

Edition 3.0 2017-08

INTERNATIONAL STANDARD



Hollow metallic waveguides—ANDARD PREVIEW Part 4: Relevant specifications for circular waveguides (Standards.iten.al)

<u>IEC 60153-4:2017</u> https://standards.iteh.ai/catalog/standards/sist/44abe08d-61c1-43f7-91d0-af8c9bf538bd/iec-60153-4-2017





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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 33.120.10 ISBN 978-2-8322-4613-9

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOLLOW METALLIC WAVEGUIDES -

Part 4: Relevant specifications for circular waveguides

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International Standard IEC 60153-4 has been prepared by subcommittee 46F: RF and microwave passive components, of IEC technical committee TC:46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories.

This third edition cancels and replaces the second edition published in 1973-1. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Expand and revise the operation frequency range for waveguides;
- b) Revise the allowance of aperture dimensions;
- c) Revise the test method for aperture dimensions;
- d) Revise the equation of attenuation.

The text of this International Standard is based on the following documents:

CDV	Report on voting
46F/344/CDV	46F/356/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC 60153 series, published under the general title *Hollow metallic waveguides*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- · reconfirmed,
- withdrawn,
- · replaced by a revised edition, or
- amended.

iTeh STANDARD PREVIEW

A bilingual version of this publication may be issued at a later date. (standards.iteh.ai)

IEC 60153-4:2017

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HOLLOW METALLIC WAVEGUIDES -

Part 4: Relevant specifications for circular waveguides

1 Scope

This part of IEC 60153 specifies straight hollow metallic tubing of circular waveguides for use as waveguides in electronic equipment.

The aim of this recommendation is to specify for hollow metallic waveguides:

- a) the details necessary to ensure compatibility and, as far as essential, interchangeability;
- b) test methods;
- c) uniform requirements for the electrical and mechanical properties.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

STANDARD PREVIEW

IEC 60050-726:1982, International Electrotechnical Vocabulary. Transmission lines and waveguides (Standards.iteh.al)

IEC 60261, Sealing test for pressurized waveguide tubing and assemblies

3 Terms and definitions af8c9bf538bd/iec-60153-4-2017

For the purposes of this document, the terms and definitions given in IEC 60050-726:1982 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

4 General

4.1 Standardized types

The series of circular waveguides covered by this publication are shown in Tables 1 and 2. The preferred types are shown in Table 2. As it might be desirable to use circular waveguides of intermediate sizes, Table 3 has been added in which the latter types are included.

4.2 Type designation

For these waveguides, the type designation comprises:

- The code: 60153 IEC-C
- A number characterizing a particular size of waveguide. This number expresses 'approximately in multiples of 100 MHz the geometric mean frequency in the H₁₁ (TE₁₁) mode.

4.3 Frequency range

In Table 2, the cut-off frequencies are shown for the following modes:

 TE_{11} , TM_{01} , TE_{21} , TE_{01} and TE_{02} .

5 Mechanical requirements

5.1 General

It should be noted that no recommendations are made for the materials to be used for waveguides. The choice of material must be agreed between customer and manufacturer.

5.2 Dimensions

5.2.1 Basic diameter and deviations

The basic diameters (inner diameters) and the deviations are specified in Table 1.

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Table 1 - Basic diameter and deviations



Dimensions in millimetres Cut-off frequency in GHz for the mode Theoretical value of attenuation in dB/m Type Inside cross-section Basic Outside cross-section Frequency signation TE11 TF02 wall Standard Basic diameter Dcviation Alminium Gold Cupper 0.0007 60153 IEC thickno in GHz 0.325 3.3 647.90 0.32 0 41 0.53 0.66 1 21 553 49 0.56 0.38 0.0009 0.0011 0.0010 0.00129 0.77 0.62 472.85 0.0011 0.37 0.48 1.42 0.48 0.446 0.0013 0.0012 0.0016 0.57 0.72 0.90 1.66 403.94 0.0014 0.0017 0.0015 0.0021 C 6.2 C 7 0.51 1.06 345.06 0.36 0.611 0.0017 0.0021 0.0020 0.0026 0.66 0.84 1.94 0.60 0.78 0.99 1.24 2.27 294.79 0.30 For subsequent study 0.715 0.0022 0.0027 0.0025 0.0033 8 0.70 0.91 1.16 1.45 2.66 251.84 0.25 0.838 0.0028 0.0034 0.0031 0.0042 C 10 1.70 0.0035 0.82 1.07 1.35 3.11 215.14 0.98 0.0044 0.0040 0.0053 0.22 C 12 0.0045 0.0067 0.96 1.25 1.59 1.99 183.77 0.18 1.147 0.0055 0.0051 3.64 14 1.12 1.46 1.86 2.33 4.26 157.00 0.16 1.343 0.0070 0.0064 0.0085 C 16 C 18 1.31 1.71 2.17 2.73 4 90 134.11 0.13 1.572 0.007 0.0089 0.0081 0.0108 2.00 121.21 0.13 1.8410 1.53 2.54 3.19 5.84 114.58 0.11 3.3 0.009 0.011 0.010 0.0136 C 22 1.79 2.34 2.98 3.74 6.84 97.87 0.10 3.3 104.50 0.10 2.1540 0.011 0.014 0.013 0.017 C 25 2.10 2.74 3.49 8.01 83.617 0.081 2.5210 0.015 0.018 0.016 0.022 4.37 3.3 90.20 0.10 30 2.46 3.21 4.08 5.12 71.425 0.071 78.029 0.089 2.9520 0.018 0.023 0.021 0.028 C 35 2.88 3.76 4.77 5.99 11.00 61.036 0.061 3.3 67.640 0.089 3.4550 0.023 0.029 0.026 0.035 40 7.03 51.994 0.051 57.074 0.089 4.0560 0.030 0.037 0.034 0.045 C 48 3.95 5.16 6.56 8.23 15.10 44,450 0.043 2.5 49.530 0.076 4.7440 0.037 0.046 0.042 0.056 56 4.61 6.02 7.65 9.60 17.60 38.100 0.038 2.0 42.164 0.076 5.5340 0.047 0.059 0.053 0.071 C 65 5.40 7.05 8.96 11.20 20.60 32.537 0.033 2.0 36.601 0.076 6.4800 0.060 0.074 0.068 0.090 0.028 C 76 6.32 8.26 10.50 13.20 24.10 31.090 0.076 7.5880 0.094 0.086 C 89 7.37 9.63 12.20 15.30 28.10 23.825 0.023 1.7 27.127 0.064 8.8500 0.10 0.12 0.11 0.144 C 104 8.68 11.30 14.40 18.10 20.90 33.10 20.244 0.020 22.784 0.064 10.42 0.12 0.15 0.14 0.18 C 120 10.00 13.10 16.70 12.07 0.15 0.19 0.17 0.23 C 140 11.60 15.20 19.30 24.20 0.015 1.21^{17.120} 0.051 13.98 0.11 0.13 0.12 0.16 te **a** 112.700 13.80 18.10 28.80 52.70 0.013 0.051 0.25 0.30 0.28 0.37 22.90 C 190 15.80 20.60 26.20 32 90 60.20 11 125 0.010 1 0 13 106 0.051 18 95 0.30 0.37 0.34 0.45 0.47 0.57 18.40 0.76 0.38 0.43 C 220 24.10 30.60 38.40 70.30 9.525 0.010 11.049 0.051 22.14 8 3312 0.007 0 76 C 255 21 10 27.50 35.00 43 90 80 4C 9.855 0.051 25 31 0.46 0.57 0.52 0.69 atza**1374** st/0176 e08d8.661 0.051 91d(29.54 0.58 0.72 0.66 24.60 32.20 93.80 tandologo 0.88 C 290 40,80 151.20 6.3500 5.5626 27.70 36.10 45.90 57.60 105.00 0.0076 0.51 0.51 7.366 0.051 33.20 0.7 0.86 0.79 1.04 hd/ie6.0676 2017 C 380 31.60 41.30 52.40 65.70 120.00 6.579 0.051 37.91 0.8 1.0 0.96 1.27 C 430 36.80 48.10 61.00 76.60 140.00 4.7752 0.0076 0.51 5.791 0.051 44.16 40.20 52.50 153.00 1.2 C 495 66.70 83.70 4.3688 0.0076 0.51 5.385 0.051 48.26 1.5 1.4 1.8 C 580 102.00 3.5814 49.10 64.10 81.40 187.00 0.0076 0.51 4.597 0.051 58.88 C 660 55.30 72.30 91.80 115.00 211.00 3.1750 0.0076 0.38 3 937 0.051 66.41 2.0 2.4 2.2 3.0 0.0076 3.531 0.051 C 765 63.50 82.90 105.00 132.00 242.00 2.7686 C 890 73.60 96.10 122.00 153.00 280.00 2.3876 0.0076 3.150 88.30 3.0 3.7 3.4 4.5 0.051 2.0244 0.007 104.16 C1040 86.8 113 144 181 331 3.9 4.8 4.4 5.8 100 131 167 209 1.7475 4.9 6.1 5.5 C1650 0.007 C 1400 193 1.7628 0.007 116 242 139. 3.8 0.007 329 1900 158 206 262 602 1.1125 0.007 189. 9.5 11.7 10.7 14.2 184 241 306 384 12.0 14.9 C 2200 703 0.9525 0.007 220. 13.6 18.1 211 275 350 439 0.007 21.9 C 2550 804 0.8331 253.2 14.6 18.1 16.5 322 408 512 0.7137 22.9 C 2900 246 938 0.007 295. 18.5 20.9 27.8 C 3300 277 361 459 576 1050 0.6350 0.007 332. 21.9 27.1 24.8 32.9 316 413 657 3800 524 1200 0.5563 0.007 379. 26.7 33.2 30.3 40.2 C 4300 368 481 610 766 1400 0.4775 0.007 441. 33.6 41.7 38 1 50.6 402 4950 525 667 837 1530 0.4369 0.0076 If necessary, outside dimension 482. 38.5 47.8 43.6 58.0 5800 491 641 814 1020 1870 0.3581 0.0076 589. 51.7 64.1 77.8 6600 553 723 918 1150 2110 0.3175 0.007 663.6 62.2 77.2 70.5 93.6 2 7650 829 1050 1320 2420 0.2769 0.007 94.4 86.2 114.5 635 2900 736 961 1220 1530 2800 0.2388 0.007 883 95 118 108 143.2 210400 1130 1810 3310 0.2024 0.007 1041.6 122 151 138 868 183 C16500 1000 1310 1670 209 383 0.1748 0.007 120 155 192 175 233 C 14000 1160 1520 1930 2420 0.1763 0.007 1392 107 133 122 162 16500 1380 1810 5270 0.1270 0.007 165 247 307 280 3290 19000 1580 2060 2620 602 0.1113 0.007 189 299 371 339 450 3840 22000 2410 431 573 25500 2110 2750 0.0833 0.007 2532 461 572 522 3500 4390 8040 694 29000