प्रसार भारती/Prasar Bharati
(भारत का लोक सेवा प्रसारक)
(India's Public Service Broadcaster)
आकाशवाणी महानिदेशालय /Directorate General: All India Radio
योजना एवं विकास एकक, आकाशवाणी भवन, संसद मार्ग, नई दिल्ली-110001
P & D Unit, Akashvani Bhawan, Sansad Marg, New Delhi-110001
[एफ. एम. डिजाईन अनुभाग /FM Design Section]
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File No. 16 Panel FM Antenna-9/4/2022-D (TD/FM) Dated 27.01.2023

Subject: Specification for Supply, Erection, Testing and Commissioning (SETC) of 16 Panel VHF FM Antenna alongwith associated equipments, items & accessories-**regarding Industry feedback & Budgetary quotes**

Dear Sir,

DG: AIR is planning for procurement of Supply, Erection, Testing and Commissioning (SETC) of 16 Panel VHF FM Antenna alongwith associated equipments, items & accessories, on open tender basis. Draft technical specification is enclosed for reference.

In this regard, the Prospective bidders from India are requested to give their industry feedback (if any) on the above referred draft Specifications **up to 10.02.2023.** To get an estimated cost, the Prospective bidders from India are also requested to give their budgetary quote for the above referred subject **up to 10.02.2023.**

Industry feedback (if any) and budgetary quote may be sent to this Directorate at the following e-mail addresses.

murugan_k@prasarbharati.gov.in
manzoor@prasarbharati.gov.in

Encl: As above.

(मंजूर अली/Manzoor Ali)
उप निदेशक (अभि.)/Dy. Director (Engg.)
कृते महानिदेश /For Director General

To: (through email)

1. Prasar Bharati web-site
2. The Prospective Bidders
3. DDG (E-Purchase), P&D Unit, DG: AIR, New Delhi

कृते महानिदेश/For Director General

Prasar Bharati
(India's Public Service Broadcaster)
Directorate General: All India Radio
P & D Unit, Akashvani Bhawan,
Sansad Marg, New Delhi-110001
[FM Design Section]
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Specification for Supply, Erection, Testing and Commissioning (SETC) of 16 Panel VHF FM Antenna alongwith associated equipments, items & accessories

CONTENTS

A. ESSENTIAL REQUIREMENTS OF TENDER:

1. (i) The Tenderer should submit Schedule of Requirements/Materials for SETC (Unpriced) ***in the same format as given in Section-5.0*** of AIR Specification in the technical bid, failing which the tender shall be considered incomplete and is liable to be rejected.

   (ii) It is also mandatory to mention ***Make & Model of the offered equipment*** in the Schedule of Requirements/Materials of supply, failing which the tender shall be considered incomplete and is liable to be rejected.

   (iii) Make/Model and detailed specifications of the equipments/items being offered shall be mentioned categorically, to access the full merit of the offer, failing which tender shall be considered incomplete and is liable to be rejected. **Broader terms viz. Equivalent/similar will not be accepted.**

2. Each statement of this specification has to be complied with & supported by printed technical literature, technical data sheets, schematic drawings and technical manuals from the OEM (Original Equipment Manufacturer) by the tenderer, to assess the merit of the offer without which the tender will be considered incomplete and is liable to be rejected.

3. The tenderer should submit the tender offer to AIR (All India Radio) in the format given below, section wise & clause wise, in respect of all the sections of technical specifications. The OEM/tenderer must provide the page number reference, in column (4) of the table given below, of the Technical bid clearly indicating the volume number also, if any, for each supporting document to verify the parametric values shown in the technical specifications compliance statement, to assess the full merit of the offer, failing which tender shall be considered incomplete and is liable to be rejected.

S. No. of AIR Specifications (Section wise & Clause wise) (1)	Details of AIR Specifications (Part/ Section wise & Clause wise) (2)	Compliance **(Yes/No)** (3)	The page No. of the tender offer, where the information/ supporting document is available. (4)	Remarks (5)
A. Essential requirements for tender				
B. Essential eligibility criteria for tenderers				
Section-1.0 Clause wise				
Section-2.0 Clause wise				
Section-3.0 Clause wise				
Section-4.0 Clause wise				

4. The tenderer should quote the rate/cost of individual items in the tender offer while submitting the tender offer for spares **(OPTIONAL)** in commercial bid. ***Optional items will not be considered for ranking purpose.***

5. The complete technical specifications (Section wise & Clause wise) compliance statements along with Schedule of Requirements/Materials (un-priced) must be signed & stamped by the respective Original Equipment Manufacturer (OEM) in the tender document, failing which the tender shall be considered incomplete and is liable to be rejected.
   In case tender offer is from other than the Original Equipment Manufacturer, the tenderer must also sign & stamp the complete Technical specifications (Section wise & Clause wise) compliance statements, failing which the tender shall be considered incomplete and is liable to be rejected. The OEM & tenderer should mention their name & designation of the signatories with full address, phone number, e-mail addresses etc.

6. The authorization and guarantee must be given by respective Original Equipment Manufacturer (OEM) on their letter head pad duly signed & stamped. In case tender offer is from other than the Original Equipment Manufacturer, the tenderer must also give guarantee on their letter head pad duly signed & stamped, failing which the tender shall be considered incomplete and is liable to be rejected. Guarantee shall be as per the format given in AIR specification.

7. In case tender offer is from other than the Original Equipment Manufacturer, the tenderer should also furnish a certificate from the OEM that the tenderer can quote items of the OEM directly, failing which the tender shall be considered incomplete and is liable to be rejected without any notice/back reference.

8. Any change in the AIR technical specifications format or language or in parameters or of any other nature including the deletion/addition of technical specifications clause, words, lines in the technical specifications compliance statement by the OEM/ tenderer will not be acceptable to AIR and the tender is liable to be rejected.

9. Prasar Bharati will follow the reciprocal market access strategy of the Government of India, which describes on the Clause 10(d) of Public Procurement Preference to Make in India, Order 2017. The Purchaser shall have right for not consider any Bid and may restrict such Bidders from the bidding process; who originate from those countries, where they do not allow market access for Indian companies; in such cases, the Clause 10 (d) of Public Procurement Preference to Make in India, order 2017, shall be invoked wherever applicable, when it is relevant.

10. Amendment in General Financial Rules (GFRs), 2017-Golobal Tender Enquiry issued vide F. No. 12/17/2019-PPD dated 15.05.2020 of Government of India, Ministry of Finance, Department of Expenditure, Public Procurement Division shall be applicable.

B. ESSENTIAL ELIGIBILITY CRITERIA FOR TENDERERS:

(a) The tenderer shall be from India only.

(b) The tenderer should either be the OEM of FM/TV Antenna or their authorized representative/dealer in India.

(c) In case the tenderer is the authorized representative/dealer, the tenderer must be an authorized representative/dealer of any OEM of FM/TV Antenna for last **three years or more OR** must be in the business of sales and supply of FM/TV Antenna/VHF FM transmitters/TV transmitters/AM Transmitters for last **three years or more**. Documentary evidence to support this must be provided.

(d) (i). The OEM of the VHF FM Antenna must have an experience of manufacturing and supplying 16 Panel (or more) VHF FM Antenna system of power rating not less than 80kW for at least last 10 years. Documentary evidence to support this must be provided.

(ii). The OEM should have supplied FM antenna to reputed/public broadcasters. The OEM must provide the details of past supply record **(in the format given below)** for at least 10 Nos. of such VHF FM Antenna of power rating not less than 80kW, supplied during last 7 years ending last day of the month previous to the one in which the tender is invited. Documentary evidence to support this must be provided.

Supply order No. with date	VHF FM Antenna Type & Model	VHF FM Antenna Power Rating	Qty. supplied	Name of the broadcaster with full postal address including e-mail address to whom VHF FM Antenna was supplied.	Remarks
(1)	(2)	(3)	(4)	(5)	(6)

(ii). All India Radio reserves the right to get performance feedback of the VHF FM Antenna from any of the above broadcasters named by the tenderer/OEM.

(iv) Copies of Supply order/completion certificates/delivery challans/invoices of at least 05 Nos., out of 10 Nos. of such FM antenna of power rating not less than 80kW submitted by the tenderer in above format, are also to be enclosed by the tenderer.

(e) The OEM of the offered VHF FM Antenna must have his local office/authorized representative/dealer in India for after sales support. **A certificate as per Annexure-I** duly signed by the OEM as well as local office/authorized representative/dealer must be submitted with the offer. Copy of Agreement/MoU executed between OEMs and their authorized representative/dealer duly signed by both must also be submitted with the offer.

(f) The OEM must have his own test bench including test field, rotating tower, suitable receiving equipments for measuring various parameters and their analysis. The tenderer must submit the necessary supporting documents along with detailed drawings, photographs etc. of the test set up facilities at OEM works, failing which, the tender is liable to be rejected.

SECTION 1.0

TECHNICAL REQUIREMENT

S. No.	Site	Height of available Tower (Metre)	16 Panel VHF FM Antenna	RF Coaxial Air Dielectric Cable with Dehydrator (Dual feeder cable system)	Antenna Switch Frame/Patch Panel	RF Coaxial Copper Rigid Lines & accessories
1.	Nandyal	100	1 No.	2 × 120*	1No., 6 Port	Yes
2.	Katihar	150	1 No.	2 × 170*	1No., 6 Port	Yes
3.	Leh	100	1 No.	2 × 120*	1No., 6 Port	Yes
4.	Balasore	150	1 No.	2 × 170*	1No., 6 Port	Yes
5.	Saharsa	132	1 No.	2 × 152*	1No., 6 Port	Yes
6.	Jagadalpur	100	1 No.	2 × 120*	1No., 6 Port	Yes
7.	Radhanpur	150	1 No.	2 × 170*	1No., 6 Port	Yes
8.	Shimoga	150	1 No.	2 × 170*	1No., 6 Port	Yes
9.	Ambajogai	150	1 No.	2 × 170*	1No., 6 Port	Yes
10.	Kumbakonam	150	1 No.	2 × 170*	1No., 6 Port	Yes
11.	Jaisalmer	300	1 No.	2 × 320*	1No., 6 Port	Yes

Note- * Exact length will be intimated at the time of placement of order.

SECTION 2.0

GENERAL SPECIFICATION

Note: Please refer tender documents for general terms and conditions of contract for SETC works including all the commercial aspects like; Packing and Packing List, Insurance and Marine Risk etc., Payment terms, Penalty/Compensation for Delay, Damages and Liabilities, Time Period and Extension for Delay, Foreclosure of Contract due to Abandonment or Reduction in Scope of Work, Cancellation of Contract in Full or Part, Recovery of Security Deposit, Performance Guarantee, Indian Electricity Rules, Unsatisfactory Workmanship, Damages Incurred During Erection, Tenderer Liable for Damages, Defects, Recovery of Compensation, Ensuring Payment and Amenities, Labour Laws to be Complied by Tenderer, Minimum Wages Act Compliance, Tenderer to Indemnify Government against Patent Rights, Return of Surplus Material, Employment of Technical Staff and Employees, Release of Security Deposit, Safety Code insurance from manufacturer's Works/factory to site etc. **i.e. in totality**.

All equipment and items of 16 Panel VHF FM Antenna System as per AIR specification shall be used for 24×7 operation. The offered equipments/items as per AIR Specifications shall be field proven for satisfactory operation.

1.0 SCOPE:

Supply, Erection, Testing and Commissioning (SETC) of 16 Panel VHF FM Antenna, RF Coaxial Air Dielectric Cable, Antenna Switch Frame/Patch Panel, RF Coaxial Copper Rigid Lines & accessories as per following schematic drawings:

S. No.	Drawing No.	Details
1.	TM-16780	Schematic Drg. for SETC of VHF FM Panel Antenna, Antenna Switch Frame/Patch Panel, RF Coaxial Cable, RF Coaxial Copper Rigid Lines & accessories for Nandyal, Katihar, Leh, Balasore, Saharsa, Jagadalpur, Radhanpur, Shinmoga, Ambajogia & Kombakonam.
2.	TM-16781	Schematic Drg. for SETC of VHF FM Panel Antenna, Antenna Switch Frame/Patch Panel, RF Coaxial Cable, RF Coaxial Copper Rigid Lines & accessories for Jaisalmer.
3.	TM-16782	Suggestive Antenna Switching/Patch Panel (MIMIC Diagram)-3-1/8', 6Ports/3U-Links
4.	TM-16783	Suggestive Antenna Switching/Patch Panel (MIMIC Diagram)-4-1/2', 6Ports/3U-Links

The broad scope of above Supply, Erection, Testing and Commissioning (SETC) are as follows:

1.1. 16 Panel (4×4) VHF FM antenna as per specification.
1.2. RF Coaxial Air Dielectric Cable and Dehydrator as per Specification.
1.3. Antenna Switch Frame/Patch Panel as per the specification.
1.4. RF Coaxial Copper Rigid Lines as per specification.
1.5. Copper Plate Earthing as per specification. Refer drawing No. TM-16599
1.6. Vertical Cable tray as per specification. Refer drawing No. TM-16640
1.7. Horizontal Cable tray as per specification. Refer drawing No. TM- 14453/3

2.0 PRE-DISPATCH INSPECTION OF ANTENNA SYSTEM AND ASSOCIATED EQUIPMENT/ITEMS:

The complete Acceptance Test Procedure/Protocol (ATP) will be prepared by the respective OEM of the offered equipments/items and submitted to DDG (E-FM), P&D Unit, DG: AIR for approval within **15 days** of issue of Acceptance of Tender. ATP will also indicate full details of setup for measuring/testing equipments to be deployed during the performance measurements/inspection. The approved ATP shall form the basis for performance measurements/inspection to be carried out. AIR has the right to include other technical parameters in ATP submitted by OEM within the ambit of specification of the product offered.

(A). INSPECTION OF ANTENNA SYSTEM:

a). Detailed Pre-dispatch Inspection (PDI) of complete Antenna system will be carried out at OEM's Works Place by **two Engineers** of All India Radio as per details given in Section-4.0**.**

b). Call for Pre-dispatch Inspection (PDI) is to be given by the tenderer to All India Radio at least **6 weeks** in advance from the date of PDI. Testing/measurement reports as per approved in ATP along with approved copy of Technical Manual (s) must be submitted to All India Radio along with the call for inspection of complete Antenna system for analyzing etc. These testing/measurement reports and approved copy of Technical Manual (s) must also be available at the time of inspection of the complete Antenna system.

c). Inspection period shall be **three days** for first Complete Antenna System and **one day** each for subsequent numbers of complete Antenna System.

d). For AIR inspecting engineers, expenses toward to and fro air journey, boarding, lodging etc. will be borne by All India Radio.

(B). INSPECTION OF ASSOCIATED EQUIPMENT/ITEMS:

a). All other associated equipments/items like RF Coaxial Copper Rigid Lines, RF Coaxial Air Dielectric Cables, Dehydrator, Antenna Switch Frame/Patch Panel etc. will be accepted on the basis of Original Equipment Manufacture's (OEM) Test Certificates, duly signed and stamped by OEM. The approved ATP shall form the basis for performance measurements/OEM test certificates.

b). These OEM test certificates duly stamped and signed by OEM in respect of all equipments/items as per approved ATP are to be submitted by the tenderer to AIR along with the call for inspection of Complete Antenna System for analyzing etc. These OEM test certificates must also be available at the time of inspection of the Complete Antenna System.

3.0 SUBMISSION OF DETAILED DESIGN & DRAWING DOCUMENTS WITHIN 30 DAYS OF ISSUE OF ACCEPTANCE OF TENDER:

The successful tenderer will perform site visit(s) and prepare one Set of detailed design & drawing documents regarding hoisting/layout of Antenna system, RF Coaxial Copper Rigid Lines, RF Coaxial Air Dielectric Cable etc. in co-ordination with concerned Zonal Offices in respect of complete setup at site and shall submit to DDG (E-FM), P&D Unit, DG: AIR, duly verified by Zonal Office, **for approval** within **30 days** of issue of Acceptance of Tender.

The tenderer shall supply one set of approved design and drawing documents of complete setup along with soft copy on pen-drive as per the distribution given below:

(i) Installation Officer of concerned sites of All India Radio
(ii) Concerned Zonal Offices
(iii) DDG (E-FM), P&D Unit, DG, AIR, New Delhi-110001

4.0 All the necessary measuring equipment and tools etc. required for completion of the project will be arranged by the tenderer during SETC and no additional amount shall be paid on this account.

5.0 Erection, Testing and Commissioning (ETC) of above "set-up" as per AIR specification shall be done under the supervision of qualified engineer of OEM / engineer duly trained and certified by OEM of VHF FM Antenna.

6.0 COMPLETION OF SETC: 12 MONTHS from the date of issue of Acceptance of Tender.

7.0 LANGUAGE/ UNITS: All information supplied by the tenderer and all markings, notes, designation on the drawings and associated write-ups including Instruction Manuals shall be in "English language" only. All dimensions and units on drawings and all references to weights and measures and quantities shall be in metric units.

8.0 DOCUMENTS/INFORMATION TO BE SUPPLIED WITH THE TENDER OFFER:

1. The complete technical specifications (Section wise & Clause wise) compliance statement alongwith Schedule of Requirements/Materials (un-priced), duly signed & stamped by the respective Original Equipment Manufacturer (OEM) and countersigned by the tenderer as per the format given above in clause A (3), **to assess the full merit of the offer, without which the tender offer will be considered incomplete and is liable for rejection.**
2. Complete printed technical literature, technical data sheets, schematic drawings and technical manuals of the offered equipments in support of compliance statement should be furnished, **to assess the full merit of the offer, without which the tender offer will be considered incomplete and liable to be rejected.**
3. Schedule of Requirements/Materials (un-priced) for SETC of 16 Panel VHF FM Antenna System & accessories in the same format as given in Section-5.0 of AIR Specification without any change in the format, **failing which the tender will be considered incomplete and is liable for rejection. The tenderer must quote all items.**
4. Descriptive information and complete details of each equipment offered shall be given by the tenderer.
5. Country of Origin, Make, Type & Model of all the Equipments/items offered should be mentioned including the name & address of their vendors.
6. A copy of the Technical Manual (Installation, Testing, Commissioning, Operation & Maintenance, including theory of operation and fault diagnosis) must be enclosed with technical bid for assessing the 16 Panel VHF FM Antenna System and accessories offered. The Technical Manual must include at least the details given below: **Tenderer may please note that AIR shall not be asked by the tenderer to sign any non-disclosure certificates/agreements in any aspects.**
   (a) General description of the 16 Panel VHF FM Antenna System, block diagram/schematic drawings etc.
   (b) Diagrams showing the isometric view of complete antenna system and allied equipment with dimensions in meters.
   (c) Installation Manual & drawings.
   (d) The procedure for frequency tuning with practical examples.
   (e) **All *Do's and Don'ts* which are essential for safe Installation, Operation & Maintenance of the Antenna system.**
   (f) Design Life of 16 Panel VHF FM Antenna System offered.

7. Following technical details, data and engineering drawings are to be submitted by the tenderer with the tender offer, **to assess the full merit of the offer, without which tender will be considered incomplete & is liable for rejected.**

(i) Complete information, details, parameters as mentioned in specification and information required for Fixing/Mounting the various Fixtures/accessories for the SETC set up.
(ii) Make, Model & Type of Rigid lines, Distribution Feed cables and Matching End Connectors etc.
(iii) Photograph of the single dipole, single panel and complete 16 Panel antenna system.
(iv) Mechanical drawing of single dipole, single panel and complete 16 Panel antenna system along with dimensions.
(v)Engineering drawing of single panel and complete 16 panel antenna system along with power dividers and RF coaxial air dielectric cables along with input and output end connector sizes & their power ratings of the dual feeder system.
(vi) A write up giving working details and salient features of the Antenna system.
(vii) Power handling capacity of following components shall be submitted in the tender document by the tenderer :
   a) Main Power divider input and output end connector size & power rating (88 MHz-108 MHz).
   b) Main RF air dielectric feed cables size & power rating including, input and output end connectors size & power rating (88 MHz-108 MHz).
   c) 2nd Power divider input and output end connector size & power rating (88 MHz-108 MHz)
   d) 2nd RF air dielectric feed cables size & power rating including, input and output end connector size & power rating (88 MHz-108 MHz).
   e) Similarly other details as per design of the manufacturer.

f) Individual Dipoles including input end connector size & power rating (88 MHz-108 MHz).

(viii) Return loss (dB) figure from input point to the end of Distribution Feed cable shall also be indicated.

8.2 List of equipment for which respective OEMs' compliance statements, guarantee certificates and certificates for authorization for after sales support is required:

(i) Complete Antenna System
(ii) RF Coaxial Air Dielectric Cable & Dehydrator with tubing and accessories
(iii) RF coaxial copper rigid lines & accessories

All the above documents are necessarily to be provided on respective OEMs' letterhead, duly signed by authorized signatory of the OEM with name and designation of authorized signatory. The documents must have clear reference of items being offered by the respective OEMs.

8.3 *In addition to above, the tenderer is also required to submit the document (s)/information as asked elsewhere in the technical specifications, to assess the full merit of the offer, without which the tender offer will be considered incomplete and is liable for rejected.*

9.0 INFORMATION TO PRECEDE DESPATCH OF EQUIPMENT:

Following information should be supplied to the DDG (E-FM), P & D Unit, DG: AIR and consignee, prior to dispatch of equipment:

(a) Detailed list of equipments under dispatch.
(b) Photograph showing location of various units/sub units with item numbers marked thereon.

10.0 INFORMATION TO BE SUPPLIED BY THE TENDERER WITHIN 15 DAYS AFTER ISSUE OF ACCEPTANCE OF TENDER:

One set of Technical Manuals (Installation, Testing, Commissioning, Operation & Maintenance, including theory of operation and fault diagnosis) colour printed & duly bound for 16 Panel VHF FM Antenna System, RF Coaxial Copper Rigid Lines, RF Coaxial Air Dielectric Cable, Dehydrator, Antenna Switch Frame/Patch Panel along with associated equipment, items & accessories along with soft copy on Pen-drive, shall be supplied to "The DDG(E-FM), P & D Unit, DG:AIR, New Delhi-110001" **for examination & approval.**

11.0 INSURANCE AND MARINE RISKS ETC.

Please refer to commercial terms.

12.0 GUARANTEE: Tenderer shall submit with his tender an undertaking to accept the following guarantees:

{This Guarantee clause is applicable to Antenna System as well as all the associated equipments/items mentioned in Schedule of Requirements/Materials (un-priced)}.

(i) A guarantee that the equipment supplied will be in accordance with these specifications, varied only to the extent stated in his tender and agreed to in the contract.
(ii) A guarantee to make good within **30 days** (from the date of first intimation to OEM/tenderer) at tenderer's expense any component which becomes defective under normal operating conditions for **36 months** from the date of commissioning at site. If the tenderer failed to rectify the fault within the stipulated period of **30 days**, the guarantee period for that particular location (Site) would be extended corresponding to the outage period.
(iii) A guarantee to supply all components for a period of **10 years** from the date of supply, at rates at which these are being supplied by the firm to other customers and also should match prices of original manufactures of these components prevailing at that time.
(iv) If at any stage during next **10 years**, the manufacturer stops production of this model of antenna system, the firm shall intimate All India Radio in advance to enable the latter to stock the critical items.

13.0 After completion of work, the tenderer shall remove dust, dirt, debris and leave the building/premises in a clean condition.

14.0 The tenderer shall make his own arrangements for providing accommodation for his workmen at site along with storage of equipment/material including the safe custody at site.

15.0 The tenderer should confirm to all local State laws/Central laws and regulations amended up to date concerning labour and their employment as applicable. The insurance etc. of the labourers shall be the responsibility of the tenderer including any kind of pre/post action and consequences relating to above insurance etc.

16.0 The tenderer shall indemnify AIR and his employees from any liability that may arise out of infringements of patents and copy rights associated with the design, fabrication, erection of any equipment etc.

17.0 The successful tenderer should indemnify and hold harmless AIR against all claims in respect of damages to buildings, property, articles, situated nearby not belonging to the AIR and public personnel arising from the erection, testing & commissioning (as per SETC specification) in the course of such erection and throughout the guarantee period.

18.0 The successful tenderer should indemnify and hold harmless AIR against claims in respect of injury to any person howsoever arising from the erection (as per SETC specification) in the course of such erection and throughout the guarantee period.

19.0 HANDING OVER OF TECHNICAL MANUALS & OTHER DOCUMENTS:

Two sets of Technical Manuals (Installation, Testing, Commissioning, Operation & Maintenance, including theory of operation and fault diagnosis) **colour printed** & duly bound for 16 Panel VHF FM Antenna System, RF Coaxial Copper Rigid Lines, RF Coaxial Air Dielectric Cable, Dehydrator, Antenna Switch Frame/Patch Panel along with associated equipment, items & accessories, inspection report including performance measurements carried out at the Works of OEM and OEM test certificates of associated equipments alongwith soft copies on Pen-drive are to be supplied to consignee.

Technical Manual as mentioned in clause 10.0 is also required to be supplied as per the details given below:

(i) For Consignee- 2 Sets of technical manual in hard copies colour printed and duly bound along-with soft copy on pen drive.

(ii) For the following Offices/Officers-1 Set of technical manual in hard copies colour printed and duly bound along-with soft copy on pen drive for each offices/officers:
DDG(E-FM), DDG(E-TM), Zonal Office (Maintenance Wing of North/South/West/East zone), Zonal Office (Project Wing of North/South/West/East zone), Technical Library(P&D Unit), R&D & NABM (T)

20.0 SUPPLY, ERECTION, TESTING AND COMMISSIONING:

The SETC of 16 Panel VHF FM Antenna, RF Coaxial Air Dielectric Cable, Dehydrator, Antenna Switch Frame / Patch Panel, RF Coaxial Copper Rigid Lines & accessories shall be undertaken by the tenderer in accordance with ATP and in conformity with the AIR Specifications.

20.1 SUPPLY: Supply of 16 Panel VHF FM Antenna, RF Coaxial Air Dielectric Cable, Dehydrator, Antenna Switch Frame / Patch Panel, RF Coaxial Copper Rigid Lines & accessories etc. shall be as per Section-5.1 of AIR Specification.

20.2 ERECTION: Erection of 16 Panel VHF FM Antenna, RF Coaxial Air Dielectric Cable, Dehydrator, Antenna Switch Frame/Patch Panel, RF Coaxial Copper Rigid Lines & accessories (as per Section-5.2) at site will be done in the transmitter complex as per layout plan approved by AIR.

20.3 TESTING:

After the erection, 16 Panel VHF FM Antenna, RF Coaxial Air Dielectric Cable, Dehydrator, Antenna Switch Frame/Patch Panel, RF Coaxial Copper Rigid Lines & accessories are to be tested, making all the initial checks including physical inspection and continuity checks of wiring/cabling etc. as per drawings. The testing will be undertaken by the tenderer as per standard practice and in conformity with ATP. The testing in a sequential manner in respect of all the equipments will be taken up with RF power, only after satisfying that erection is fit for RF Power application.

20.4 COMMISSIONING AT SITE:

After erection and testing of the 16 Panel VHF FM Antenna, RF Coaxial Air Dielectric Cable, Dehydrator, Antenna Switch Frame/Patch Panel, RF Coaxial Copper Rigid Lines & accessories, performance figures/measurements for all parameters are to be taken by the tenderer in the presence of AIR's representative as per ATP.

Actual field strength survey covering contours up to signal strength of 48, 54, 66 & 74 dBµV/m to be carried out and plotted on map of the area.

The tenderer shall supply one set of final performance figures/measurements including actual field strength survey as mentioned above along with soft copy on pen-drive as per the distribution given below:

(i) Installation officer of concerned site of All India Radio.
(ii) Concerned Zonal Offices
(iii) DDG (E-FM), P&D Unit, DG, AIR, New Delhi-110001

21.0 On acceptance of the tender, the name of the accredited representative(s) of the tenderer who would be responsible for taking instructions from DG: AIR, New Delhi-110001 or his authorized representative shall be communicated in writing to AIR.

22.0 Ambient conditions for all indoor Equipments:

i.	Operating temperature range	0 ºC to 45 ºC
ii	Relative Humidity	95% non-condensing.
iii	Working altitude	Up to 3000 meters AMSL

23.0 Environmental conditions for outdoor Equipments & items

i	Maximum Wind Speed	198 km/Hour
ii	Ambient Temperature	0ºC to 50 ºC
iii	Humidity	95% non-condensing
iv	Rainfall	Moderate to heavy

24.0 Power Supply for indoor Equipments:

(i)	Operating Line voltage	AC Single Phase : 230 Volts $\pm$ 10 %
(ii)	Frequency	50 Hz $\pm$ 4%
(iii)	Power factor	Better than 0.9

25.0 ESSENTIAL REQUIREMENT FOR LOCAL OFFICE/AUTHORIZED REPRESENTATIVE/ DEALER IN INDIA FOR AFTER SALES SUPPORT:

(a) The OEM should have complete setup for maintenance/repair of the Antenna System in India, either of its own or through local office/authorized representative/dealer.

(b) The local office/authorized representative/dealer will be the nodal point for resolving issues related to after sales support. It is the responsibility of local office/authorized representative/dealer to arrange the repair/replacement of faulty items. Any module of antenna system or other equipment requiring repairs will be repaired. If it is not feasible to repair the module at site, the same will be collected from the site by local office/authorized representative/dealer and will arrange repairs locally. The cost of transportation, repairs etc. shall be borne by the tenderer during the guarantee period.

(c) After sales support for the repairs/maintenance of antenna system after the completion of guarantee period, shall also be provided by the respective OEM of the antenna system and other associated equipments through their local offices/authorized representatives/dealers in India.

(d) The details of technical facilities available with local office/authorized representative/dealer **for after sales support such as test bench, necessary test & measuring equipment and photographs thereof, must be provided in the technical bid**.

(e) At the discretion of AIR, the representative(s) of AIR may visit the works of local office/authorized representative/dealer of OEM in India to ensure/verify that adequate technical infrastructure is available for after sales service for timely resolving the issues related to attending/replacing the equipments. Tenders from the tenderers who failed to meet these criteria shall be considered incomplete and is liable to be rejected.

SECTION 3.0

TECHNICAL SPECIFICATIONS

3.1 16 PANEL VHF FM ANTENNA

3.1.1 INTRODUCTION:

3.1.2 The FM Antenna is required for use with FM transmitters of All India Radio. The Antenna will consist of 16Panels (4×4).

3.1.3 Each face/side of FM Antenna shall consist of 4 Panels, which will be mounted on each of the four faces of the tower. Each panel **will consist of two horizontal dipoles and two vertical dipoles**. No other offer will be acceptable to AIR and the tender offer is liable to be rejected in case of deviation from the AIR specifications.

3.1.4 The Power Feeding to the Antenna shall be through Antenna Patch Panel for Splitting the RF power into two equal parts for feeding Upper & Lower Antenna Panel Assembly. The Antenna Switch Frame/Patch Panel shall also have arrangement for feeding half of the Rated Power of 16 Panel VHF FM antenna system to either Upper or Lower Portion of Antenna Panel Assembly.

3.1.5 The Antenna will be installed on existing self-supporting tower. The FM aperture of tower will be of square cross-section of about 2500 mm × 2500 mm with Latticed Steel Structure.

3.1.6 **ELECTRICAL PARAMETERS:**

(i) Polarization : Circular

(ii) Input Impedance : 50Ω, unbalanced, each

(iii) Frequency Range : 88 MHz-108 MHz

(iv) VSWR (for complete antenna system) : Better than 1.1:1.0 (Frequency Range 88 MHz-108 MHz)

(v) Impedance & Return Loss (dB) Value in Graph form over entire (88MHz -108 MHz) frequency range to be enclosed with the tender.

3.1.7. **The Power Rating of Antenna, Loading Details & Input Connector Sizes are given below:**

S. No.	Name of Site	Antenna Power Rating	Weight of Antenna (in Kg.)	Wind Load (in Kg.)	Vertical Antenna Aperture (in mm)	Max. Wind Speed (in Km/Hr)	Input Connector size
1.	Nandyal	≥ 40kW	≤ 3500	≤ 4500	≤ 12000	198	2×3 1/8" EIA
2.	Katihar	≥ 40kW	≤ 3500	≤ 4500	≤ 12000	198	2×3 1/8" EIA
3.	Leh	≥ 40kW	≤ 3500	≤ 4500	≤ 12000	198	2×3 1/8" EIA
4.	Balasore	≥ 40kW	≤ 3500	≤ 4500	≤ 12000	198	2×3 1/8" EIA
5.	Saharsa	≥ 40kW	≤ 3500	≤ 4500	≤ 12000	198	2×3 1/8" EIA
6.	Jagadalpur	≥ 40kW	≤ 3500	≤ 4500	≤ 12000	198	2×3 1/8" EIA
7.	Radhanpur	≥ 40kW	≤ 3500	≤ 4500	≤ 12000	198	2×3 1/8" EIA
8.	Shimoga	≥ 40kW	≤ 3500	≤ 4500	≤ 12000	198	2×3 1/8" EIA
9.	Ambajogai	≥ 40kW	≤ 3500	≤ 4500	≤ 12000	198	2×3 1/8" EIA
10.	Kumbakonam	≥ 40kW	≤ 3500	≤ 4500	≤ 12000	198	2×3 1/8" EIA
11.	Jaisalmer	≥ 80kW	≤ 3500	≤ 4500	≤ 12000	198	2×4 1/2" IEC

No other Power Rating of Antenna, Loading Details & Input Connector size will be acceptable to AIR as the tender offers will be considered on equitable basis and tender offer is liable to be rejected.

3.1.8 Downward beam tilt : Between [0.5° to 1°] for entire Operating Frequency Range

3.1.9 Null filling : Required, 10%.

3.1.10 **Antenna Gain** : ≥ 5 dBd (Antenna gain in all directions over entire frequency range of 88 MHz-108 MHz should be enclosed with the tender)

3.1.11 a) No. of Vertical Panels : 4 Nos.(i.e. No. of Bays=4) {on each face of Square tower}
b) No. of Panels per Bay : 4 Nos.
c) No of dipoles per Panels : 4 Nos.(2 horizontal & 2 vertical)

No other antenna system except as per 3.1.11 as above will be acceptable to AIR as the tender offers will be considered on equitable basis and tender offer is liable to be rejected.

3.1.12 **Spacing between panels**: Actual distance to be intimated in tender and a drawing showing Erection of panels also to be enclosed.

3.1.13 (i). **Vertical Plane of the Complete Antenna System**: Expected Pattern for 0° to ± 90° to be enclosed with tender.

(ii). **Horizontal plane of the Complete Antenna System:** Radiation pattern should be Omni directional. Measured gain variation in dBd should be enclosed with tender.

3.1.14 **Antenna panels feeding arrangements (For two RF Coaxial Air Dielectric Cables):** The two RF Coaxial Air Dielectric cables shall be equalized/matched pair. Antenna system shall be compatible for accepting RF power with two RF Coaxial Air Dielectric cables and also to facilitate operation of half Antenna system i.e. either Upper or Lower half under system fault or maintenance/ contingency requirement from either of the two RF Coaxial Air Dielectric cables.

Full details and detailed schematic drawings of the above proposed feeding system shall be submitted with the tender offer by the tenderer.

3.1.15 Full Performance Details: Detailed data sheets and drawings are to be enclosed with the tender offer.

3.1.16 Actual measured Field Radiation Pattern for V&H vectors separately for a similar Antenna supplied elsewhere, are to be enclosed with the tender offer.

3.1.17 **Pressurization System:** Pressurization is must up to the feed point of antenna dipoles i.e. in the RF Coaxial Air Dielectric cable, power dividers, sub dividers, splitters, branch RF Coaxial cables & sub-distributor RF Coaxial cables. All the RF coaxial cables as above shall be **Air Dielectric type**. *Foam type RF coaxial cables will not be accepted and tender shall be rejected.*

3.1.18 **MECHANICAL DETAILS:** {For Entire Antenna Assembly}

(i) EXTERNAL MATERIALS: Dipoles will be made of stainless steel. Power Dividers & Rigid feed lines will be made of Marine Brass or Copper. End Connectors on Dipoles and Feed Cables will be of standard & reputed make & their make should be indicated in the tender offer. All electrical contacts must be silver plated. Reflector Panels & clamps shall be constructed of hot dip galvanized Steel. All fasteners will be of Stainless Steel or High Tensile non corrosive material.

(ii) INTERNAL MATERIALS: Inner lines of Dipoles will be of copper or Brass. All electrical contacts will be silver plated. All bullets will be made of Beryllium copper and silver plated. Insulators will be made of high quality pure Teflon/PTFE.

(iii)All joints including tuning points etc. to be made completely air tight & water tight.

(iv) MOUNTING ARRANGEMENT: The 16 panels will be fixed on vertical and horizontal supports to be provided by the tenderer on the four faces of Tower. These supports shall be of hot dip galvanized angle iron/channel rails. Technical details are to be enclosed by the tenderer.

3.1.19 ACCESSORIES: Antenna supply will be complete with Power Dividers, Rigid Lines, RF Coaxial Distribution Feed Cables with matching End Connectors, Adaptors/ Reducers, Clamps & Fasteners for Dipoles, Power Dividers and Reflector Panels etc. Full details, list and schematic drawings of 16 Panel VHF FM Antenna & associated hardware system/ subsystem drawings to be enclosed with the tender offer.

3.1.20 **Earthing Work:** 4 Nos. of independent earthing system will be provided by the tenderer/ OEM as per drg. No. TM-16599 for connecting cable earthing Kits and Antenna switch frame/Patch panel. It includes laying of copper strip and connecting to cable earthing Kits/ Antenna switch frame/Patch panel. The value of the earth resistance of each earth system should be as less than 1 Ω.

3.1.21**Spares (Optional):**List of recommended spares and any other accessories.(Item wise details of offered material including part numbers, if any, are to be given by the tenderer). In case of kits, full item wise details of kits are to be provided. The tenderer shall quote for one set of manufacturers recommended list of spares for Complete antenna system based on the actual failure pattern. These may include following:

a) "O" ring
b) Silicon grease
c) Connectors assorted sizes
d) RF distributors air dielectric coaxial cables
e) Dipole
f) Other miscellaneous items.

All India Radio at its own discretion may procure essential spares for a value not exceeding 10% of the cost of equipments. All the tenderer should quote all the essential spares.

3.2 RF COAXIAL AIR DIELECTRIC CABLES & DEHYDRATOR

3.2.1 **RF COAXIAL AIR DIELECTRIC CABLE**

(i) Frequency Range: 88 MHz-108 MHz
(ii) Impedance: 50 Ω ± 0.5 Ω
(iii) Other technical details given below:

S. No.	Name of Site	RF Coaxial Air Dielectric Feeder cable Length *	Average Power Rating of RF Coaxial Air Dielectric Cable (Corrugated Copper, PE Jacket, PE/PP spiral spacer) at standard conditions VSWR 1.0, ambient temperature 40º C (@ 108 MHz)	Attenuation of each RF Coaxial Air Dielectric Cable (Corrugated Copper, PE Jacket, PE/PP spiral spacer) at standard conditions VSWR 1.0, ambient temperature 20º C (@ 108 MHz in dB/100 M)
1.	Nandyal	2 × 120*	≥ 50 kW	≤ 0.40
2.	Katihar	2 × 170*	≥ 50 kW	≤ 0.40
3.	Leh	2 × 120*	≥ 50 kW	≤ 0.40
4.	Balasore	2 × 170*	≥ 50 kW	≤ 0.40
5.	Saharsa	2 × 152*	≥ 50 kW	≤ 0.40
6.	Jagadalpur	2 × 120*	≥ 50 kW	≤ 0.40
7.	Radhanpur	2 × 170*	≥ 50 kW	≤ 0.40
8.	Shimoga	2 × 170*	≥ 50 kW	≤ 0.40
9.	Ambajogai	2 × 170*	≥ 50 kW	≤ 0.40
10.	Kumbakonam	2 × 170*	≥ 50 kW	≤ 0.40
11.	Jaisalmer	2 × 320*	≥ 50 kW	≤ 0.40

** Cable length may be considered as tentative, exact length will be confirmed after site visit and submission of requisite document by the tenderer as per clause 3.0 of Section 2.0.*

The RF Coaxial Air Dielectric Cable shall be as per AIR Specification, failing which, tender will be considered incomplete and is liable to be rejected. The RF Coaxial Air Dielectric Cable shall be supplied with 3-1/8" EIA flange Gas Barrier Connector (with gas inlet) fitted at one end of the cable along-with 'O' rings, nuts, bolts & washers, silicon grease etc. and 3-1/8" EIA flange Gas Pass Connector fitted at other end of the cable along-with 'O' rings, nuts, bolts, washers, silicon grease etc. with Bullets (inners) for 3-1/8" Flange Connectors.

3.2.3 All accessories associated with Feeder cable are to be provided as per the site requirement for completion of SETC i.e.

(i) Hoisting stockings
(ii) Earthing kits
(iii) Wall glands
(iv) Cable Clamps (adjustable height) with nut, bolt & washer and associated accessories (Material for cable clamp should be hot dip galvanized/stainless steel with stainless steel screws, nuts, bolts & washers)
(v) Any other accessories offered for the completeness of the system (Item wise details & part No., if any, of the offered and included materials are to be given by the tenderer)

3.2.4 Dehydrator with tubing & accessories for dual feed RF Coaxial Air Dielectric Cable system:

Dehydrator with tubing & accessories for Pressurization in entire RF Coaxial Air Dielectric Cable and Antenna System: Qty. (2+1=3) Sets.[One set as spare]

S. No.	Technical Parameter	Technical Specification
1.	Dehydrator Type	Automatic
2.	Operating Voltage	Single Phase as per Section-1.0
3.	Output Capacity (SCFM)	$\geq$ 0.3
4.	Ambient Humidity, % maximum	85% RH
5.	Output Pressure	adjustable from 2.0 psig to 8.0 psig
6.	Low Pressure Alarm	adjustable from 1.0 psig to 2.0 psig
7.	High Pressure Alarm	adjustable from 3.0 psig to 9.0 psig
8.	Output air dew point	-40°C or better
9.	Operating temperature	0-40°C
10.	Power Fail Alarm	Loss of input power
11.	High Humidity Alarm	Details to be given by the tenderer
12.	Excess Run Alarm	Details to be given by the tenderer
13.	Max. active Power consumption	Details to be given by the tenderer
14.	Compressor Rating	Details to be given by the tenderer
15.	Protection against earth fault	Details to be given by the tenderer
16.	Protection against overload	Details to be given by the tenderer
17.	Dimensions, H × W × D, (mm)	Details to be given by the tenderer
18.	Net Weight (kg)	Details to be given by the tenderer
19.	In addition to above, Dehydrator should have communication over IP facility for alarms/status	Details to be given by the tenderer

3.3 ANTENNA SWITCH FRAME/PATCH PANEL:

The Antenna Switch Frame/Patch Panel with Mimic Diagram, Power metering facility {for Forward & Reflected Power readings at inputs and outputs ports} shall have the provision for connecting the Combined Transmitters Power to either a split Antenna System or complete Antenna through manual patching facilities.

3.3.1 **Frequency Range:** 88 MHz-108 MHz

3.3.2 **Other Technical Details:**

S. No.	Name of Site	No. of Ports	Return Loss	Average Power Handling Capacity	Input Connector	Output Connectors
1.	Nandyal	6 Ports	Better than 30 dB	40 kW	3-1/8"EIA	2×3-1/8"EIA
2.	Katihar	6 Ports	Better than 30 dB	40 kW	3-1/8"EIA	2×3-1/8"EIA
3.	Leh	6 Ports	Better than 30 dB	40 kW	3-1/8"EIA	2×3-1/8"EIA
4.	Balasore	6 Ports	Better than 30 dB	40 kW	3-1/8"EIA	2×3-1/8"EIA
5.	Saharsa	6 Ports	Better than 30 dB	40 kW	3-1/8"EIA	2×3-1/8"EIA
6.	Jagadalpur	6 Ports	Better than 30 dB	40 kW	3-1/8"EIA	2×3-1/8"EIA
7.	Radhanpur	6 Ports	Better than 30 dB	40 kW	3-1/8"EIA	2×3-1/8"EIA
8.	Shimoga	6 Ports	Better than 30 dB	40 kW	3-1/8"EIA	2×3-1/8"EIA
9.	Ambajogai	6 Ports	Better than 30 dB	40 kW	3-1/8"EIA	2×3-1/8"EIA
10.	Kumbakonam	6 Ports	Better than 30 dB	40 kW	3-1/8"EIA	2×3-1/8"EIA
11.	Jaisalmer	6 Ports	Better than 30 dB	80 kW	4-1/2"IEC	2×4-1/2"IEC

3.3.3 Mechanical Details: Dimensions and weight to be given by the tenderer.

3.3.4 Provision to connect with the transmitter interlocks should be provided.

3.3.5 Technical data/details: The following technical data/details are to be provided by the tenderer to assess the full merit of the offer without which tender will be considered incomplete & is liable to be rejected.

(i) The Antenna Switch Frame /Patch Panel shall be designed to connect combined RF output power of FM Transmitters to split antenna system for equal power outputs to each upper and lower half antenna.

(ii) Manual patching facilities for use during maintenance or emergency conditions shall be provided by the tenderer. The Patch Panel shall also have arrangement for directly connecting the transmitters to upper and lower half of antenna. For reference a suggestive Antenna patch panel mimic diagram is enclosed.

(iii)**Power Monitoring Unit with meter:** Antenna Switch Frame/Patch Panel Power Meter shall have the provision for Forward & Reflected Power Monitoring Unit with power metering facility at inputs and outputs ports. **The measurement accuracy of the power meter should be within ± 5%.** The metering should be clearly shown as above in the technical details.

(iv) Return Loss (dB) Graphs for Antenna Switch Frame/ Patch Panel shall be submitted by the tenderer for entire frequency range (88 MHz-108 MHz).

3.4 RF COAXIAL COPPER RIGID LINES & ACCESSORIES:

3.4.1 Technical parameters/specification of RF Coaxial Copper Rigid Lines (50 Ω) and accessories.

Size	Average Power handling capacity at ambient temperature 40ºC	Attenuation @ 108 MHz at 20ºC (in dB/100 M)	Material	Frequency Range
4-1/2"	≥ 80 kW	≤ 0.25	High conductivity copper conforming to 95% IACS/99% purity	88 MHz-108 MHz
3-1/8"	≥ 45 kW	≤ 0.33	High conductivity copper conforming to 95% IACS/99% purity	88 MHz-108 MHz

3.4.2 Additional Hardware and accessories (Impedance 50 Ω): As per Section 5.0.

3.5 RF Cable Tray:

3.5.1 Vertical RF Cable tray. The Vertical RF Cable tray for support of RF Feeder Cables starting from the base of the tower and going up to the Junction box position shall be routed along the tower face as per drawing No.TM- 16640 which is suggestive only. Tower height as per Section 1.0. No drilling is allowed for fixing cable tray on the tower. Suitable clamping arrangement may be used.

3.5.2 Horizontal RF Cable tray: The Horizontal RF Cable tray to support antenna RF feeder Cables on ground from tower base to the transmitter hall shall also be fabricated by the tenderer. The Cable Tray shall be as per drawing No. TM-14453/3 which is suggestive only.

SECTION 4.0

INSPECTION DETAILS

The inspection for acceptance of the Complete Antenna System will be carried out at Manufacturer's Works Place by **two Engineers** of All India Radio (AIR) in accordance with Acceptance Test Procedure/Protocol (ATP). All facilities like complete set of measuring instruments, power supply, manual assistance etc. will be provided by the OEM. Complete details and specifications of the Antenna system will be checked and all parameter values will be measured.

The tenderer shall put up the Complete Antenna System for Inspection as per AIR specification.

All the spares ordered as per AT will be tested in actual circuit at Manufacturer's Works Place by Engineers of AIR.

Testing/measurements including operational & functional checking of the Complete Antenna System shall be carried out at three different frequencies including operating frequency in the VHF Band i.e. 88 MHz to 108 MHz as per approved ATP.

Tenderer shall arrange for the photographs of Complete Antenna System which will be attached with the ATP/Inspection report.

Exhaustive checking and measurements will be carried out so as to completely check the compliance of the Complete Antenna System as per AIR specifications.

It is mandatory that all these testing/measurements of Complete Antenna System as per parameters in Section-3.0 at three frequencies in the VHF band i.e. 88 MHz to 108 MHz are carried out well in advance. These must be submitted to All India Radio along with the call for inspection of Complete Antenna System well in advance for analyzing etc. These measurement details, graphical printout, notes and figures must be available at the factory at the time of inspection.

Following information should also form part of above data which will also be checked for complete antenna system during inspection by AIR Inspecting Engineers **at manufacturer's works place:**

a) Main Power divider input and output end connector size & power rating (88 MHz-108 MHz).
b) Main RF Air Dielectric feed cables size & power rating including input and output end connector's size & power rating (88 MHz-108 MHz).
c) 2nd Power divider input and output end connector size & power rating (88 MHz-108 MHz)
d) 2nd RF Air Dielectric feed cables size & power rating including input and output end connector's size & power rating (88 MHz-108 MHz).
e) Similarly other details as per design of manufacturer.
f) Individual Dipoles including input end connector size & power rating (88 MHz-108 MHz).
g) Country of origin Make, Model, Serial number of all equipments/items.

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SECTION 5.0, SCHEDULE OF SUPPLY, ERECTION, TESTING & COMMISSIONING (SETC)

SECTION 5.1, SCHEDULE OF SUPPLY (UNPRICED)

S. No.		Make	Model	Qty.										
				Nandyal	Katihar	Leh	Balasore	Saharsa	Jagadalpur	Radhanpur	Shimoga	Ambajogai	Kumbakonam	Jaisalmer
1.0	**Supply of 16 Panel VHF FM Complete Antenna System** broadly comprising of following and in conformity of AIR Specification alongwith Technical Manuals: (a). Power Dividers (As per design of manufacturer) (b). Distribution Cables (As per design of manufacturer) (c). RF coaxial air dielectric cables /Rigid line with EIA end connector & with complete accessories (As per design of manufacturer) (d). Panel reflectors (As per design of manufacturer) (e). Dipoles, Horizontal (Numbers as per Specification) (f). Dipoles, Vertical (Numbers as per specification)			1 Complete system	1 Complete system	1 Complete system	1 Complete system	1 Complete system	1 Complete system	1 Complete system	1 Complete system	1 Complete system	1 Complete system	1 Complete system
1.1	Supply of any other items/hardware materials etc. offered for the completeness of the above Antenna System (Item wise details of the offered items/hardware materials etc. shall be given by the tenderer)			1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot
2.0	**Supply of RF Coaxial Air Dielectric Cable** (Corrugated Copper, PE Jacket, PE/PP spiral spacer) as per Specification. *C*able length may be considered as tentative. Exact length will be confirmed after site visit and submission of requisite document by the tenderer as per clause 3.0*			2× 120* M	2× 170* M	2× 120* M	2× 170* M	2× 152* M	2× 120* M	2 × 170* M	2 × 170* M	2 × 170* M	2 × 170* M	2 × 320* M

(R.K. Singh, AE) (Manzoor Ali, DDE) (Rajendra Nahar, DE) (K. Murugan, DDG)

	of Section 2.0.													
2.1	3-1/8" EIA flange Gas Barrier Connector (with gas inlet) fitted at one end of the above cable alongwith 'O' rings, nuts, bolts, washers, silicon grease etc.			2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.
2.2	3-1/8" EIA flange Gas Pass Connector fitted at other end of the above cable alongwith 'O' rings, nuts, bolts, washers, silicon grease etc.			2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.
2.3	Bullets (inners) for 3-1/8" Flange Connectors			4 Nos.	4 Nos.	4 Nos.	4 Nos.	4 Nos.	4 Nos.	4 Nos.	4 Nos.	4 Nos.	4 Nos.	4 Nos.
2.4	Hoisting stockings for each cable as per recommendation of manufacturer			2 Sets	2 Sets	2 Sets	2 Sets	2 Sets	2 Sets	2 Sets	2 Sets	2 Sets	2 Sets	2 Sets
2.5	Earthing kits for RF Coaxial Air Dielectric Cable			2×3Nos = 6Nos.	2×3Nos = 6Nos.	2×3Nos = 6Nos.	2×3Nos = 6Nos.	2×3Nos = 6Nos.	2×3Nos = 6Nos.	2×3Nos = 6Nos.	2×3Nos = 6Nos.	2×3Nos = 6Nos.	2×3Nos = 6Nos.	2×3Nos = 6Nos.
2.6	Wall gland/ feed through assembly with accessories for RF Coaxial Air Dielectric Cable			2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.
2.7	Cable Clamps (adjustable height) with nut, bolt & washer and associated accessories (Material for cable clamp should be hot dip galvanized/stainless steel with stainless steel screws, nuts, bolts & washers)			2× 120* Sets	2× 170* Sets	2× 120* Sets	2× 170* Sets	2× 152* Sets	2× 120* Sets	2 × 170* Sets	2 × 170* Sets	2 × 170* Sets	2 × 170* Sets	2 × 320* Sets
2.8	Any other accessories offered for the completeness of the system			1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot
3	**Supply of Dehydrator with tubing & accessories as per AIR specification**			3 Nos.	3 Nos.	3 Nos.	3 Nos.	3 Nos.	3 Nos.	3 Nos.	3 Nos.	3 Nos.	3 Nos.	3 Nos.
4	**Supply of Antenna Switch Frame/Patch Panel** complete as per AIR Specification			1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set
5	**Supply of RF coaxial copper rigid lines & accessories (**Complete Erection materials) as per AIR Specification as given below:													
5.1	3-1/8″ RF coaxial copper Rigid Line (complete with outer, inner & insulators)			12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M
5.2	3-1/8″ Un-flanged 90º Elbow with equal leg (complete with outer, inner & insulators)			8 Nos.	8 Nos.	8 Nos.	8 Nos.	8 Nos.	8 Nos.	8 Nos.	8 Nos.	8 Nos.	8 Nos.	8 Nos.

5.3	3-1/8″ Clamp type Coupling (complete with outer, inner & insulators)			12 Nos.	12 Nos.	12 Nos.	12 Nos.	12 Nos.	12 Nos.	12 Nos.	12 Nos.	12 Nos.	12 Nos.	12 Nos.
5.4	3-1/8″ Field Flange (Clamp type)			5 Nos.	5 Nos.	5 Nos.	5 Nos.	5 Nos.	5 Nos.	5 Nos.	5 Nos.	5 Nos.	5 Nos.	5 Nos.
5.5	Hanger for 3-1/8″ RF coaxial Rigid Line			8 Nos.	8 Nos.	8 Nos.	8 Nos.	8 Nos.	8 Nos.	8 Nos.	8 Nos.	8 Nos.	8 Nos.	8 Nos.
5.6	3-1/8" to N Test Reducer			1 No.	1 No.	1 No.	1 No.	1 No.	1 No.	1 No.	1 No.	1 No.	1 No.	1 No.
5.7	Any other accessories offered for the completeness of the system (Item wise details of offered and included material, items & parts are to be given by the tenderer).			1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot
6	**Supply of new Vertical RF cable tray** material including supply of complete hardware material and accessories etc. complete as required at site.			1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job
7	**Supply of new Horizontal RF cable tray** material along with GI Sheet canopy material as per specification along-with supply of complete hardware material and accessories etc. as required at site.(Rate per meter shall be quoted by the tenderer. (*ranking purpose, however actual quantity in running length shall be paid to the tenderer by AIR. Actual requirement of tray shall be decided on the basis of report to be submitted as per clause 3.0 of section 2.0)			40 M*	40 M*	40 M*	40 M*	40 M*	40 M*	40 M*	40 M*	40 M*	40 M*	40 M*
8	**Supply of mounting arrangement** for 16 panel VHF FM antenna on the existing tower: Supply of all the supports of hot dip galvanized angle iron/channel rails for the vertical and horizontal supports on the four faces of Tower, for the hoisting of 16 panel antenna system complete as per AIR specification.			1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set
9	Inspection Charges as per AIR specifications			1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot

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SECTION 5.2: SCHEDULE OF ERECTION, TESTING & COMMISSIONING (ETC) (Unpriced)

S. No.	Description	Make	Model	Qty										
				Nandyal	Katihar	Leh	Balasore	Saharsa	Jagadalpur	Radhanpur	Shimoga	Ambajogai	Kumbakonam	Jaisalmer
1.	**Erection, Testing and Commissioning of 16 Panel VHF FM Antenna** as per specification on the existing tower in the FM aperture after unpacking, physical checking/ necessary care for the safety of the antenna system like cleaning, ingress of moisture, pressurization etc. at site before Erection in accordance with the Erection manual of the manufacturer along with hauling of the complete panel antenna system.			1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job
2	**Mounting arrangement for 16 Panel VHF FM Antenna on the existing tower**: Fabrication, Erection/hoisting, fixing of all the supports of hot dip galvanized angle iron/channel rails for the vertical and horizontal supports on the four faces of Tower for the hoisting of 16 panel antenna as per AIR specifications.			1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job
3	**Vertical RF Cable Tray:** Fabrication, Erection/hoisting, fixing, testing and commissioning of new vertical RF cable tray for RF coaxial cables on the existing tower complete as required at site. (Tower height as per Section 1.0). No drilling is allowed for fixing tray on the tower. Suitable clamping arrangement may be used.			1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job
4	**Horizontal RF Cable Tray:** Fabrication, Erection/hoisting, fixing, testing and commissioning of new horizontal RF cable			40 M*	40 M*	40 M*	40 M*	40 M*	40 M*	40 M*	40 M*	40 M*	40 M*	40 M*

	tray for RF coaxial cables along with GI sheet canopy as per specifications complete as required at site. (Rate per meter shall be quoted by the tenderer. (*ranking purpose, however actual quantity in running length shall be paid to the tenderer by AIR).													
5	**Erection, Testing and Commissioning of RF Coaxial Air Dielectric cables** as per specification on the existing tower/Cable Tray.			1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job
6	**Erection, Testing and Commissioning of Dehydrators** with tubing and accessories including making pressurization connections etc. as per specification at site.			1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job
7	**Erection, testing and commissioning of Antenna Switch Frame/Patch Panel** as per specifications including making various RF coaxial line input/output connections for feeding to the lower and upper half of the 16 Panel VHF FM antenna complete as required.			1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job
8	Any other job required for the completeness of the system (Item wise details of offered and included material, items & parts are to be given by the tenderer)			1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job
9	Checking of complete set up before application of RF power and recording the performance measurements like VSWR/Return Loss vs frequency etc. in the entire FM band 88 MHz-108 MHz in the form of graphical colour printout for reference and records.			1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job
10	Checking of complete set up with RF power and recording forward/reflected power readings on meter panel of Antenna patch panel and carrying out actual field strength survey covering contours up to signal strength of 48, 54, 66 & 74 dBµV/m and			1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job

	plotting on political map of the area.													
11	**Earthing Work:** 4 Nos. of independent earthing system including all materials & labour as per AIR specification. (4 Nos. of independent earth system will be provided by the tenderer/OEM as per drg. No.16599 for connecting cable earthing Kits and Antenna switch frame/Patch panel. It includes laying of copper strip and connecting to cable earthing Kits/ Antenna switch frame/Patch panel. The value of the earth resistance of each earth system should be less than 1 Ω).			1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job	1 Job

Note: Rates per meter/per number/per job shall be quoted.

SECTION 5.3, SCHEDULE OF SUPPLY SPARES (OPTIONAL):
(Optional items shall not be considered for ranking purpose)

S. No.	DESCRIPTION	Make	Model	Qty.										
1.0	The tenderer shall quote for one set of manufacturer recommended list of spares for Complete antenna system based on the actual failure pattern. These may include following:			Nandyal	Katihar	Leh	Balasore	Saharsa	Jagadalpur	Radhanpur	Shimoga	Ambajogai	Kumbakonam	Jaisalmer
	a) "O" ring			1Set	1Set	1Set	1Set	1Set	1Set	1Set	1Set	1Set	1Set	1Set
	b) Silicon grease			1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot
	c) Connectors assorted sizes			1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set
	d) RF distributors air dielectric coaxial cables			1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set	1 Set
	e) Dipole			2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.	2 Nos.
	f) Other miscellaneous items.			1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot	1 Lot

2.0	Spares (Optional): List of recommended spares and any other accessories. (Items wise details of offered material including part numbers, if any, are to be given by the tenderer). In case of kits, full item wise details of kits are to be provided.													
3.0	Manufacturer recommended list of spares for Dehydrator based on the actual failure pattern (Items wise details of offered material including part numbers, if any, are to be given by the tenderer).													

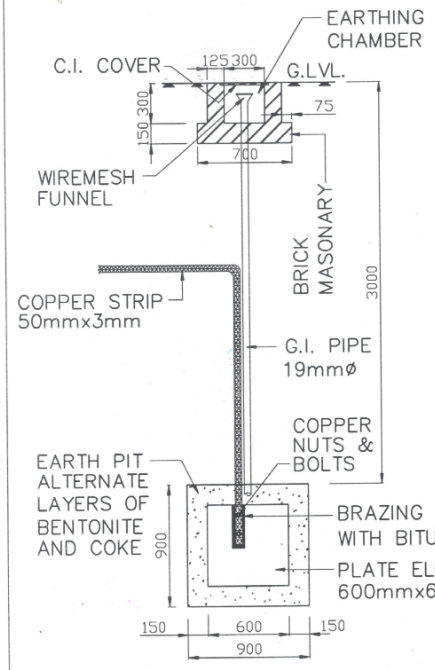
All India Radio at its own discretion may procure essential spares for a value not exceeding 10% of the cost of equipments. All the tenderer should quote all the essential spares.

ANNEXURE-I

PERFORMA FOR INFORMATION ABOUT LOCAL OFFICE /AUTHORIZED REPRESENTATIVE/ DEALER IN INDIA FOR AFTER SALES SUPPORT

1.	Address of local office/authorized representative/ Dealer	
	Telephone (Landline) No.	
	Mobile No.	
	E-mail Address	
2.	Address for communication (if different)	
3.	Legal Status (local office/authorized representative/dealer)	
4.	Name, contact number (Mobile number) & e-mail address of official representative of the local office/authorized representative/dealer	
5.	Brief details of Technical facilities available for after sales support: The details of technical facilities available with local office/authorized representative/dealer for after sales support such as test bench, necessary test & measuring equipment and photographs thereof, must be provided in the technical bid.	
6.	Main line of business, specialization and number of years of operation	
7.	Total number of permanent technical employees including their designation and qualification	
8.	Details of Agreement/MoU for after sales support with OEM (Copy must be provided with the offer)	Date of Agreement: Executed at : Executed by
(Authorized Signatory of local office/authorized representative/dealer) Name : Signature:		**(Authorized Signatory of Antenna OEM)** Name : Signature:

(SUGGESTIVE DRAWING FOR COPPER PLATE EARTHING)

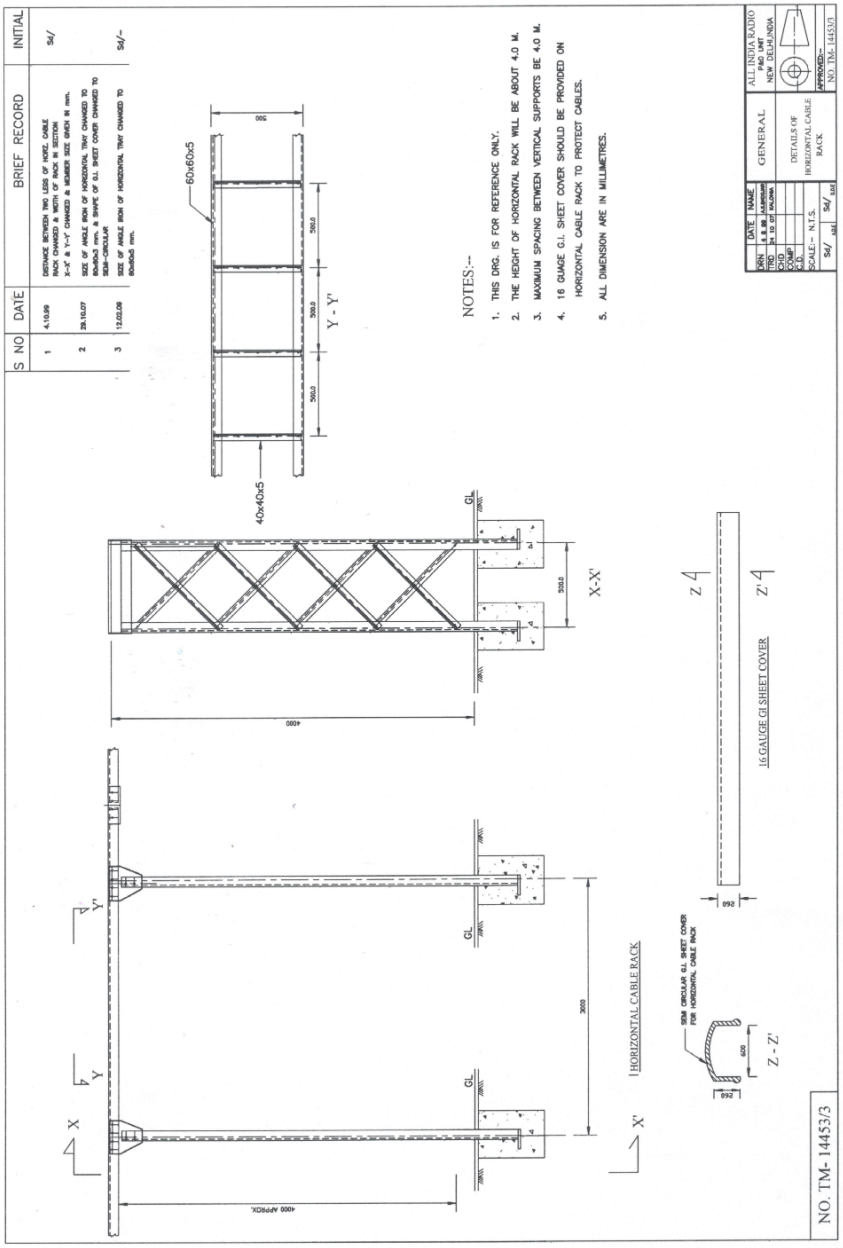


NOTES:-

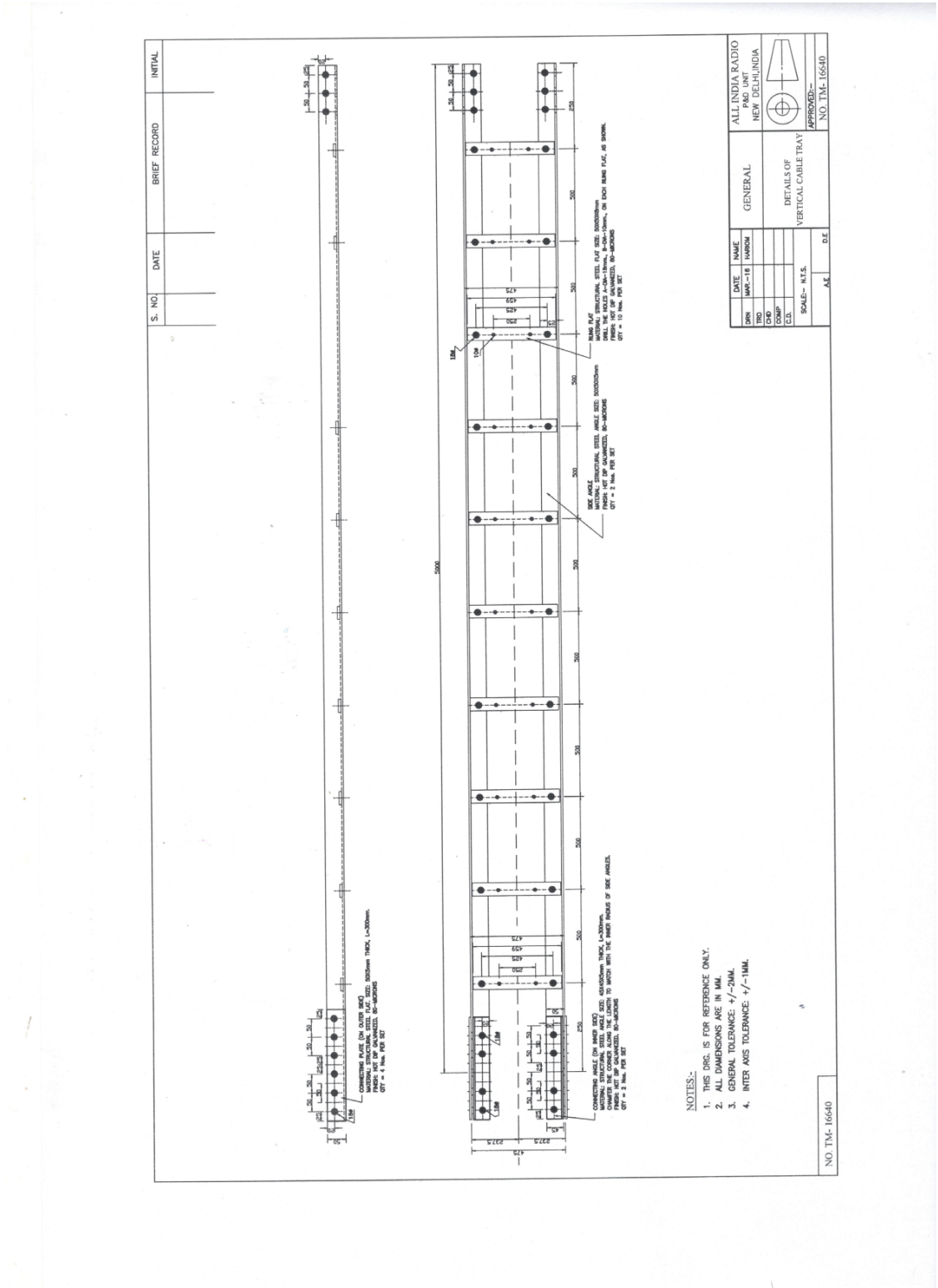
Plate Earth: Pit size of 900x900x3900 mm is excavated & copper plate of size 600x600x3.15mm is placed vertically in the excavated pit. The plate shall be connected to copper strip of 50x3mm. The bolt,nuts,check nuts & washers shall be of copper.The pit is filled with alternate layers of coke & bentonite up to a depth of 900mm & remaining portion filled with loose soil without stones. The masonary chamber at ground level of size 700x 700x150mm with a hole in the middle to pass the G.I. pipe of 19mm dia with a provision for funnel & provided with C.I. frame & cover with locking arrang- ements. The funnel shall be fixed with wiremesh. The main hole cover shall be painted & marked with resistance of the earth.

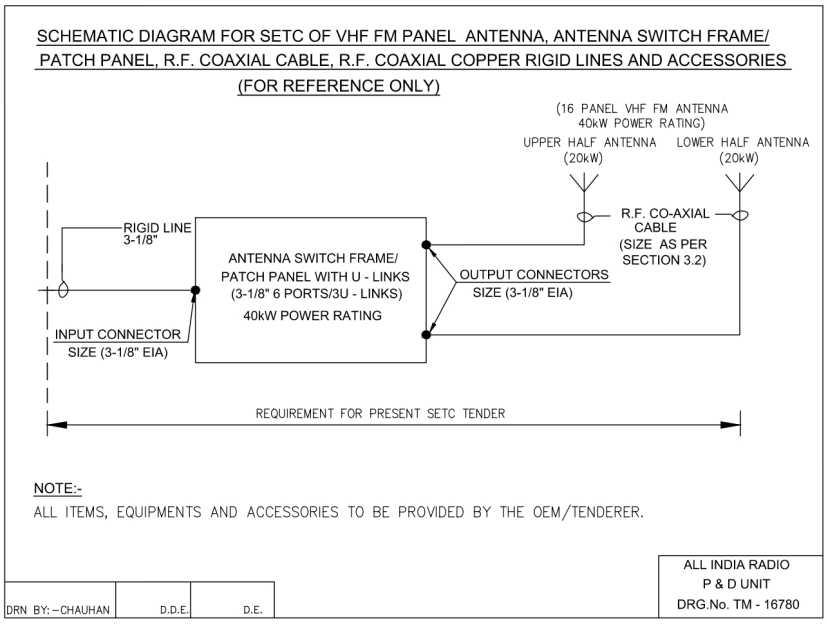
All the dimensions are in millimeters.

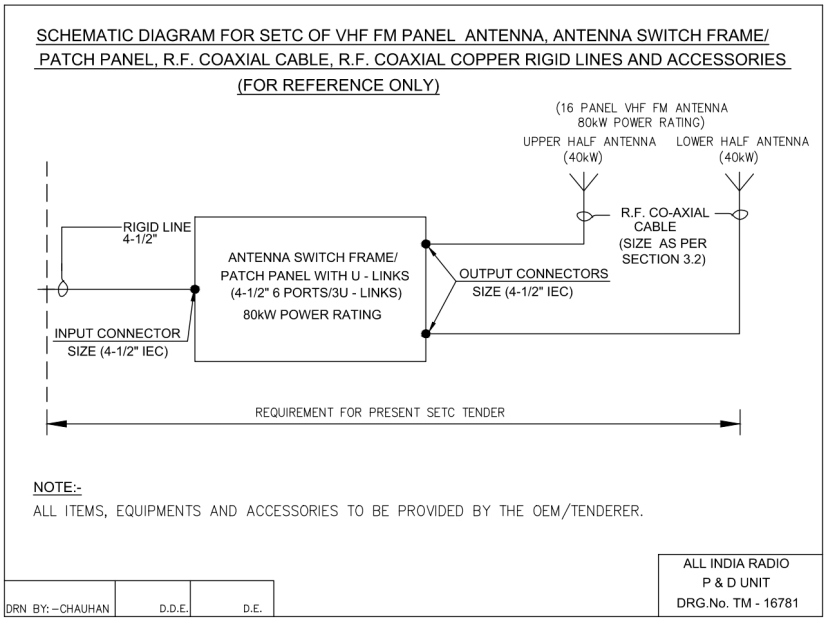
ALL INDIA RADIO
P & D UNIT
NEW DELHI
DRG. No. TM-16599

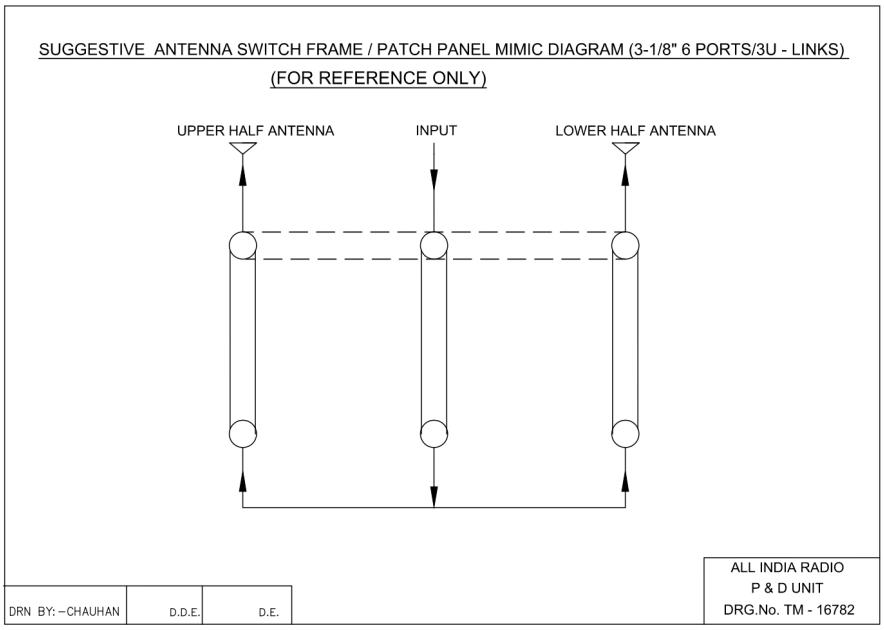


(R.K. Singh, AE) (Manzoor Ali, DDE) (Rajendra Nahar, DE) (K. Murugan, DDG)

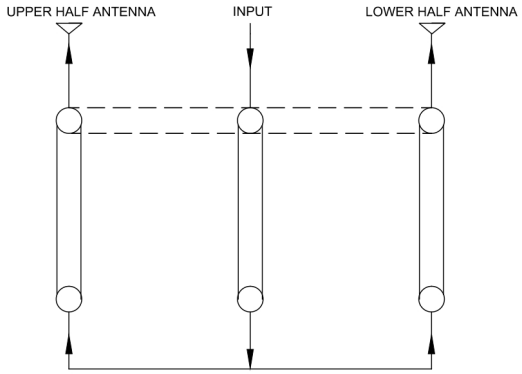

S. NO.
DATE
BRIEF RECORD
INITIAL
ALL INDIA RADIO
P&D UNIT
NEW DELHI,INDIA
GENERAL
DETAILS OF
VERTICAL CABLE TRAY
APPROVED:-
NO. TM- 16640
DRN
TRD
CHD
COMP
CLD.
DATE
NAME
MAR--16
HARIOM
SCALE:- N.T.S.
A.E
D.E
NOTES:-
1. THIS DRG. IS FOR REFERENCE ONLY.
2. ALL DIMENSIONS ARE IN MM.
3. GENERAL TOLERANCE: +/-2MM.
4. INTER AXIS TOLERANCE: +/-1MM.
NO. TM- 16640


SCHEMATIC DIAGRAM FOR SETC OF VHF FM PANEL ANTENNA, ANTENNA SWITCH FRAME/ PATCH PANEL, R.F. COAXIAL CABLE, R.F. COAXIAL COPPER RIGID LINES AND ACCESSORIES
(FOR REFERENCE ONLY)
(16 PANEL VHF FM ANTENNA 40kW POWER RATING)
UPPER HALF ANTENNA (20kW)
LOWER HALF ANTENNA (20kW)
R.F. CO-AXIAL CABLE (SIZE AS PER SECTION 3.2)
RIGID LINE 3-1/8"
ANTENNA SWITCH FRAME/ PATCH PANEL WITH U - LINKS (3-1/8" 6 PORTS/3U - LINKS) 40kW POWER RATING
OUTPUT CONNECTORS SIZE (3-1/8" EIA)
INPUT CONNECTOR SIZE (3-1/8" EIA)
REQUIREMENT FOR PRESENT SETC TENDER
NOTE:-
ALL ITEMS, EQUIPMENTS AND ACCESSORIES TO BE PROVIDED BY THE OEM/TENDERER.
DRN BY:-CHAUHAN
D.D.E.
D.E.
ALL INDIA RADIO
P & D UNIT
DRG.No. TM - 16780


SCHEMATIC DIAGRAM FOR SETC OF VHF FM PANEL ANTENNA, ANTENNA SWITCH FRAME/
PATCH PANEL, R.F. COAXIAL CABLE, R.F. COAXIAL COPPER RIGID LINES AND ACCESSORIES
(FOR REFERENCE ONLY)
(16 PANEL VHF FM ANTENNA
80kW POWER RATING)
UPPER HALF ANTENNA
(40kW)
LOWER HALF ANTENNA
(40kW)
R.F. CO-AXIAL
CABLE
(SIZE AS PER
SECTION 3.2)
RIGID LINE
4-1/2"
ANTENNA SWITCH FRAME/
PATCH PANEL WITH U - LINKS
(4-1/2" 6 PORTS/3U - LINKS)
80kW POWER RATING
OUTPUT CONNECTORS
SIZE (4-1/2" IEC)
INPUT CONNECTOR
SIZE (4-1/2" IEC)
REQUIREMENT FOR PRESENT SETC TENDER
NOTE:-
ALL ITEMS, EQUIPMENTS AND ACCESSORIES TO BE PROVIDED BY THE OEM/TENDERER.
ALL INDIA RADIO
P & D UNIT
DRG.No. TM - 16781
DRN BY:-CHAUHAN
D.D.E.
D.E.


SUGGESTIVE ANTENNA SWITCH FRAME / PATCH PANEL MIMIC DIAGRAM (3-1/8" 6 PORTS/3U - LINKS)
(FOR REFERENCE ONLY)
UPPER HALF ANTENNA
INPUT
LOWER HALF ANTENNA
ALL INDIA RADIO
P & D UNIT
DRG.No. TM - 16782
DRN BY:-CHAUHAN
D.D.E.
D.E.

SUGGESTIVE ANTENNA SWITCH FRAME / PATCH PANEL MIMIC DIAGRAM (4-1/2" 6 PORTS/3U - LINKS)
(FOR REFERENCE ONLY)



DRN BY: – CHAUHAN	D.D.E.	D.E.	ALL INDIA RADIO P & D UNIT DRG.No. TM - 16783