

**PRASAR BHARATI
BROADCASTING CORPORATION OF INDIA
DIRECTORATE GENERAL:ALL INDIA RADIO
(PLANNING & DEVELOPMENT UNIT)**

F. No: 27/12/2(4 bay)/2007-D(TD/FM)

**SPECIFICATION FOR 4 BAY CIRCULARY POLARIZED POLE TYPE VHF FM
ANTENNA (For antenna to be mounted on the leg of TV tower at Srinagar TV Site)**

Specification No.: Specification No: 10thplan/4 BAY VHF ANTENNA/FM/3/June (Revision-II)/2009-D (TD/FM)

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N.B. :

- 1. The Tenderer shall submit schedule of material /requirement of
Supply without price as in Section III (A) & Section III (B) of AIR
Specification (two bid system i.e. technical bid and commercial bid).**
- 2.Each statement of this specification has to be complied with &
supported by printed literature/data sheets from the manufacturer of the
equipment by the tenderer, without which tender will be considered
incomplete & is liable to be rejected. The tenderer should
make a detailed offer.**

3. All the technical details , Schematic drawings and schedule of requirement/material must be submitted and enclosed with the tender by the tenderer failing which the tender is liable to be rejected.

4. The tenderer shall submit the tender offer to AIR in the format given below .

| Sr. No. of AIR Spec. Section wise & Clause wise | Details of AIR Spec. | Make & Model No of the Equipment offered | Performance figures of equipment and schematic drawing Nos. | Compliance Yes/NO | Ref to tender page No. | Remarks |
|--|-----------------------------|---|--|--------------------------|-------------------------------|----------------|
| Section I | | | | | | |
| Section II | | | | | | |
| Section III(A) | | | | | | |
| Section III(B) | | | | | | |

5. Tenderer shall quote the rate / cost of individual items in the tender offer while submitting the offer for spares in commercial bid.

6. The complete technical compliance must be signed & stamped by the Original Equipment Manufacturer(OEM) of the equipment in the tender document. In case tender offer is from other than the Original Equipment Manufacturer, the tenderer must also sign & stamp each page of the compliance statement. The OEM & tenderers shall fill up their name in CAPITAL LETTERS, full address with pin code , phone number, fax number, e-mail address and with their full signatures , failing which the tender shall be liable for rejection.

**SECTION - I
GENERAL SPECIFICATION:**

1.0 Please refer tender documents for general terms and conditions of contract for supply 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 Supply ,Cancellation of Contract in Full or Part, Recovery of Security Deposit, Performance Guarantee, Unsatisfactory Workmanship, Damages Incurred During transit, Tenderer Liable for Damages, Defects, Recovery of Compensation, Ensuring Payment and Amenities, Tenderer to Indemnify Government against Patent Rights, Release of Security Deposit, Safety Code ,insurance from manufacturer's works/factory to respective site etc i.e. in totality

2.0 INSPECTION:

- (a) 4 bay VHF FM Circularly polarized antenna will be accepted on the basis of OEM's test Certificates of actual performance measurements as per Standard International manufactures practice after assembly of full antennae System with all accessories& before dispatch to AIR. This Pre dispatch performance Measurements, (full details) must be supplied with the Equipment to Consignee and indenter as per terms & condition of Supply Order.
- (b) Radiation pattern after erection to be checked as per clause 2.0(a)

3.0 DETAILS REQUIRED ALONG WITH TENDER (4 BAY CIRCULARLY POLARIZED VHF FM ANTENNA SPECIFICATION (PRESSURIZED):

- 3.1 Complete technical compliance must be signed & stamped by the Original Equipment Manufacturer (OEM) of the equipment in the tender documents. Tel. No. Fax No. and E-mail address of the OEM should be given on first page of the tender document. In case tender offer is from other than Original Equipment Manufacturer, the Tenderer must also sign & stamp each page of the compliance statement.
- 3.2 Complete technical information, details, parameters and drawings as mentioned in **Section -II (technical specifications)** as above are to be submitted with tender *by the tenderers*; from the Original Equipment Manufacturer (OEM) of the equipment.
- 3.3 Complete set of *Technical* drawings / Engineering drawings giving full details and dimensions of dipoles / Bays and rigid lines etc. with complete list of items to be submitted with tender.
- 3.4 Make, model and type of rigid lines, interconnecting RF co-axial air dielectric cables, end connectors etc are to be given in tender along with their power (continuous average) handling capacity. Details of rigid lines assembly, components used and engineering drawings are to be given.
- 3.5 A write up giving full working details and salient *technical* features of the antenna system are to be submitted with tender by the tenderers.
A copy of tech. manuals including specifications of antenna and installation / operation instructions are to be forwarded with tender.

- 3.6 A list of required spares and tools etc. along-with item-wise price details are to be quoted separately(as optional) with tender by the tenderers.
- 3.7 Para-wise & item-wise compliance statement should be forwarded with tender. Actual value *shall* be indicated. In case of deviations the same may also be clearly stated. All information and details asked for must be forwarded with tender.
- 3.8 In support of Tenderer's claim an "up-to-date" list of their customers including their full address, Telephone/Fax No & E-mail address is required to be submitted as an essential stipulation, along with complete set of actual performance figures *i.e. Performance measurement taken on the fully assembled 4 bay VHF FM circularly polarized antenna must be furnished along with the tender.*
4 bay VHF FM circularly polarized antenna shall be field proven for satisfactory operation. A supply record of 4 bay VHF FM circularly polarized antenna power wise and year wise in the last 10 years may be enclosed by the tenderer.

Names, Postal address, E-mail address and Fax numbers of customers must be indicated.

3.9 Experience (Supply):

Minimum 10 years experience of OEM in production of the products quoted.

4.0 GENERAL:

4.1 INFORMATION TO BE SUPPLIED BY THE TENDERER AFTER PLACEMENT OF SUPPLY ORDER :

One **printed & duly bound** set of Installation, Commissioning, Operation & Maintenance manuals for complete 4 bay VHF FM circularly polarized antenna shall be supplied to the Director Engineering (Project), P&D Unit DG AIR New Delhi within one month of Acceptance of Tender.

All the details should be complete and exhaustive. One Soft copy of these documents is also required on CD for use with PC.

4.2 INFORMATION TO PRECEDE DESPATCH OF EQUIPMENT:

Following information should be supplied to the DE (Proj.) P&D Unit DG AIR New Delhi, and each of the consignee, one month prior to dispatch of Equipment:

4.2.1 Detailed list of Equipments under dispatch.

4.2.2 Photograph & Engineering Drawings with illustrations identifying the various component/subsystems and showing location of items.

4.3 INFORMATION TO BE SUPPLIED ALONGWITH EQUIPMENT:

4.3.1 For each complete 4 bay VHF FM circularly polarized antenna **two** printed & duly bound copies of manuals and books for Installation, Testing, Commissioning, Operation, Maintenance, Fault diagnosis are to be supplied to consignee.

4.3.2 Three Complete set, of these documents i.e. **printed & duly bound** set of *Installation, Commissioning, Operation & Maintenance* manuals for complete 4 bay VHF FM circularly polarized antenna against the order are required to be sent to (irrespective of number of antenna ordered), the following officers / offices / places:

- | | |
|--|-----------------|
| 4.3.2.1 Zonal Office (Project Wing) | - 1 set |
| 4.3.2.2 Technical Library, P&D Unit, DG:AIR | - 1 set |
| 4.3.2.3 Staff Training Institute (Technical) | - <u>1 set</u> |
| Total | - <u>3 sets</u> |

One Soft copy of these documents is also required on CD for use with PC to be delivered to DE(Proj), P & D Unit, DG AIR .

4.3.2.7 One copy each of the Pre-dispatch Performance Test at manufacturer's work as per ATP and Inspection Report - carried out at factory - should be sent to Director (Project), P&D Unit, DG:AIR and consignee.

4.4 DELIVERY OF EQUIPMENT

Within six months (06) from date of order.

4.5 ISO CERTIFICATION: The tenderer should either be original equipment manufacturer or supply the equipment only from the original equipment manufacturer. Original equipment manufacturer should have ISO Certification for the manufacturing work and the documentary proof for the same are to be enclosed with the tender.

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

4.6.1 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.

4.6.2 A guarantee to make good within 30 days at his own expense any component which becomes defective under normal operating conditions within 18 months from the date of acceptance of the equipment at respective site.

4.6.3 A guarantee to supply all components for a period of 10 years from the date of acceptance of equipment at site, at rates at which these are being supplied by him to other customers & also should match prices of original manufactures of these components prevailing at the time.

4.6.4 If at any stage, during next 10 years, the manufacturer stops production of this model of equipment, he shall intimate All India Radio in advance to enable the later to stock the critical items.

SECTION - II (TECHNICAL SPECIFICATIONS)

1.0 INTRODUCTION:

The 4 bay pole type VHF FM circularly polarized antenna provisions is required for use with FM transmitters of All India Radio for multi frequency operation at Srinagar (J&K).

The tenderer is required to offer complete Antennae System, comprising of Dipoles, Inter bay RF coaxial air dielectric feeders, Power Splitters including Rigid Lines , Fine Tuning arrangement (on site) and other accessories for the completeness of offered Antenna System.

1.1 The Antenna will be installed on the pipe (*100 mm inner dia. Category 'C'*) already installed on one leg between 97.7 M & 84.7 M of the existing Square Cross section (approx 3.80Mx3.80M) of self-supporting steel latticed 122 M TV tower. The aperture is tapering in the lower portion. Refer drawing Annexure-I.

1.2 Following equipment and items will be provided by AIR separately.

1.2.1 The transmitter, which will conform to ITU-R standards.

1.2.2 RF co-axial cable (air dielectric), rigid lines(for inter connections of transmitter Chain in the Transmitter Hall), dehydrator, dummy load and RF switch (for selection of Antennae or Dummy load) etc.

1.2.3 Self-supporting latticed Tower (Existing TV tower of 122 M).

1.2.4 A Stainless steel / GI pipe of *100 mm inner dia.*is already installed on the tower by AIR for fixing the four(4) Dipoles / Bays, Side mount VHF FM Antennae.

All the items required for the Completeness of 4 bay VHF FM antenna system offered by the tenderer and its mounting for optimum performance shall be supplied by the tenderer except equipment and items mentioned above in Para No.1.2.1 , 1.2.2, 1.2.3 and 1.2.4

2.0 TECHNICAL SPECIFICATION:

2.1 ELECTRICAL PARAMETERS:

2.1.1 Polarization : Circular.

2.1.2 Input impedance : 50 ohm unbalanced.

2.1.3 Frequency band : 88 -108 MHz.

2.1.4 Return loss/ VSWR

2.1.4 .1: Better than 1.15:1.0 over the Operating band Frequency Range (100 –103.7 MHz). To be optimized on operating frequency (to be intimated later) should be better than 1.1:1.0.

2.1.4 .2: Return Loss Value(dB) in Graph form over entire (88 -108 MHz) frequency range to be enclosed.

2.1.5 Continuous **Average Power rating** : 20 kW.

2.1.6 Downward beam tilt : 1° for entire Operating Frequency Range

2.1.7 Null filling : Required, 10%.

2.1.8 4 bay Antenna Gain : ≥ 3.0 dBd

2.1.8.1 **Antenna gain** (with respect to half wave dipole) - (Antenna gain in all directions over entire frequency range of 88 - 108 MHz should be enclosed with the tender)

2.1.8.2: Vertical Plane: Expected Pattern for 0° to $\pm 90^\circ$ to be forwarded with tender.

2.1.8.3 **Horizontal plane:** Radiation pattern should be Omni directional and gain variation should be within ± 1.0 dB over 3 dBd.

2.1.9 No. of vertical Bays (Dipoles) : 4 Nos.

2.1.10 Spacing between Bays : Actual distance to be indicated in tender, and a full Engineering drawing to be enclosed.

2.1.11 Antenna Mounting details : The FM antenna will be mounted between 84.7M to 97.7 M on one leg/face of existing 122 M TV tower having a Square Cross section (of approx 3.80Mx3.80M).

The four (4) dipoles of the FM Antenna will be mounted on a *100 mm inner dia.* GI / stainless steel pipe on one leg of the tower. Expected field pattern (circular polarization) with such a supporting tower should be submitted along with the tender. Details for carrying out field adjustments for ensuring that actual Radiation Pattern (Horizontal and Vertical plane) conform to AIR specification, **if any**, in the field **or** at site are to be enclosed with the tender.

2.1.12 Inter-bay feeding / Feed System : Full details of Feeding arrangement and the Engineering drawings with dimensions; along-with the details of Inter-connecting RF co-axial air dielectric cables / rigid lines etc to be submitted with tender. The entire feeding system should be adequately protected as per environmental conditions as specified in clause 2.2.6.

2.2. MECHANICAL DETAILS:

2.2.1

(i) Antenna Weight : ≤ 200 Kg

(ii) Antenna Wind Load : ≤ 300 Kg

(iii) Maximum Wind Speed : 198 km. per Hr.

- 2.2.2 Available Pipe length for antenna : 10,000 mm
- 2.2.3 External material of Dipoles and rigid feed lines: Exterior of dipoles will be made of stainless steel or hot dip galvanized steel or Marine Brass. Rigid lines with Marine Brass or Copper.
- 2.2.4 **Internal material (for Power Divider, Rigid lines & interconnecting feed cables / lines)** : Inner lines of Dipoles will be of copper, Brass or Aluminum & those of Power Dividers will be of copper or Brass. All electrical contacts will be silver plated. All inners and bullets ---- of connecting head or mating head - will be made of Beryllium copper and silver plated. Insulators will be made of virgin Teflon.
- 2.2.5 **Pressurization** : pressurization is must up to the antenna dipoles i.e in the RF coaxial cable, power dividers, sub divider, splitter, branch cables & sub distributor cable.
- 2.2.6 **Ambient Temperature / RH** : -20° C to 45 ° C , RH 95% NC.
- 2.2.7 **Input connector** -- main power divider of antenna system : To match with 3 -1/8” EIA Flange connector, RF output of FM transmitter will be available through the 3-1/8” EIA Flange connector mounted on 3-1/8" RF co-axial air dielectric cable.
- 2.2.8 **Set of clamps** : Suitable clamps for dipoles, Power Divider / Splitter and RF co-axial air dielectric cables / rigid lines etc. are to be included in the offer and the mechanical details (dimension & materials used etc) be indicated in the tender.
- 2.2.9 The entire Antennae System should be adequately protected. Each component / Sub system of the Antennae System should be adequately protected for extreme weather conditions . The Antennae system should also be well protected against dust .

SECTION - III(A)

**SCHEDULE OF REQUIREMENTS / MATERIALS (UNPRICED)
[FOR ONE SET OF 4 BAY CIRCULARLY POLARIZED VHF FM ANTENNA]
(For antenna to be mounted on the leg of TV tower at Srinagar TV Site)
[PART- "A"]**

| S NO. | Spec. clause ref. | Description | Qty |
|-------|-------------------------------------|--|-------------------|
| 1. | Sec.-II (Technical Spec.) | 4 bay VHF FM Circularly polarized antenna system complete as per details given in compliance to AIR Specification No: Xth plan/4 BAY VHF ANTENNA /FM /3/June (Revision-II)/2009-D(TD/FM) including antenna clamps. | 1 Set Complete |

Total of PART - "A" :

SECTION-III (B)

OPTIONAL ITEMS:

**[FOR ONE SET OF 4 BAY CIRCULARLY POLARIZED VHF FM ANTENNA]
(For antenna to be mounted on the leg of TV tower at Srinagar TV Site)
PART-"B"**

| S NO. | Spec. clause ref. | Description |
|-------|-------------------|---|
| 1. | Sec.-II | (Optional) Spares: Antenna installation accessories and tools kit. (Items wise details of offered material are to be given by the tenderer) |

Total of Optional Items PART-"B":