

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

No. 18/1/2005-E.I

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| Specification for: | Valve Type 4CX-15,000 A High power ceramic Tetrode |
| Specification No. : | Spec/18/1/2005/TM/1002 |
| No. of pages: | 6 |
| Prepared by: | KAILASH CHAND |
| Date of approval: | 20.08.2007 |
| Date of issue: | 21.08.2007 |

Para wise compliance report for all the clauses of the specification must be done without it tender will be rejected.

(KAILASH CHAND)
Dy. Director Engg. (TM)

Specifications No. : Spec/18/1/2005/TM/1002

Specifications of Ceramic Tetrode Valve Type- 4CX-15,000 A

Para wise compliance report for all the clauses of the specification must be done, without it tender will be rejected.

1. Scope:

The ceramic Tetrode is being used in AIR's network of 10 KW MW transmitters. The valve will be used in Modulator and RF power amplifier stages of the Transmitters.

2. General characteristic of the valve:

The valves offered should be **New and of first quality.**

- a. Ceramic metal tetrode with co-axial structure.
- b. Throated tungsten cathode with direct heating.
- c. Anode: Air cooled.
- d. Maximum frequency for full ratings (W)- 110 MHz.

e. Anode dissipation: 15kW.

- f. Designed for RF Broadcasting applications amplifiers.
- g. Output power up to 10kW in MW broadcasting.
- h. Operating position: Vertical anode up.
- i. Net Weight: 5.80 Kg.

3. Eligibility of the supplier:

- a. The supplier must possess valid ISO 9001/ 2000 Certificate in production.
- b. Original Equipment Manufacturer or their Authorised agent shall only be eligible to quote.
- c. Authorisation letter must be ink signed by the OEM and submitted along with the tender.
- d. The supplier must possess an experience of at least 2years in manufacturing.
- e. The supplier must provide past record of timely and good quality supply of tendered items to Broadcast Organisations in the preceding two years supported with copies of orders placed by the Broadcast Organisation with the Manufacturing firm, and Broadcaster's satisfaction letters regarding the tendered item.

Any offer which fails to meet the above eligible condition will be summarily rejected.

4. Electrical Specifications:

4.1.1 **Filament voltage** : 6.3-7.5 Volts

| | | | | | | |
|----------|---------|-----|----|-----|---|------|
| Filament | current | for | Vf | 7.5 | V | 160A |
|----------|---------|-----|----|-----|---|------|

4.1.2 **Interelectrode Capacitance**

a) Cathode ground

Cin 160.5 pf

Cout 24.5 pf

Feed- through 1.5 pf

b) Grid and Screen grounds

Cin 67.0 pf

Cout 25.5 pf

Feed- through 0.2 pf

4.1.3 Amplification Factor

Grid G1 to screen G2 4.5

5. Mechanical Specifications: Please see the attached diagram of the valve.

Maximum Length(Less Boiler) 238.0 mm.

Maximum Diameter(Less Boiler) 193.0 mm

Operating position Vertical

Weight 5.80 kg

6. Operating Data

6.1 Absolute Max. Rating

| Class of operation | Type of service | Maximum Rating | |
|--------------------|------------------------------------|-------------------|-------------------|
| | | Plate Voltage (V) | Plate Current (A) |
| C | RF power Amplifier | 10,000 | 5.0-6.0 |
| C | RF power Amplifier plate modulated | 8,000 | 4.0 |
| AB ₁ | RF linear Amplifier | 10,000 | 6.0 |
| AB ₁ | AF Amplifier or Modulator | 10,000 | 6.0 |

6.2 Typical Operating Values

| Class of operation | Type of Service | Plate voltage (V) | Screen voltage (V) | Plate current(A) | Drive power (watts) | Output Power (watts) |
|--------------------|------------------------------------|-------------------|--------------------|------------------|---------------------|----------------------|
| C | RF power Amplifier | 10,000 | 750 | 4.6 | 220 | 36,500 |
| C | RF power Amplifier Plate modulated | 8000 | 750 | 3.7 | 150 | 23,500 |
| AB ₁ | RF Linear Amplifier | 10,000 | 1500 | 4.3 | --- | 28,500 |
| AB ₁ | RF Amplifier or Modulator | 10,000 | 1500 | 8.5 | --- | 57,000 |

6.3 Tube Cooling:

Anode of the valve should be forced air cooled.

i) Operating Temperature Maximum

Ceramic/Metal seals and Anode Core 250 °C

7 Certificate of Origin:

- a) In order to verify that each tube supplied by OEM comes from an ISO-9001/2000 certified factory, the vendor should provide country of origin and type of the tube, and

Sr. No., if any, must be engraved or inked on the body of each tube and it must be visible easily even while in operation.

- b) In the absence of such a certificate of origin on the tubes, the tubes shall be considered as rebuilt or not manufactured by vendor.
- c) Rebuilt/ Refurbished/Reconditioned tube will not be accepted

8. Package and Marking

Please refer to the relevant clause in the booklet “**Instructions to Bidders**”

9. INSURANCE AGAINST WAR AND MARINE RISK:

Please refer to Commercial terms for transportation by air, sea and land up to ultimate consignee.

10. Tube Appearance

The tube (Valve) brazing area, ceramic cleanliness, electrical connections, coolant connection, plating, shining silver plated surface around anode, cathode grid rings should be of high quality.

The shining of silver plated on cathode, grid and anode ring should be as good as new after the run of 100 hours operation of the tube.

11. Delivery

Delivery should complete in nine months after the issue of the AT. The lot of tubes should be duly insured (Insurance as per commercial terms) and be delivered at the destination of consignee Central Store, New Delhi.

12. Guarantee Conditions

The electron tubes shall be free from defects in design, material and workmanship. The tube will be operated within pre designed fixed parameters and dynamic broadcast parameters, by taking all cooling conditions into account.

The tube shall be guaranteed for 2000Hrs. of heater/filament operation or 2 years from the date of receipt which ever occur first. In case of failure of the tube within the first 100 Hrs. full free replacement with a **New and of first quality tube** is to be provided by the OEM/ supplier. Prorata credit will be for failure of tube between 100hrs. and 2000hrs. The claim shall be settled by the **Supplier/OEM without any option** as given below:

If the tube fails after 100 hours and within guaranteed 2000 hours, then prorata

$$C = P \left(\frac{G-H}{G} \right)$$

G

C - Credit

G - Guaranteed no. of hours

H - Useful filament hours served by the defective tube.

P - Purchased price of defective tube.

13. Performance Guarantee

As per DGS and D rule

14. Literature

Necessary literature, catalogues concerning to the article in supply and the company profile including the manufacturing procedure etc. must be supplied by the Bidder.

