RADIO DIVISION

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6 GHz WAVEGUIDE

GENERIC REQUIREMENTS

NO. GR/FDR-04/04. FEB 2007

(Supersedes GR No. GR/FDR-04/03. FEB 2003)

TELECOMMUNICATION ENGINEERING CENTRE

KHURSHID LAL BHAWAN , JANPATH
NEW DELHI- 110001
INDIA

HISTORY SHEET OF THE GR

The GR No. GR/FDR-04/03.FEB 2003 on "6 GHz Waveguide" has been reviewed. As there are some changes, inclusions & deletions in the technical specification, the reviewed GR is numbered as GR No. GR /FDR - 04/ 04. FEB 2007 and supersedes the GR/FDR-04/03.FEB 2003 . The Type Approval Certificate (TAC) / Technical Specification Evaluation Certificate (TSEC) would be considered as a fresh case.

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REFERENCES

TEC GR

1. TEC GR No. GR/ACC -14/02. JUN 2003 : Accessories of Antennas , Feeder Cables and Waveguides

BSNL QA Documents

1. QM -333 : "Specification for environmental testing of electronic equipments for transmission and Switching use ".

IEC/ ISO Standards

1. IEC-60529 : (2001) Ed. 2.1 { includes amendment 1 (1999)} & with corrigendum 1 (2003) "Degrees of protection provided by enclosures (IP Code)."
2. ISO- 9001:2000 "International Quality Management System."

BIS Standards

1. IS-1897 : 1983 "Specification for Copper strip for electrical purpose" { Second Revision}
2. IS-12063 : 1987 (Reaffirmed in 2004) "Classification of degrees of protection provided by Enclosures of electrical equipment."
3. IS-14811 :2000 "Specification for Rolled Copper Plate, Sheet , strip and foils for general Engineering purposes".

GOVERNMENT OF INDIA

DEPARTMENT OF TELECOMMUNICATIONS

TELECOMMUNICATION ENGINEERING CENTRE

NEW DWLHI-110001

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PART –I

1.0 Scope

1.1 This document contains the generic requirements of 6 GHz Waveguide to be used for 6 GHz Microwave Systems.

1.2 The 6 GHz Waveguide shall be used in conjunction with 6 GHz Microwave Systems at one end 6 GHz antenna at the other end. The waveguide system shall consist of corrugated copper flexible non- circular waveguide with polyethylene jacket along with 'E' and 'H' bends and suitable terminations at both ends. The waveguide shall be rugged and it shall be possible to re-use the system by use of re-bends , if necessary . The waveguide shall be supplied in full drum length, terminated at one end and pressurized and sealed at the other end for transport . Attachment of end fittings shall be done in the field and it shall be possible with standard tools.

2.0 Functional and Technical requirements

2.1	**Material :**	Corrugated copper* kcalb dna gnitaoc evisorroc itna htiw .tekcaj enelyhtylop
Note :- Copper as per BIS No. 1897 (1983) "Specification for Copper strip for electrical purpose " { Second Revision} or IS : 14811 : 2000 – "Specification for Rolled Copper Plate , Sheet Strip and Foils for general Engineering purposes".		
2.2	**Frequency of operation :**	6.43 – 7.11 GHz
2.3	**Attention :**	6.43 GHz – 4.6 dB/100m (max) 6.77 GHz – 4.5dB/100m (max) 7.11 GHz – 4.4 dB/ 100m (max)
2.4	**Return loss with connectors: At both ends**	30 dB (minimum)
2.5	**Pressurisation :**	Pressurisable to 10psi (70kPa)

2.6	**Maximum pulling length: per hoisting stocking**	120 meters

	during installation	
2.7	**Minimum Bending Radius:** **a) with single bending** **b) with 10 re-bendings**	**E plane** **H plane** 300 mm 600 mm 900 mm 1800 mm
2.8	**Terminations :** **Type** **Numbers** **Flange Assembly** **Gas inlet** **Connector**	 PDR 70 2 At site Only at one termination Fixed tuned
2.9	**Pressure window :** **As per GR No. GR/ACC-14/02. JUN 2003**	To mate with PDR 70 Flange at both ends
2.10	**Clamp spacing at normal, :** **Critical areas and bends** **{5% extra clamps for critical Areas to be included}**	1 Metre
2.11	**Outer dimensions :**	To be furnished by the supplier
2.12	**Weight :**	To be furnished by the supplier
2.13	**Colour of the polyethylene jacket**	Black
2.14	**Marking on the jacket :**	The name of manufacture or trade mark, type of waveguide, year of manufacture and running length shall be marked legibly every metre. Purchaser's logo (as applicable) shall be marked every metre if so specified, at the time of ordering.
2.15	**Environmental conditions :**	The waveguide assemblies are for installation and operation under fully exposed weather conditions. These shall without wind speeds upto 200 kmph and shall also be capable of withstanding the effects of industrial pollution, salinity of atmosphere in coastal areas , storms etc. The performance shall not deteriorate beyond values specified in this GR for testing as per Category "D" of BSNL QA

		Document QM-333 including corrosion (salt mist) tests.
2.16	**Accessories :**	The following accessories are to be Supplied : i) Clamps ii) Grounding kit iii) Wall gland iv) Hoisting grip (stocking) v) Pressure window vi) Flanging tool kit vii) Bending tool kit viii) Sealing Material

		ix) Injection Gun x) Straight joint6 kit The accessories from S.No. (i) to (v) are to be as per GR No. GR/ACC-14/02.JUN 2003.

PART – II

3.0 General Requirements

3.1 **a)** The waveguide shall be manufactured in accordance with international quality Management system ISO 9001 :2000 for which the manufacturer should be duly accredited. A quality plan describing the quality assurance system followed by the manufacturer Would be required to be submitted.

b) The waveguide shall meet the latest BSNL QA Guidelines.

3.2 RF connectors used shall be reliable and of standard type to ensure failure free Operation for over 500 matings.

3.3 The joints in the waveguide assembly , if any, shall have protection as per BIS Standard IS 12063 : 1987 (Reaffirmed in 2004) "Classification of degrees of protection provided by enclosures of electrical equipment " {equivalent to IEC-60529} to meet at least the protection level of IP-65.

3.4 The waveguide shall conform to the requirements for environment specified in BSNL QA Document QM- 333 "Specification for environmental testing of electronic equipment for transmission and switching use " for operation, transportation and storage. The applicable tests shall be for environmental category "D" including corrosion (salt mist).

3.5 **Documentation :**

Documentation shall include one hard copy and one soft copy of technical literature in Hindi or English with detailed assembly and installation procedure and shall be provided along with the waveguide

LIST OF ABBREVIATIONS

BIS	Bureau of Indian Standards
BSNL	Bharat Sanchar Nigam Limited
dB	Decibel
E plane	Plane containing the electric-field vector
GHz	Giga Hertz
GR	Generic Requirements
H plane	Plane containing the magnetic-field vector
IEC	International Electro technical Commission
IP	International Protection : Designator for degrees of Protection in conjunction With two numerals
IS	Indian Standard
ISO	International Organization for Standardization
Kmph	Kilometre per hour
kPa	Kilo Pascals
m	Metre
MHz	Mega Hertz
Mm	Millimetre
PDR 70	Pressurisable type D rectangular flange of size 70
Psi	Pounds Per Square Inch
QA	Quality Assurance
QM	Quality Manual
RF	Radio Frequency
TAC	Type Approval Certificate
TEC	Telecommunication Engineering Centre
TSEC	Technical Specification Evaluation Certificate

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