UPLINK INTERFACILITY WAVEGUIDE FOR C, Ext-C & Ku BAND

GENERIC REQUIREMENTS

No. TEC/GR/TX/SWG-001/03/JAN-09
(Supersedes GR. No. GR/SWG-01/02.MAR 2005)

C TEC

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HISTORY SHEET

Title GR	**GR No.**	**Remarks**
UPLINK INTERFACILITY WAVEGUIDE FOR C, Ext-C & Ku BAND	TEC/GR/TX/SWG-001/03/XXX-09	Revised GR in new format , combining the two GRs GR/SWG-01/02.MAR 2005 and GR/SWG-02/02.MAR 2005

1.0 INTRODUCTION

This document contains the generic requirements for Uplink Interfacility Waveguide for C, Ext- C & Ku- band to be used in conjunction with High Power Amplifier subsystem at one end, and antenna at other end. It shall consist of non-circular corrugated flexible copper waveguide with rugged polyethylene jacket. The waveguide shall be pressurised and sealed for transport. The waveguide shall be rugged so as to be reusable by use of rebinds, if necessary. The waveguide shall be provided in the lengths indicated by a customer either with terminations at both ends, or termination at one end with termination at the other end to be field fitted, which shall be possible with standard hand-tools.

2.0 FUNCTIONAL AND TECHNICAL REQUIREMENTS

2.1 MATERIAL

2.1.1 Waveguide : Corrugated copper* with anticorrosive Coating

*Copper used shall conform to BIS standard IS-1897 (1983) "Specification for copper strip for electrical purposes" (second revision).

2.1.2 Jacket : Polyethylene jacket with any light colour, and UV stabilized to protect it from degradation in sunlight.

2.2 CHARACTERISTICS

2.2.1 Frequency of operation : 5.925 GHz to 6.425 GHz for C –Band
: 6.725 GHz to 7.025 GHz for Ext. C-band
: 13.750 GHz to 14.500 GHz for Ku-Band

2.2.2 Attenuation characteristics
(i) For C-Band : 4.95 dB/100 m (maximum)
at 5.925 GHz at 25° C**
(ii) For Ext c-band : 6.95 dB/100 m (maximum)
at 6.725 GHz at 25° C**
(iii) For Ku-Band : 16.6 dB/100 m (maximum)
at 13.75 GHz at 25° C**
* * Variation of ±0.2% per° C may be taken for temperature other than 25°C.

2.2.3 Return loss with Connecters at both ends
(i) For C-Band : 30dB minimum over whole Frequency band
(ii) For Ext C-band : 29dB minimum over whole Frequency band
(iii) For Ku-Band : 28.3dB minimum over whole Frequency band

2.2.4 Minimum bending radius		E-plane	H-plane
(i) For C & Ext-Band			
a. With single bending	:	300 mm	600 mm

b. With 10 re-bendings		900 mm	800 mm
(ii) For Ku-Band			
a. With single bending	:	130 mm	360 mm
b. With 10 re-bendings		130 mm	360 mm

2.2.5 Minimum pulling length per Hoisting stocking during Installation : 30 m

2.2.6 Termination
a. Type : PDR 70 for C &Ext-Band
: PDR 120 for Ku – Band
Or as specified by the purchaser

2.2.7 Pressurisation : Up to 30 gm/cm2

2.2.8 Pressure window mate with PDR 70 : For C &Ext-Band -To flanges at both ends
: For Ku-Band -To mate with PDR 120 flanges at both ends

2.2.9 Clamps spacing at normal, critical areas and bends : 0.5 m
(5% extra clamps for critical areas to be included)

2.2.10 Outer dimensions : To be furnished by the supplier

2.2.11 Weight : To be furnished by the supplier

3.0 QUALITY REQUIREMENTS

3.0.1 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.

And

The equipment shall meet the latest operator's quality manual on

i) Quality and reliability in product design.

ii) Guidelines for standard of workmanship for printed boards.

iii) Guidelines for standard of workmanship for printed board assemblies.

iv) Guidelines for standard of workmanship for surface mounted devices.

v) Transmission equipment general documentation.

The supplier shall furnish a certification from the manufacturer to this effect, which shall be verified at the time of technical specifications evaluation.

4.0 SAFETY REQUIREMENTS

4.1 TEMPERATURE & HUMIDITY

4.1.1 The waveguide systems are for installation and operation under fully exposed weather conditions. The temperatures may range from subzero to extremely hot. The waveguide system shall be capable of working without any degradation in performance for the temperature range from -20° C to +70° C and the relative humidity range from near dry to 95% condensing at 40° C. Optional compliance for temperature lower than -20° C shall be called for specific sites, on need basis.

4.2 CORROSION

4.2.1 The waveguide system shall be capable of withstanding the effects of rains, snowfall, industrial pollution, salinity of atmosphere in costal areas, etc.

4.3 ENGINEERING REQUIREMENTS

4.3.1 The joints in the waveguide assembly shall have protection as per BIS standard IS 12063 {1987} "Classification of degree of protection provided by enclosures of the electrical equipment" {equivalent to IEC-529} to meet at least the protection level of IP-65.

4.3.2 The waveguide system shall adopt state-of-the-art technology.

4.3.3 All connectors shall be reliable and of standard type to ensure for over 500 failure-free mating operations under the environmental conditions specified.

4.3.4 The mechanical design and construction of each/units shall be inherently robust and rigid under all conditions of operations, adjustment, replacement, storage and transport and conforming to the latest operator's quality manual on "Specification for environmental testing of electronic equipments for transmission and switching use".

5.0 DESIRABLE REQUIREMENTS

5.0.1 The manufacturer shall guarantee the satisfactory performance of the equipment without any degradation in performance up to at an altitude of 3,000 meters.

5.0.2 The equipment shall be able to work without any degradation in performance in saline atmosphere near coastal areas and should be protected against corrosion.

5.0.3 The equipment shall conform to the requirements for the latest operator's quality manual for Specification for environmental testing of electronic equipments for transmission and switching use-for operation, transportation and storage, including vibration and corrosion (salt mist).

5.1 DOCUMENTATION

5.1.1 Technical literature in English or Hindi with complete layout, detailed block schematic and circuit diagram of various assemblies with test voltages/waveforms at different test points of the units shall be provided. All aspects of installation, operation, maintenance and repair shall be covered in the manuals. The soft copy as well as hard copy of the manuals shall also be provided. The manuals shall include the following manuals.

5.2 INSTALLATION, OPERATION AND MAINTENANCE MANUAL

a. Safety measures to be observed in handling the equipment;
b. Precautions for installation, operation and maintenance;
c. Test jigs and fixtures required, and procedures for routine maintenance preventive maintenance, troubleshooting and subassembly replacement;
d. Illustration of internal and external mechanical parts.

5.3 REPAIR MANUAL

a. List of replaceable parts used, including their sources and the approving authority;
b. Detailed ordering information for all the replaceable parts shall be listed in the manual to facilitate reordering of spares as and when required;
c. Procedure with flowchart for troubleshooting and subassembly replacement shall be provided. Test fixtures and accessories required for repair shall also be indicated. Systematic troubleshooting charts (fault-tree) shall be given for the probable faults with their remedial actions.

5.4 ACCESSORIES

5.4.1 COMPULSORY ACCESSORIES

a. Wall gland
b. Hoisting stocking
c. Clamps
d. 2 flexible waveguide of 1 meter length each (1.06 VSWR) along with prefabricated at both ends.
e. Pressure Window
f. E and H bands

5.4.2 OPTIONAL ACCESSORIES

a. Earthing kit
b. Cutting tool
c. Flanging tool
d. Bending tool kit
e. Aluminimum foil
f. Sealing compound
g. Injection gun

5.5 MARKING

5.5.1 Waveguide shall be marked with the following information every 5/10 meters

a. Name of manufacturer
b. Year of manufacturing
c. Frequency of operation

6.0 FIELD TRIAL: Four week minimum

Instructions to the purchaser

a. Purchaser shall specify the required quality manuals in the tender document against the clause no. 3.0, 4.3.4 and 5.0.3.
b. Purchaser shall specify the required termination against the clause 2.2.6.

7.0 ABBREVIATIONS

BIS	: Bureau of Indian Standards
°C	: Degree Celsius
dB	: decibel
GHz	: Giga Hertz
GR	: Generic Requirements
IEC	: International Electrotechnical Commission
IP	: International Protection
IS	: Indian Standard
ISO	: International Standardisation Organisation
m	: meter
mm	: millimeter
QA	: Quality Assurance
QM	: Quality Manual
TEC	: Telecommunication Engineering Centre
VSWR	: Voltage Standing Wave Ratio