic pump down, automatic unloading on start and automatic capacity control. All the safety controls provided like HP output, LP output, failure switch etc shall be part of the Interlock ckt.	

2.13.12	Details of main isolating switch	Shall be heavy duty type and of adequate capacity conforming to IS-13947/93 specifications and of reputed manufacturer such as English electric, L&T, Siemens. It shall use HRC fuses of suitable ratings.	
2.13.13	Earthing	(i) All three phase motors and equipment shall be earthed with 2 nos. distinct and independent GI wires of 8 SWG.  (ii) All switches shall be earthed with 2 numbers distinct and independent copper wire/tapes.	
2.13.14	<b>MCCBs/MCBs</b>	All MCCBs / MCBs should be enclosed in a moulded insulated housing .The operating and tripping mechanism should be quick make and break. MCCBs shall have breaking capacity of greater than 10 KA to 65KA. capacity of greater than 10 KA to 65KA. capacity of greater than 10 KA to 65KA. capacity of greater than 10 KA to 65KA. have thermal overload(adjustable), earth leakage and short circuit protection. MCBs should have thermal overload(adjustable), and short circuit protection. MCCBs shall have breaking capacity of greater than 6 KA.	
2.13.15	<b>Single Phase Preventers</b>	SPP shall act when sully voltage drops down to 90% rated voltage or on failure of one or four phases.	

<b>2.14.</b>	<b><u>CIVIL WORKS</u></b>		
2.14.1	Foundation blocks	The tenderer shall provide the foundation blocks with vibration isolation for the packaged units for effective control of transmission of vibrations & structure borne noise. NOTE: The holes if any made by the tenderer in the walls for passage of pipes, conduits, trenches, cables etc. shall be repaired & original finish shall be given by the tenderer.	
2.14.2	Staging & R.S.Joist	As per site conditions, the tenderer shall provide suitable staging/ R.S.Joists for the cooling tower and make-up water tank. The design of the staging s/R.S.Joists should be liberal & of adequate size. R.S.Joists should be given coats of primer & anti-rust paint.	
2.14.3	Miscellaneous	Any other work not specifically mentioned above but necessary for satisfactory completion of entire job shall be the responsibility of the contractor.	
2.15.	<b><u>SURFACE PAINTING &amp; FINISH</u></b>	All equipment & plumbing shall be painted after installation with an approved colour.	
2.16.	<b><u>A.C. Packaged Unit (OVERALL)</u></b>		
	a) Overall dimension of each unit (MM	To be specified by the tenderer. :	
	b) Type of vibration isolator and its transmissibility factor	To be specified by the tenderer.	
	c) Operating Wt. Kg.	To be specified by the tenderer.	
	d) Type of foundation	Direct on floor over cushy foot/ restoflex pad kept between RCC block and unit.	
2.17	<b><u>Dismantling of old AC Plants</u></b>		
	Dismantled A/C Plants 3 x 27 TR Kirloskar AC 470	L.S	Dismantled AC Plant shall be taken by the tenderer under buyback arrangement.

**END OF THIS SECTION**



## ANNEXURE - II

### CODES, REGULATIONS, NOISE AND VIBRATION CONTROL

The codes, regulation as detailed below shall be followed in execution of the work:

- |     |   |   |
|-----|---|---|
| 1.  | Safety code for air-conditioning (Revised) amendment.   | IS 659:1964 (reaffirmed 1991)                       |
| 2.  | Safety code for mechanical refrigeration  | IS 660:1963 (reaffirmed 1991)                       |
| 3.  | Testing of refrigeration compressors  | IS 5111:1993  |
| 4.  | Hermetic compressors  | IS 10617:Part I, II & III<br>1983 (reaffirmed 1991) |
| 5.  | Thermostats for use in refrigeration etc.   | IS:11338:1965 (reaffirmed 1991)                     |
| 6.  | Steel for general structural purpose  | IS:2062:1992  |
| 7.  | Specific requirements for the direct switching of the individual motors                                     | IS 4064 (Part II) : 1978                            |
| 8.  | PVC Insulated (HD) Electric Cables for working voltage up to 1100 Volts and up to 11 KV grade respectively. | IS: 1554 (Part I & II)                              |
| 9.  | HRC Cartridge fuse links up to 650 Volts.   | IS 2208:1976  |
| 10. | Starter   | IS 8554 (Part I) :1979                              |
| 11. | Inspection and testing of installation  | IS 732 (Part III) 1979                              |
| 12. | Three Phase induction motors  | IS:325  |
| 13. | Code for practice for electrical wiring installations.  | IS 732:1989   |
| 14. | Code for practice for earthing  | IS 3043:1966  |
| 15. | Wrought aluminium & aluminium alloy sheet and strip for general engineering purposes.                       | IS : 737  |
| 16. | Burden tube pressure and vacuum gauges  | IS:3624   |
| 17. | Glossary of terms used in refrigeration and air-conditioning  | IS:3615   |
| 18. | Specification for single phase small AC & Universal motors  | IS:996  |
| 19. | Circuit breaker A.C.  | IS:2516:1980 (Part I & II)                          |
| 20. | Contractors for A.C. Voltage upto 1100 V  | IS:2959:1975  |
| 21. | Low Voltage switch gear and control gear Assemblies   | IS 8623:1993 (Part I & II)                          |
| 22. | Code of practice for selection of Starters for AC induction motors  | IS 3914   |

23.	Specification for cables glands	IS 4821
24.	Coded for selection, installation & maintenance of switch gear and control gear	IS 10118:1982 Part I & IV
25.	Conduits for electrical installations	IS 9537:1981 Part I to IV
26.	Permissible limits of noise level for rotating electrical machines	IS 12065:1987
27.	Code of practice for installation and maintenance of motors	IS 3106:1966
28.	Electrically welded steel pipes for water, gas and sewage	IS:3589
29.	Method for testing panel type air filters and AC purposes	IS 761310:1975 (reaffirmed 1991)
30.	Unbonded glass wool for thermal insulation	IS 3690:1974
31.	Expanded polystyrene for thermal	IS 4671:1984 (reaffirmed)
32.	Centrifugal fans (1 <sup>st</sup> Revision)	IS 894:1987 (reaffirmed 1991)

### **SAFETY CODES**

The following IS codes shall be followed :

1.	Safety code for scaffolds & ladders	IS:3696
2.	Code of practice for fire precaution in welding & cutting operations	IS:3016
3.	Code for safety procedures and practices in electrical works	IS:5216
4.	Code of practice for safety and health requirements in electrical & gas welding and cutting operations.	IS:3696

### **SPACE**

All shop drawings shall be prepared by the Tenderer after examining. Architectural and other drawings, site conditions and shall be based and designed on the spaces shown on them.

### **DRAWING**

The tentative layout plants enclosed with the tender documents are only for guidance purposes only.

### **NOISE AND VIBRATION CONTROL**

The tenderer must take all necessary precautions to have a minimum noise generation and its transmission as deemed necessary. Minimum vibration as permitted by IS relevant code shall be ensured. A few points for guidance are given below:

- a) Double fire retardant flexible connection shall be made from air discharge to the duct.
- b) Vibration isolation pads of suitable thickness and loading for elimination of vibration shall be provided as per recommendations of the manufacturer.

- c) Vibration isolation springs of DUNLOP make only of suitable size to suit weight of compressor for elimination of vibrations shall be provided as per recommendations of the manufacturer.
- d) Flexible conduits of suitable diameter and length are to be provided for making flexible electrical connection to the motors. All conduit connections where conduits are 60mm and large shall be made of at least 1.2 times the minimum length and installed in U shape, grossly slack to provide maximum vibration isolation.
- e) All suspended ceiling shall be isolated on hangers. The vibration hangers shall have stable steel spring. A neoprene neck shall be provided where the hanger rod is connected to the supporting element to prevent metal to metal contact. The steel spring element shall have static deflection equal to half the static deflection of the isolated equipment and shall be used to support all equipment from the vibration equipment or from the floor or ceiling of the equipment room.
- f) All other mechanical equipment such as expansion tanks etc. shall have double deflection neoprene in compression for overload of 9 mm. The top and bottom surface shall be ribbed and bolt holes shall be supplied in the base.
- g) In case of conduits, pipes, tubes, the annular space between construction and penetrating element shall be filled with fibrous material and both sides sealed with hardening resident sealant.
- h) All floor mounted vibration isolated equipment shall be supported on steel frames or concrete block.
- i) The air conditioning tenderer shall take all other precautions or provide on his own if not specified above for reducing noise level to within limits or minimise vibrations in all mechanical equipment without any additional cost.

## **ANNEXURE-III**

### **INSPECTION PROCEDURE FOR INITIAL INSPECTION OF AC PLANTS AT MANUFACTURER/TENDERER'S WORKS.**

#### **I. AIR CONDITIONING PLANT COMPRISING COMPRESSOR & CONDENSER.**

1. Physical verification of the unit for its make, model, type, capacity etc. shall be carried out of the equipment offered at Manufacturer's/supplier works with reference to A/T.
2. Manufacturer's test certificate shall be scrutinized to check compliance with the requirement as specified in the order.

#### **II. A.H.U. AND COOLING COIL**

##### **(A) AIR HANDLING UNIT**

1. Salient features such as model, size, physical dimensions and other details of various sections, fan motor detail, fan dimension etc. shall be verified against the contract requirements.
2. Manufacturer's test certificate for the motor and air-handling unit shall be furnished and scrutinized as per contract requirements.
3. Test certificate for static and dynamic balancing of the fan/blower shall be furnished for verification.

##### **(B) Cooling Coil.**

1. Manufacturer's internal test certificate on salient features like type, material, no. and gauge of fins and tubes and no. of rows shall be furnished and verified with reference to contract requirements.
2. Hydraulic pressure to the extent of 21 Kg/ cm<sup>2</sup> shall be applied and this pressure should be maintained for 15 minutes and no drop should be observed indicating any leaks. Alternatively pneumatic submerged pressure test shall be carried out for 15 minutes with compressed air or dry nitrogen at a pressure of 21 kg/ cm<sup>2</sup> to ensure that there is no leakage.

#### **III. PUMPS**

1. Salient features such as model and make shall be checked as per contract requirements.
2. Manufacturer's test certificate will be furnished and verified against contract requirements.

#### **IV. COOLING TOWERS**

Salient features such as dimensions, materials used, constructional details, number and size of nozzles, type, make and size of fan and fan motor etc. shall be verified against the requirements. Inspection of cooling tower in knocked down condition shall be carried out at manufacturer's/ tenderer's works.

2. Manufacturer test certificate certifying the capacity of cooling tower and static balancing of fan should be furnished.

#### **V. SWITCH GEAR, CONTROL GEAR AND MEASURING INSTRUMENTS**

1. It shall be verified that control panel is of CPRI approved make.
2. Manufacturer's test certificate for air circuit breaker shall be verified as per contract requirement.
3. Availability of measuring instruments of required accuracy for conducting different tests shall be verified.

#### **VI. Electric motor**

1. It shall be verified that the electric motors are of approved make.

## **VII. PIPES AND VALVES**

1. It shall be checked that the pipes and valves are as per makes specified in the contract. For items for which makes are not given in the contract, they should be of ISI mark/duly approved by the indenter.
2. Dimensions including thickness shall be checked for pipes against the requirements of contract.

### **NOTES**

- 1) All the components where initial inspection at manufacturer's works is not stipulated shall be of approved make.
- 2) Accuracy of testing instruments shall be as mentioned in the inspection procedure laid down in this Section.

**INITIAL TEST AT SITE AFTER INSTALLATION WITH TEST READINGS ;**

Tenderer's representative shall witness all type of routine tests. Performance tests of equipment/control installed shall be carried out at site.

On completion of installation, the tenderer shall conduct initial test. Any defects found shall be rectified immediately. The test readings during initial test run shall be recorded in the Test Readings Proforma enclosed with this Annexure.

The initial test which has to be carried out by the tenderer shall be (but not limited to) as follows:-

- a) Pressure tests for all refrigerant circuit as given in this specification/ as recommended by the manufacturer before charging the system.
- b) To check satisfactory functioning of all electrical motors, switch-gear, condensor motors and fans, control, Pressure testing, refrigerant system etc.
- c) To check alignment of motors.

**NOTES:**

All necessary test instruments such as thermometers, pyrometer, pressure gauges, anemometer, dust-count meter, Sound level (decibel) meter, personnel, and required quantity of gas, oil and lubricants etc. shall be arranged by the tenderer at his own expense. However, power for testing and commissioning of the system shall be provided free of cost by the indenter.

In addition to the initial test as explained in Section I and above, the tenderer shall also give two continuous running tests of the system during peak summer and monsoon each of 24 hour duration or for 3 days each of 10 hour duration when the ambient conditions are close to the design conditions. The capacity test shall be conducted in presence of representative of the indenter and inside and outside conditions shall be recorded on hourly basis.

**CAPACITY OF PLANT**

Before capacity tests are conducted, the following aspects shall be checked:

- a) The tests shall be conducted during the peak season only. In case the outside design conditions are not available, then tests shall be conducted at design conditions closest to outside design conditions.
- b) All internal loads such as light load, occupancy or equipment load shall be close to design loads. Otherwise, artificial load shall be generated to satisfy internal design loads.
- c) Hourly readings of temperature, relative humidity, electric current, power consumption etc. shall be recorded. The capacity of the system components shall be computed as given in the TEST READING-PROFORMA given below.
- d) Test readings shall be furnished in duplicate prior to handing over the plants.

**1. OUTSIDE DESIGN CONDITIONS**

- a) Season :
- b) Dry bulb temp. Deg.C. :
- c) Wet bulb temp. Deg.C. :

**2. INSIDE DESIGN CONDITIONS**

- a) Dry bulb temp. Deg. c. :

- b) Wet bulb temp. Deg.C. :
- c) Relative Humidity % :

**3. COMPRESSOR**

- a) Suction Temp. Deg.C. :
- b) Suction Pressure Kg./Sq.cm. :
- c) Discharge temp. Deg.C. :
- d) Discharge pressure Kg/Sq.cm.
- e) Oil Pressure Kg./Sq.cm. :
- f) Capacity of compressor motor(HP):
- g) Starting current(Amps)
- h) Readings of voltmeter,  
Ammeter and power factor meter.
- i) Power computation at various  
loads of 100% 75%, 50%, 25%

Motor current - Amps :

Voltage - Volts :

Starting current -Amps. :

**CONDENSER WATER CIRCUIT**

- a) Water flow rate LPM :
- b) Entering water temp. Deg.C. :
- c) Leaving water temp. Deg.C. :
- d) Pressure drop through Condenser Kg/cm<sup>2</sup>
- e) Refrigerant condensing temp. Deg.C. :
- f) Refrigerant Pressure Kg/ cm<sup>2</sup> :

Flow of water through condenser may be obtained by means of a flow meter or by pressure drop in the condenser.

The water flow can be read against the recorded pressure drop from the manufacturer's rating curves

**4. COOLING TOWERS**

- a) Wet bulb approach  
:
- b) Water flow rate LPM :
- c) Leaving water temp. Deg.C.  
:
- d) Entering water temp. Deg.C. :

## 5. AIR HANDLERS

- a) Coil face area Sq.mt. :
- b) Maximum air quantity CMH :
- c) Actual air quantity CMH :
- d) Air velocity m<sup>3</sup>/hour :
- e) Entering air temp. DB/WB Deg.C :
- f) Leaving air temp. DB/WB Deg.C :
- g) Motor drive for air handlers
  - i) Rated horse power(HP) :
  - ii) Rated voltage/current/volt/ampere:
  - iii) Actual voltage/current/volt/ampere:
  - iv) Starting current amperes

The above data should also be recorded for each individual AHU.

## 6.CONDENSER WATER CIRCULATION PUMP SETS

- a) Flow rate LPM :
- b) Suction pressure Kg.per sq.cm. :
- c) Discharge Pressure Kg/sq.cm. :
- d) Rated HP of motor :
- e) Rated voltage/current/ volts/ ampere :
- f) Actual voltage/current/ volts/ ampere :
- g) Starting current Amps. :

Record all data for pump, as for compressor motor.

## 7. FILTEERS

- a) Area of filters m<sup>2</sup> :
- b) Effective area m<sup>2</sup> :
- c) Velocity of air m/hr. :
- d) Quantity of air m<sup>3</sup>/hr. :

### Notes:

#### 1. TESTING VARIOUS LOADING CONDITIONS

The performance tests shall be conducted at various loads of 100%, 75%, 50% and 25% of the capacity of each plant.

## 2. COMPUTATION OF CAPACITY OF VARIOUS EQUIPMENT.

### a) Compressor

$$\text{B.H.P./Ton} = \frac{\text{Power input in kW}}{0.746 \times \text{Compressor Cap. in ton.}}$$

The capacity of compressor shall be taken from manufacturer's rating chart to be supplied by the tenderer.

### b) Condenser

Refrigerating Capacity  $H_c = [(T_2 - T_1)W - 860P]$  Kcal/hr.

$$= \frac{[(T_2 - T_1)W - 860P]}{3024} \text{ TR}$$

$H_c$  = Net cooling effect produced in Kcal/hr.

$T_2$  = Outlet water temp.

$T_1$  = Inlet water temp.

$W$  = Quantity of water passed/hr in kg.

$p$  = Power input in kW.

### c) Cooling Tower

$$\text{Cooling Tower Efficiency} = \frac{\text{Range} \times 100}{\text{Range} + \text{Approach}}$$

$$= \frac{(T_h - T_c) \times 100}{(T_h - T_c) + (T_c - T_{wb})}$$

$$= \frac{(T_h - T_c) \times 100}{(T_h - T_{wb})}$$

Where-

$T_h$  - Hot water temp. (Water inlet)

$T_c$  - Cold water temp. (Water Outlet)

$T_{wb}$  - Ambient wet bulb temp.

### d) Cooling coils of Air Handlers

$$\text{Capacity of cooling coil} = \frac{\text{Cfm} \times 60 (h_e - h_l)}{\text{Avg. sp. volume } V \times 12000}$$

Whereas  $h_e$  = Enthalpy of entering air in btu/lb\*

$h_l$  = Enthalpy of leaving air in btu/lb.\*

$V = (V_e + V_1)/2$

$V_e$  = Specific volume of air entering in Cft/lb of air

$V_1$  = Specific volume of leaving air Cft/lb of air.

\* Wet bulb temperature of air before and after the cooling coil of the AHU should be measured to know  $h_e$  and  $h_l$  values.

3. All functional tests of motors, other electrical equipment, electrical cables shall be conducted as per Indian Electrical Rules and ISI specifications.

4. The interlocking of compressor motor with condenser and cooling tower fan shall be checked.

5. HP/LP cut-out, oil failure switch, flow switch, etc. shall be thoroughly checked and tested at various settings.

6. The in built capacity control arrangement of each compressor shall be checked at various steps of loading.

**LIST OF APPROVED MAKES OF DIFERENT EQUIPMENT**

1. Compressors : Similar to CARRIER/ACCEL/VOLTAS/BLUE  
STAR/COPLAND/BATLIBOI
2. Fan : Similar to NICOTRA/COMFRI/GE/CROMPTON
3. Cooling Coil : Similar to VOLTAS/BLUE STAR/CARRIER AIRCON/COIL  
CO./ AIRFLOW/ BATLIBOI  
Condenser Pump : Similar to VOLTAS/KIRLOSKAR/MATHER & PLATT/BEACON.
4. Induction Motors : Similar to ABB/CROMPTON GREAVES/SIEMENS
5. Pot/Y-Strainer : Similar to EMERALD/SANT/
6. Pressure Gauges : Similar to FIEBIG/EMERALD/JAPSIN/H.GURU
7. Industrial Type Thermometer : Similar to EMERALD/D.S. ENGINEERS/JAPSIN
8. Expanded Polystyrene : Similar to METTUR BEARDELL/  
THERMOLLOYD/STYRENE PACKING
9. Fibre Glass Rigid Board : Similar to U.P. TWIGA/KIMCO/OWENS CORNING
10. Fire Damper : Similar to CARYAIRE/CONAIR/SERVEX/O.P.  
ENGINEERING
11. Paints : Similar to ICI/ASIAN/JENSON & NICHOLSON/  
GOODLASS NEROLAC/SHALIMAR
12. Air-Circuit Breakers/MCCB : Similar to L&T/SIEMENS/GE/CROMPTON
13. MCB : Similar to INDOKOPP/L&T/GE/CROMPTON
14. Power Cable : Similar to ICC/CCI/ GLOSTER/GRANDLAY  
/UNIVERSAL/INCAB
15. Control Cable : Similar to GLOSTER/GRANDLAY/NATIONAL/HENLEY  
BATRA/INCAB/UNIVERSAL
16. Volt Meter/Ammeter : Similar to A.E/IMP/MECO/KAYCEE
17. Switches : Similar to L&T/SIEMENS/GE
18. H.R.C. Fuse and Fittings : Similar to L&T/SIEMENS/GE
19. Current Transformer : Similar to A.E/KAPPA/PRECISE
20. Contactors and Over Load relays : Similar to L&T/SIEMENS/GE
21. Indicating Lights/Push Buttons. : Similar to SIEMENS/L&T/VAISHNO
22. Selector/Toggle Switch : Similar to KAYCEE/L&T/ELECON
23. Change Over Switch : Similar to ELECON/L&T/HAVELS
24. Time Delay Device : Similar to SIEMENS/L&T/BCH
25. Single Phase Device : Similar to L&T/MINILEC/
26. Electrical Panel, Sub- : CPRI Approved firms  
Panels, etc.

**STATEMENT OF TECHNICAL PARTICULARS FOR  
PACKAGED TYPE, WATER COOLED AC PLANT (To be  
submitted with the Technical bid)**

**1. COMPRESSOR**

- (a) Manufacturer's Name :
- (b) Model :
- (c) Type of Compressor - Reciprocating  
Semi-Hermetic :
- (d) No. of Compressors per Unit :
- (e) Nominal Capacity of each Unit TR :
- (f) Nominal Capacity of each Compressor TR :  
at design Conditions :
- (g) Saturated Suction Temperature Deg.C :
- (h) Saturated Discharge Temperature  
Deg.C :
- (i) Max. RPM :
- (j) Mode of start :
- (k) Refrigerant used :
- (l) Qty. of Refrigerant used :
- (m) Power consumption KW/TR :
  - Full load 100% :
  - 80% :
  - 70% :
  - 60% :
  - 50% :
  - 40% :
  - 30% :
- (n) Type of capacity control :
- (o) Range of capacity variation :
- (p) Safety devices & controls :
- (q) Monitoring Devices :

- (r) Type of bearings :
- (s) Quantity and grade of lubricating oil :

**MOTOR (COMPRESSOR)**

- (a) Make of Motor :
- (b) Type of Motor :
- (c) Motor KW :
- (d) Class of Insulation :
- (e) R. P. M. :
- (f) Type of starter :
- (g) Electrical characteristics :
- (h) Voltage/Frequency Fluctuations permissible :
- (i) Method of Startring :
- (j) Starter maanufacturer :
- (k) Full load current (Amp.) :
- (l) Starting current (Amp.) :
- (m) Locked rotor current (Amp.) :
- (n) Overload/ under voltage/ single phase Protections provided :

**2. CONDENSER**

- (a) Manufacturer's Name :
- (b) Model :
- (c) Shell dia OD (MM) :
- (d) Tube dia OD (MM) :
- (e) No. of passes :
- (f) Number of tubes :
- (g) Length of tube (MM) :
- (h) Material of Tubes :

- (i) Material of shell :
- (j) Number of Integral Fins :
- (k) Overall length of condenser (MM) :
- (l) Fouling Factor in MKS :
- (m) Heat rejection capacity K cal/hr. :
- (n) Shell thickness (MM) :
- (o) Tube thickness (MM) :
- (p) Water flow rate (LPM) :
- (q) Water temperature in Deg.C :
- (r) Water temperature out Deg.C. :
- (s) Pressure drop (Mt. of water) :
- (t) Operating ref. Charge Kg. :

### **3. EVAPORATOR**

- (a) Manufacturer's Name :
- (b) Model :
- (c) Type of evaporator :
- (d) Tube material :
- (e) Tube thickness (MM) :
- (f) No. of Tubes :
- (g) No. of passes :
- (h) Tube dia O.D. (MM) :
- (i) Water Flow LPM :
- (j) Water Temperature out Deg.C. :
- (k) Water Temperature in Deg.C. :
- (l) Pressure Drop Mt. of water :
- (m) Heat rejection K cal/Hr. :
- (n) Fouling factor MKS :

**4. COOLING TOWER**

- (a) Make of cooling Tower :
- (b) Type of cooling Tower :
- (c) Model of cooling Tower :
- (d) Material of casing, fill and basin :
- (e) Overall dimension in mm :
- (f) Dry weight KG :
- (g) Operating weight :
- (h) Water flow rate litre/minute :
- (i) Drift Loss (%) :
- (j) Evaporation Loss (%) :
- (k) Approach of cooling tower :
- (l) Range of cooling Tower :
- (m) Capacity of cooling tower :
- (n) No. of fans & fan diameter :
- (o) Sound level generated by fan(s) :
- (p) CTI Certification

**5. FAN MOTOR**

- (a) Type of Motor :
- (b) Horse Power of motor :
- (c) R.P.M. of Motor :

**6. CONDENSER PUMP SETS**

- (a) Make :
- (b) Type :
- (c) Model :
- (d) Discharge (LPM) :
- (e) Head (mtrs.) :

- (f) Efficiency :
- (g) Brake Horse Power :
- (h) Horse power of motor :
- (i) Make/Type of motor :
- (j) Make/Type of starter :
- (k) Impeller Diameter (MM) :
- (l) Material of Bearing/Seal :
- (m) Type of Bearing/Seal :

**7. CONTROLS (MAKES)**

- (a) Flow Switch
- (b) Differential Switch :
- (c) Pressure gauge :
- (d) Thermometers :
- (e) Manometer :
- (f) Anti-freeze thermostat :
- (g) Solenoid Valve :

**8. ELECTRICAL ACCESSORIES**

Please indicate the makes, type, rating/ grade and other details of the following :

- (a) Panels :
- (b) Remote Control console :
- (c) ACB/MCCB/FSU :
- (d) HRC Fuses :
- (e) Rotary/ selector Switches :
- (f) Capacitor Bank :
- (g) Starters :
- (h) Contactors :
- (i) Indicating Lights :

- (j) Push Buttons :
- (k) Control Cables :
- (l) Power Cables :
- (m) Ammeters :
- ( n) Voltmeters :
- (o) Single Phase Preventers :
- (p) Current Transformer :
- (q) Bus-bar/Grade :
- (r) Overall dimensions of the panel :

**9. PIPES**

- (a) Make :
- (b) Class :
- (c) Diameter and wall thickness mm :

**10. VALVES**

- (a) Check Valve make :
- (b) Butterfly Valve make :
- (c) Balancing Valve make :
- (d) Is flow measuring facility/ built in pressure drop available in balancing valve? :
- (f) Y-Strainer Make :
- (g) Pot – Strainer Make :
- (h) Material/Gauge/perforation of basket in Pot Strainer. :

**11. PIPE INSULATION**

- (a) Manufacturer's Name :
- (b) Material :
- (c) Density Kg./ m<sup>3</sup>. :
- (d) Thermal Conductivity K cal/hr. m Deg.C :

## 12. AIR HANDLING UNITS

### General:

- (a) Make and type (SS/ DS, vertical or horizontal ) :
- (b) Range of Capacity (CMH) :
- (c) Capacity of A.H.U. at rated coil face velocity CFM/(CMH) :
- (d) Material/gauge of casing, Drain Pan, Fan :
- (e) Overall size LxBxH (mtrs.) :
- (f) Overall weight in Kg. :
- (a) Service / side clearance required :

### Cooling coil :

- (a) Make
- (b) Material of tube/fins and type of expansion. :
- (c) No. of fins/cm. :
- (d) No. of rows deep :
- (e) Dia of tubes (mm) :
- (f) Face area ( sq. metre) :
- (g) Cooling Capacity ( K. cal/hr.) :
- (h) Entering/leaving temperature DB (Deg.C.) :
- (i) Entering/leaving temperature WB (Deg.C.) :
- (j) Apparatus Dew Point (Deg.C) :
- (k) Chilled water flow rate US LPM :
- (l) Face Velocity (metres per second) :
- (m) Test Pressure (Kg/cm ) :
- (n) Number of tubes :
- (o) Length of tubes :

### **Filter Section**

- (a) Make :
- (b) Type of filters :
- (b) Number of filters :
- (d) Size of filters :
- (e) Air velocity through filters (metres/minutes) :
- (f) Efficiency in % for particulate size :

### **Fan and Fan Motor**

- (a) Make :
- (b) Type of Fan :
- (c) Number of Fans :
- (d) Width and dia of fans (mm) :
- (e) Type of blade :
- (f) Air quantity CMH :
- (g) Fan Speed :
- (h) Provision and range of speed reduction :
- (i) Static Pressure in mm of water gauge:
- (j) Type of balancing :
- (k) Make and type of motor :
- (l) Class of insulation :
- (m) Voltage/ frequency fluctuation permissible :
- (n) Brake Horse Power in HP :
- (o) Motor RPM :
- (p) Type of Starter :
- (q) Make of Starter :
- (r) Protections available :
- (s) Sound level generated at outlet of AHU :

**13. ON-LINE SCALE PREVENTOR FOR CONDENSER WATER CIRCUIT**

- (a) Type :
- (b) Make :
- (c) Brief constructional details :
- (d) Principle of operation :
- (e) Type of connections and mounting arrangement required. :
- (f) Whether AC. Mains, supply required :  
for units operation ? If yes, details  
of power supply requirement

The scope shall comprise the supply, installation of pipe, fittings, valves etc. and testing and balancing the complete system. Refer to drawings and specifications to determine number and requirements of items of equipment requiring piping, such as bends, drain, relief etc. wherever equipment is provided with connections for such piping.

**Pipes:**

All piping work shall conform to specifications and details given below:

a) Pipes upto 150NB shall be MS ERW(Electric Rod Welded) medium(black steel beveled end) and as per IS 1239/79 Part- I with amendment of Jan., 1987.

b) Above 150 NB to 250 NB the pipes shall be MS ERW as per BS 3589.

Pipe sizes shall be selected with water velocity not exceeding 2.5 metre/second or as per the requirement of individual liquid flow to ensure smooth, noiseless, balanced circulation of fluid. The maximum friction in pipe shall not exceed 6 Metre Per 100 metre.

All piping and their steel supports shall be thoroughly cleaned with steel brush for removing dirt, rust and grease with chemical solution, if required, and coated with zinc chromate primer and given two coats of cold setting adhesive compound before installation.

**Fittings:**

The dimensions of the fittings shall conform to IS:1239-part II(as per latest amendment). All bends up to and including 150 mm diameter shall be ready made of heavy duty wrought steel of appropriate class. All fittings such as branches, reducers etc. in all sizes shall be fabricated from pipe of same diameter and thickness and its length shall be at least twice the diameter of the pipe. Bends in sizes of 200 mm diameter or higher may be fabricated from pipes of same diameter and thickness with a minimum of 4 sections and having minimum centre line radius of 1.5 times diameter of pipe.

The dead ends are to be formed with flanged joints and 6 mm thick blank between flanged pair for 150 mm and over in case a future extension is to be made here. Otherwise blank end disc 6 mm thick is to be welded with additional cross stiffeners from 50 mm x 50mm MS heavy angles. For sizes above 350 mm and all ends larger than 400 mm dia shall have dished ends and tested

**Flanges:**

All flanges shall be of mild steel as per IS 6392/71(as per latest amendment) or the relevant BS and shall be slip-on type welded to the pipes. Flange thickness shall be suitable for class-I pressure. Flanges may be tack welded into position, but all final welding shall be done with joints dismantled. 3mm thick gaskets shall be used with all flanges joints. The gaskets shall be fibre-reinforced rubber as approved by indentor or his representative at site. Flanged pairs shall be used on all such equipment, which may require to be isolated and removed for service, e.g. pumps, refrigeration machines, Air Handling Unit etc.,

Special adhesive compound shall be used between flanges of air & gas lines. All threaded valves shall be provided with nipples and flanged pair on both sides to permit flanged connection for removal of valves from main line for repair/replacement.

**Valves:**

All gate valves and check valves up to and including 65 mm shall be of gun metal screwed type, conforming to class 2 of IS:778. All gate and check valves of 80 mm diameter and above shall be of cast iron flanged type having black rubber seat and conforming to class 2 of IS:780(for sizes up to 300 mm) and of IS:2906(for sizes 350 mm and above). All such valves shall be with ISI marking and certification.

All gauges cocks shall be of gun metal plug type, complete with syphon(brass chrome plated). All drain valves shall be of gun metal with a hose union connection at one end. Auto air purge valves shall be provided at higher points in the piping system for venting.

All balancing valves up including 40 mm diameter shall be gunmetal screwed type construction. The valves of 50 mm diameter and above shall be in cast iron flanged end construction. The valve shall have stainless steel disc with special erosion/corrosion proof sealing. The valves shall be capable of delivering metered quantity of water and subsequently function as isolating valve. All valves shall have built-in pressure drop measuring facility to ascertain water flow rate. The valve shall have temper proof adjustable and lockable arrangement for required water quantity after commissioning. The valves shall be complete with pressure test cock etc. The valves shall meet minimum requirement of relevant BS specification. The test cocks should be long enough to protrude out of valve insulation. All valves shall be supplied with test certificates and the manufacturer must have test facilities at his/her works.

#### **Strainers:**

The strainers shall be Pot type/'Y' type cast iron or fabricated steel body, tested to a pressure of 10 kg/sq.cm. The strainers shall have a perforated bronze/SS screen with 3 mm perforations, 0.63 mm thick and with a permanent magnet to catch iron fillings. The Pot strainers shall be provided with flanged connections and Y- strainers shall be provided with flanged ends. The strainers shall be designed to facilitate easy removal of filter screen for cleaning without disconnection of the pipe line.

#### **Jointing:**

All pipe lines shall be of welded type except GI piping, which shall have screwed joints. Square cut plain ends will be welded for pipes up to and including 100 mm dia. All pipes 125 mm dia or larger shall be beveled by 35 degrees before welding.

#### **Miscellaneous:**

All piping is to be provided to make the equipment connected complete and ready for regular and safe operation. Connect the equipment as per recommendation of manufacturer, duly approved by the indenter.

All condensate drainage to be pitched in the direction of flow to ensure proper drainage. Pitching shall be preferably 20mm per metre length but not less than 10 mm per metre in any case. Provide valves and capped connection for all low points in piping system where necessary or required for drainage system. Provide isolating valves and drain valve in all riser to permit repairs without interfering with rest of the system. Take precautions to close ends of pipes to prevent debris entering the piping system. Independent supports are to be provided for piping so that equipment is not stressed by piping weight. Cut the pipes accurately according to measurements established at site so as to place them in position without forcing. Pipe support shall be adjustable for height and given primer coat with rust preventive paint and finish coated with paint as approved by the Indenter or his representative at site.

Unions, if used, shall be flanged type. Locate unions between shut off valves and equipment as required. Provide shut off valves where indicated and for individual equipment/units at inlet and outlet to permit unit removal for repairs without interfering with the remaining system. By-pass line and stop valves shall be provided for all automatic control valves as specified. All valves to be located for easy access and operation.

Extra supports shall be provided at the bends and at heavy fittings like valves to avoid undue stresses on the pipes. Pipe hangers shall be fixed on walls and ceiling by means of approved metallic dash fasteners using vibration isolators wherever required for minimising transmission of vibration to the structure.

#### **Hangers & supports:**

Hangers and supports shall be provided and installed for all piping and tubing, wherever indicated, required or otherwise specified. Wherever necessary additional hangers and support shall be provided to prevent vibration or excessive deflection of piping or tubing. All hangers and supports shall be of steel. Hangers shall be supported from structural steel or concrete inserts(dash fasteners/expansion bolts) as per site conditions. No hanger shall be secured to underside of lightweight roof decking. Drilling or punching of holes in steel joist members shall not be permitted.

All pipes in plant room shall be supported by pipes and channels from floor or as directed by the indentor or his representative at site. A layer of felt shall be provided between the pipes and respective hanger/support.

Where pipes are to be buried underground these should be coated with one coat of bituminous paint as per specification. The top of the pipe shall not be less than 75 cms from the ground level. Wherever this is not practical, permission of indentor or his representative at site shall be taken for lower depth. The pipes shall be surrounded on all sides by sand cushion of not less than 15 cms. After the pipes have been laid with top sand cushion, the trench shall be refilled with excavated soil and extra soil shall be removed from the site by the tenderer.

#### **Sleeves:**

Where pipes pass through walls, provide steel pipe sleeve 50 mm larger than outside diameter of pipe. Where pipes are insulated, sleeve shall be large enough to have ample clearance for insulation.

Where pipes pass through wall or floor slab, the space between pipe and sleeve shall be packed with glass wool. The centre of pipe shall be in centre of pipe sleeve and the sleeve shall be flush with the finished surface. Floor sleeve shall project 50 mm above finished floor level.

#### **Arrangement and Alignment of Piping**

All piping shall be arranged and aligned in accordance with the drawings as specified. Unless otherwise specified, the piping shall be installed in a uniform way parallel to or perpendicular to walls or ceiling and all changes in direction shall be made with fittings. The horizontal piping shall be run at right angles and shall not be diagonally across rooms or other piping. Wherever possible all piping shall be arranged to provide maximum headroom.

All piping shall be installed as directly as possible between connecting points in so far as the work of other trades permits. Where interference occurs with another trade, whose work is more difficult to route, the tenderer shall re-route his piping as required at the direction of indentor or his representative at site. All piping shall be carefully installed to provide for proper alignment, slope and expansion. The stresses in the pipelines shall be guided and pipes shall be supported in such a manner that pipe lines shall not creep, sag or buckle. Anchors and supports shall be provided wherever necessary to prevent any misalignment of piping. Small tubing, gauges, controls or other equipment installed on any apparatus, shall not be coiled nor be excessive in length, but shall be installed neatly, carefully bent at all changes of direction, secured in place and properly fastened to equipment at suitable intervals to prevent sagging.

The piping shall be grouped wherever possible and shall be installed uniformly in straight parallel lines in either vertical or horizontal positions. All tubing/capillaries shall be provided with PVC sleeve to save it against frictional cuts or damage due to vibration.

#### **Expansion or Contraction:**

The tenderer shall provide for expansion and contraction in all long runs of piping installed by use of swing connections and expansion loops.

#### **Testing:**

Entire piping shall be tested before connection to equipment. In no case piping, equipment or appliances be subjected to pressures exceeding their test rating. The tests shall be completed before applying insulation. Testing of the segments of pipe work will be permitted provided all open ends are first closed by blank-offs or flanges. After tests have been completed, the system shall be drained and flushed and cleaned of all dust and debris. All strainers, valves and fittings shall also be cleaned of all dirt, fillings and debris.

Entire piping shall be tested to hydraulic test pressure of at least one and a half times the maximum operating pressure but not less than 10 Kg/sq.cm. for a period of not less than 12 hours. All leaks and defects in the joints revealed during testing shall be rectified to the satisfaction of indentor or his representative at site and test repeated till no leak or defects are found without any extra cost. All piping system shall be tested in the presence of indentor or his representative. The dates for carrying out the test shall be intimated in advance to indentor and all equipment, labour and material required during the test shall be provided by the tenderer.

The condensate pipe shall be tested and proven tight under hydraulic pressure 20 kg/cm<sup>2</sup>, unless otherwise stated, for a period of 4 hours without drop in pressure.

The test after rectification shall be repeated till the entire system is found satisfactory. The test can be carried out for a portion of piping to avoid hindrance in the work of insulation.

The tenderer shall ensure proper noiseless circulation through all piping systems. If, due to air lock, proper circulation is not achieved, the tenderer shall bear all expenses for carrying out rectification work including finishing of floors, walls and ceiling damaged in the process of rectification. The tenderer shall provide all labour and materials for removal of water and its disposal at proper location.

### **Drain piping:**

The drain piping shall be medium class galvanized sheet as per IS 1239/1979, The fittings shall be of 'B' Brand or Equal forged with screwed connections. The gate valves shall be of Gun Metal as described earlier. Pipe crosses shall be provided at bends to permit easy cleaning of drain lines. The drain line shall be provided to the nearest drain trap and pitched towards the trap. Drain lines shall be provided at all the lowest points in the System as well as at equipment where leakage of water is likely to occur or to remove condensate and water from pump glands.

### **Thermal Insulation Specifications**

The thermal insulation material shall be PUF of density 32 kg/m<sup>3</sup> and thermal conductivity not more than 0.032Kcal/hr.mt.deg.C. The insulation shall be either of 25 mm, 50 mm or 75 mm thick as necessary. To minimize wastage, two layers of 25 mm thick mattresses can be used to form a 50 mm thick pad and a 50 mm and a 25 mm combination may be used to form a 75 mm thick pad and so on. The chicken wire mesh used shall be made of GI wire. Tar felt used shall be ISI marked. GI binding wire shall be of 22 gauge.

Thickness of insulation material to be used:

- |  |  |
|--|--|
| i. On pipes up to and including 80 mm NB                 | 50 mm  |
| ii On other pipes  | 75 mm  |
| iii On all pipes running in trenches outside or exposed. | 75 mm  |
| Vapour barrier to be used                                | Polythene faced fire retardant<br>On all insulation except PUF/hessian of 10 oz grade. |

Exterior surface finish :-

- |  |   |
|--|---|
| i. All surfaces in the plant room:                         | 30 gauge Al foil stuck with Al tape                                     |
| ii.All surfaces in trench or exposed to whether to whether | Tar felt sealed with bitumen applied over a plaster of asbestos cement. |

Sequence of application: On pipes.	Clean surface, apply a coat of Black Japan paint, insulation held with chicken wire mesh , apply polythene faced hessian, apply surface finish.
---------------------------------------	---

Balancing valves and 'Y' stainers need not be insulated to facilitate ease of measurement and maintenance

Measurements:

Pipe insulation shall be measured along with center line of the pipe in linear measurement including all the valves, flanges and fittings,. Following additional measurement of the same size of pipe shall be allowed for the valves and fittings.

All GM valves @1.5 Rmt of the same size pipe length

All CI Flanged valve @ 2,3 Rmt of the same size pipe length

All flanges @ 0.8 Rmt of the same size pipe length.

**SCHEDULE OF REQUIREMENT FOR WATER COOLED 6x15TR. AIR-CONDITIONING PLANTS**

Name of the Station : All India Radio-- CHENNAI 'A'

S.NO	DESCRIPTION OF THE EQUIPMENT	CAPACITY OF EACH UNIT	QTY.	REMARKS.
4.0.	SITC of 6X15 Ton Packaged type Water cooled Air conditioning plant Consisting of the following:-	15 Ton	0 6 Nos per site	i) 04 Nos. of plants, will run at a time, remaining 02 Nos plants shall be standby. ii) Tentative Layout of A/C Eqpt. layout enclosed for reference. TC-16183
4.1.	Package type, water cooled 15 Ton on ASHRE design conditions with R-22 or R134a refrigerant comprising semi-hermetic type Reciprocating compressor complete with microprocessor controller, water cooled condenser, cooling tower and piping with first charge of refrigerant as per following design conditions:	45360 Kcal/Hr.	6 units per site	Ref. para-1.0 of sec.-I
4.1.1	End suction condenser Water pump sets with Bronze impeller for condenser water re-circulation complete with TEFC squirrel cage motor with accessories as given in sec.-II and as per following parameters --- i) Capacity of each pump net head ii) Efficiency	900 LMP to suit the system requirement. 80%	Two Units per site	Ref. para-2.4 of sec.-II
4.1.2	<b>Air Handling unit</b> complete with fan section with motor Cooling coils with coil section Air filter section, stainless Steel drain pan etc. Confirming to specifications given in section-II and as per following parameters:		06 units per site	Ref. para-2.7 of sec.-II
a)	Total refrigeration capacity of cooling coils per unit	Shall not be less than 45360Kcal./hr./unit		
b)	Nominal fan discharge per unit.	6,000 CFM/102,00 CMH		

4.1.3	Housing/cabinet for the above equipment complete with air outlet port/ports at the top and air suction grill in the front Of the plant, with Thermal /acoustic Lining inside and attractively finished with corrosion resistant paint from outside along with ant vibration mounts.	The design & size of the Cabinet shall allow adequate space around Each component, mounted inside the cabinet, for ease of maintenance/ serviceability	One set of cabinet per unit.	
4.1.4	Induced Draft Cross Flow Type water cooling fire Retardant FRP/HDG Steel tower with accessories	Total heat rejection capacity shall be not less than 271250.KCal/Hr	02 units per site	Ref.para–2.6 of Section-II. One unit as stanby.
4.1.5	Make-up water tank PVC, Sintex Type With accessories.	Not less than 2000 ltrs.	1 unit per site	Ref. para 2.7 of Section-II
4.1.6	MS'C' Class Condenser water pipes and accessories	To match the requirements of water circuits	1 lot	Ref. para 2.10 of Section-II.
4.1.7 (a)	Cubical Type sectionalized floor standing switchboard by CPRI approved firms of 31 MVA fault capacity,3-phase,415 Volt, 4-wire switch board .	As required for various Electrical machines of A/C System.	1 lot	Ref.para 2.13 of Section-II
(b)	SITC of earth pits for the above equipment. ( As per CPWD general Specification for electrical works, 1994(Part-I-internal)		2Nos	
(c)	Electrical power cables and Control wires.	As required		
4.1.8	On-Line water scale Preventer / Water softening system. (The tenderer may study the Quality of water to recommend and quote suitable on-line scale preventer/ water Softening system.)	As required	01No	Ref. Para-2.3 of sec.-II
4.2	Training of AIR Personnel.			Ref. Para- 1.10, sec.- 1
4.3.	Civil works: Foundation staging etc. for equipment, making Openings in walls/slabs and making good thereof. Painting of equipment.	As per requirement of the equipment.	1 Job	Ref.para. 13 sec. 2
4.4	Supply of Manuals for operation, maintenance and servicing for all the equipment supplied and detailed drawings of electrical and interlocking circuits.		03 sets for each site	
4.5.	Dismantling of existing A/c plants		One job	
4.6.	Remote Status Panel		01No.for each site	Ref. Para-2.11of sec-2

**OPTIONAL ITEMS**

1)	Operation charges for 1st 6 months After commissioning of AC Plants		Lump sum	
2)	Charges for comprehensive AMC per year.		Lump sum	
3)	Spares		1set for each site	Ref..Para 1.13,of sec.-I N.B: The cost of spares shall not be considered for ranking of the bid.
4.)	Tools	1 set for each site .		Ref. Para 1.14 of sec.-I

**SITE CONDITIONS:-**  
**Ambient design conditions**

S.NO.	STATION	POWER	TEMP.IN SUMMER		TEMP.IN MONSOON		TEMP.IN WINTER	
			DB(°C)	WB(°C)	DB(°C)	WB(°C)	DB(°C)	WB(°C)
1	CHENNAI 'A'	200 kW	40	36.5	28	26	21	19

**END OF THIS SECTION**



H.T., LT. & A/C PLANT TENTATIVE EXISTING LAYOUT IN 2X100 KW MW TR, AT H.P.T., AIR AVADI, CHENNAI

