



DPC: 23 / 30479507 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

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Responsible committee: EPL/46 Cables, wires and waveguides, radio frequency connectors and accessories for communication and signalling

Interested committees:

Title: BS IEC 63466 Leaky waveguide

Part 1: Generic specification. General requirements and test methods

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- iii) requires additional national guidance or information

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



46/947/CD

COMMITTEE DRAFT (CD)

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2023-11-24

SUPERSEDES DOCUMENTS:

46/915/CD, 46/941/CC

IEC TC 46 : CABLES, WIRES, WAVEGUIDES, RF CONNECTORS, RF AND MICROWAVE PASSIVE COMPONENTS AND ACCESSORIES

SECRETARIAT:

United States of America

SECRETARY:

Mr David Wilson

OF INTEREST TO THE FOLLOWING COMMITTEES:

SC 46A

PROPOSED HORIZONTAL STANDARD:



Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☒ EMC

☐ ENVIRONMENT

☒ QUALITY ASSURANCE

☐ SAFETY

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TITLE:

Leaky waveguide Part 1: Generic specification - General requirements and test methods

NOTE FROM TC/SC OFFICERS:

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LEAKY WAVEGUIDES- PART 1: GENERIC SPECIFICATION- GENERAL REQUIREMENTS AND TEST METHODS

1 Scope

This part of IEC xxxxx specifies the general requirements and test methods for leaky waveguides, including terms and definitions, design and structure, type designation, ratings and characteristics, identification, marking and labelling, requirements and test methods, etc.

This part is applicable to leaky waveguides, including rectangular leaky waveguides and elliptic leaky waveguides. These leaky waveguides are intended for using in tunnels, railways, highways, subways, elevators and other installations in which conventional antenna transmission is not satisfactory or even impossible.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document(including any amendments)applies.

IEC 60050 *International Electrotechnical Vocabulary –(all parts)*

IEC 60068-1 *Environmental testing –Part 1: General and guidance*

IEC 60068-2-61 *Environmental testing –Part 2 Test methods Test ZABDM: Climatic sequence*

IEC 60153-1 *Hollow metallic waveguides –Part 1: General requirements and measuring method*

IEC 60261, *Sealing test for pressurized waveguide tubing and assemblies*

IEC 60332-1-2 *Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable*

IEC 60754-1 *Test on gases evolved during combustion of materials from cables – Part 1: Determination of the halogen acid gas content.*

IEC 61034-2 *Measurement of smoke density of cables burning under defined conditions – Part 2: Test procedure and requirements.*

IEC 61196-1-106, *Coaxial communication cables – Part 1-106: Electrical test methods – Test for withstand voltage of cable sheath*

IEC 61196-1-212 *Coaxial communication cables – Part 1-212: Environmental test methods – UV stability*

IEC 61196-1-215, *Coaxial communication cables – Part 1-215: Environmental test methods – High temperature cable ageing*

IEC 61196-1-302, *Coaxial communication cables – Part 1-302: Mechanical test methods – Test for eccentricity*

IEC 61196-1-316, *Coaxial communication cables – Part 1-316: Mechanical test methods – Test of maximum pulling force of cable*

IEC 62230, *Electric cables – Spark-test method*

IEC TS 60695-7-50, *Fire hazard testing – Part 7-50: Toxicity of fire effluent – Estimation of toxic potency – Apparatus and test method*

IEC TS 60695-7-51, *Fire hazard testing – Part 7-51: Toxicity of fire effluent – Estimation of toxic potency: Calculation and interpretation of test results*

162

163 ISO 3274-1996 *Geometrical Product Specifications(GPS)— Surface texture: Profile method —*
164 *Nominal characteristics of contact(stylus)instruments.*

165 ISO 4288-1996*Geometrical Product Specifications(GPS)— Surface texture: Profile method —*
166 *Rules and procedures for the assessment of surface texture.*

167 **3 Terms and definitions**

168 In addition to those given in IEC 60050 for the purpose of this document, the following terms
169 and definitions apply.

170 **3.1**

171 **leaky waveguide**

172 waveguide with hollow metallic tube that is intentionally not completely closed, so that part of
173 the electromagnetic wave energy transmitted or received through the waveguides is coupled by
174 a bidirectional transmission system formed by the hollow metallic tube of the waveguides and
175 the external environment.

176 Note 1 to entry: The coupling intensity between leaky waveguide and mobile equipment depends on:

- 177 - structure of the leaky waveguide;
- 178 - characteristics of antenna(such as the type, the orientation, gain, etc.);
- 179 - distance and orientation of the mobile antenna from the leaky waveguide;
- 180 - nature of ambient atmosphere;
- 181 - operating frequency range;
- 182 - manner of installation of the leaky waveguide;
- 183 - shape, material and size of surrounding buildings.

184 **3.2**

185 **rigid rectangular leaky waveguide**

186 leaky waveguide with rectangular cross-section metallic tube not allowing bending and torsion
187 during installation and operation.

188 **3.3**

189 **twist**

190 the angle rotating around the longitudinal axis over the specified length of the rectangular leaky
191 waveguide.

192 **3.4**

193 **bow**

194 the maximum deviation of the actual axis length of the leaky waveguide from the straight
195 distance of specified length connecting two points on that axis.

196 **3.5**

197 **eccentricity(for rigid rectangular leaky waveguide)**

198 Half of the difference between the measured thickness of opposite walls of the rectangular leaky
199 waveguide.

200 **3.6**

201 **elliptical Leaky waveguide**

202 Leaky waveguide with elliptical cross-section metallic tube allowing limited bending and torsion
203 during installation and operation.

204 3.7**205 E plane**

206 the plane perpendicular to the long axis of the elliptical leaky waveguide and parallel to the
207 short axis of the elliptical leaky waveguide.

208 3.8**209 H plane**

210 the plane perpendicular to the short axis of the elliptical leaky waveguide and parallel to the
211 long axis of the elliptical leaky waveguide.

212 3.9**213 E Bend**

214 bending along the E plane of the elliptical leaky waveguide.

215 3.10**216 H Bend**

217 bending along the H plane of the elliptical leaky waveguide.

218 3.11**219 coupling loss**

220 ratio of the power P_t transmitted into the leaky waveguide at one point to the power P_r received
221 by a half-wavelength dipole antenna located at a distance from the leaky waveguide at the same
222 point(see formula 1):

223

$$224 L_c = 10 \log_{10} \frac{P_t}{P_r} \quad (1)$$

225

226 Where:

227 L_c the coupling loss, in dB;

228 P_t the transmission power in the leaky waveguide at one point, in W;

229 P_r the receiving power of the half-wavelength dipole antenna at a distance from the leaky
230 waveguide at the same point, in W.

231 4 Design and structure**232 4.1 General**

233 The typical structure of rigid rectangular leaky waveguides is shown in figure 1, and the typical
234 structure of elliptical leaky waveguides is shown in figure 2.

235 The design and structure of leaky waveguide shall be in accordance with 4.2 to 4.3 and the
236 relevant specifications.

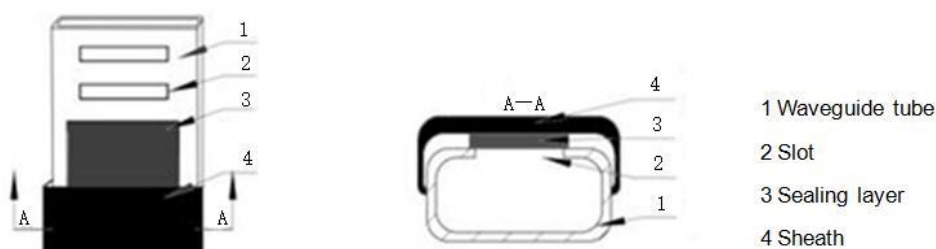


Figure 1 -Typical structure of rigid rectangular leaky waveguides

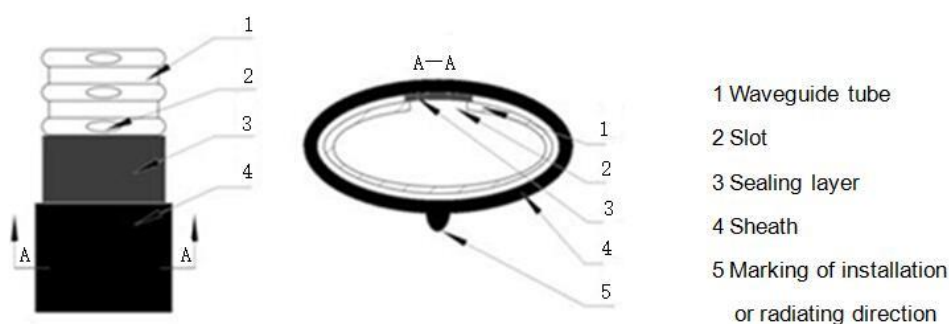


Figure 2- Typical structure of elliptical Leaky waveguides

4.2 Rigid rectangular leaky waveguides

4.2.1 Waveguide tube

The material for waveguide tube shall be as stated in relevant specifications.

The internal structure and dimensions of waveguide tube shall comply with IEC 60153-1 or relevant specifications.

Unless otherwise specified, the ratio between the height and width of the inside cross-section is 1:2.

The thickness and tolerance of waveguide tube wall shall be as stated in the relevant specifications. The inner angle radius shall be specified in the relevant specifications.

The nominal values and tolerances of the height and width of the outside cross- section of waveguide tube shall be as stated in the relevant specifications.

4.2.2 The slots in waveguide tube

The shape and dimensions of the slots in the waveguide shall be such that the electrical requirements are met.

4.2.3 Sealing layer

The material of sealing layer shall be as stated in the relevant specifications.

The sealing layer should be adhered to the slots of the metal waveguide tube and closely bonded with the waveguides.

The thickness of the sealing layer shall comply with the requirements for gastight tests of the leaky waveguides.

4.2.4 Sheath

The material of sheath shall be as stated in the relevant specifications.

264 The sheath shall cover the whole sealing layer, which may cover only a part of the waveguide
265 tube or the entire waveguide tube as required.

266 The thickness and tolerance of the sheath shall be as stated in the relevant specifications.

267 For outdoor leaky waveguides, UV stability tests shall be passed in accordance with IEC 61196-
268 1-212

269 **4.3 Elliptical leaky waveguides**

270 **4.3.1 Waveguide tube**

271 The materials for elliptical waveguides tubes shall be as stated in the relevant specifications.

272 The long and short axis dimensions of elliptical waveguide tubes shall be as stated in the
273 relevant specifications.

274 The wall thickness of the elliptical waveguide tubes shall be as stated in the relevant
275 specifications.

276 The peak, root, pitch of the elliptical waveguide tube shall be as stated in the relevant
277 specifications.

278 **4.3.2 The slots in waveguide tube**

279 The shape and dimensions of the slots in the waveguide shall be such that the electrical
280 requirements are met.

281 **4.3.3 Sealing layer(When applicable)**

282 The material for sealing layer shall be as stated in the relevant specifications.

283 The sealing layer should be adhered to the slots of the metal waveguide tube and closely
284 bonded with the waveguides.

285 The thickness of the sealing layer shall comply with the requirements for gastight tests of the
286 leaky waveguides.

287 **4.3.4 Sheath**

288 The material for sheath shall be as stated in the relevant specifications;

289 The sheath shall cover the whole elliptical leaky waveguides, the thickness and tolerance of the
290 sheath shall be as stated in the relevant specifications.

291 For outdoor leaky waveguides, UV stability tests shall be passed in accordance with IEC 61196-
292 1-212.

293 **5 Type designation**

294 **5.1 Type name**

295 The type name of leaky waveguides covered by this specification shall comprise the following:

296 a) letter "L" indicating the leaky waveguides.

297 b) a letter indicating the shape of the inside cross-section of the leaky waveguides

298 R ——— rigid rectangular leaky waveguides.

299 E ——— elliptical leaky waveguides.

300 Note 1 to entry: For other types of waveguides, the letter shall be in accordance with the relevant specification
301 sheets.

302 **5.2 Variant**

303 The variant of leaky waveguides covered by this specification shall comprise the following: