BS EN 60154-1:2016

BSI Standards Publication

Flanges for waveguides

Part 1: General requirements

bsi.

National foreword

This British Standard is the UK implementation of EN 60154-1:2016. It is identical to IEC 60154-1:2016. It supersedes BS EN 60154-1:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/46, Cables, wires and waveguides, radio frequency connectors and accessories for communication and signalling.

A list of organizations represented on this committee can be obtained on request to its secretary.

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European foreword

The text of document 46F/304/CDV, future edition 3 of IEC 60154-1, prepared by SC 46F "RF and microwave passive components", of IEC/TC 46 "Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60154-1:2016.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2017-03-22
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2019-06-22

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60050	series	International Electrotechnical Vocabulary (IEV)	-	-
IEC 60068	series	Environmental testing	EN 60068	series
IEC 60153	series	Hollow metallic waveguides	EN 60153	series

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FLANGES FOR WAVEGUIDES –

Part 1: General requirements

FOREWORD

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International Standard IEC 60154-1 has been prepared by subcommittee 46F: RF and microwave passive components, of IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories.

This third edition cancels and replaces the second edition published in 1982. This edition constitutes a technical revision.

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

a) define the alignment pin and hole for waveguide alignment;
b) specify the dimensions in the metric system.

The text of this standard is based on the following documents:

CDV	Report on voting
46F/304/CDV	46F/318/RVC

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

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

A list of all parts in the IEC 60154 series, published under the general title *Flanges for waveguides*, can be found on the IEC website.

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

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

INTRODUCTION

This International Standard relates to straight hollow metallic tubing for use as waveguides in electronic equipment. In recent years, the operation frequency of waveguide components and systems has been extended to 1 THz and above. However, the IEC 60154 series of standards for flanges for waveguides, currently specifies the interface design up to 40 GHz for rectangular waveguides. In addition to this, the current issues of the IEC 60154 series of standards were issued in the 1970's and do not meet the needs of current applications. This new edition of IEC 60154-1 addresses these two issues.

FLANGES FOR WAVEGUIDES –

Part 1: General requirements

1 Scope

This part of IEC 60154 specifies the dimensions of waveguide flanges for use in electronic equipment.

It covers requirements for flanges drilled before or after mounting on waveguides. It should be noted that for optimum electrical performance, post-drilling of the alignment holes after mounting is recommended.

The aim of this standard is to specify for waveguide flanges the mechanical requirements necessary to ensure compatibility and, as far as practicable, interchangeability as well as to ensure adequate electrical performance.

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 (all parts), *International Electrotechnical Vocabulary* (available at <http://www.electropedia.org/)

IEC 60068 (all parts), *Environmental testing*

IEC 60153 (all parts), *Hollow metallic waveguides*

3 Terms and definitions

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

4 General

4.1 Flange designation

Waveguide flanges covered by this standard shall be indicated by a reference number comprising the following information:

a) the number of the present IEC publication (60154);

b) the letters “IEC";

c) a dash;

d) a letter relating to the basic construction of the flange style, i.e.:

P = a flange having a gasket groove but no choke groove (formerly called pressurizable);

C = a choke flange with a gasket groove (formerly called choke, pressurizable);

U = a flange having neither a gasket groove nor a choke groove (formerly called unpressurizable[1]);

e) a letter for the type according to the drawing. Flanges with the same letter and of the same waveguide size can be mated;

f) the letter and number of the waveguide for which the flange is designed.

Example:

"60154 IEC-CBR 100" denotes a choke flange of type B for ordinary rectangular waveguide 60153 IEC-R 100.

4.2 Standard atmospheric conditions for testing

Unless otherwise specified, all tests shall be carried out under standard atmospheric conditions for testing as specified in IEC 60068.

Before the measurements are made, the flanges shall be stored at the measuring temperature for a time sufficient to allow the entire waveguide to reach this temperature.

When measurements are made at a temperature other than the specified temperature, the results shall, where necessary, be corrected to the specified temperature. The ambient temperature at which the measurements are made shall be stated in the test report.

4.3 Visual inspection

Waveguide flanges shall be uniform in composition. There shall be no burrs, cracks, die marks, dirt, grease, scale nor splinters.

Contact surfaces shall have a clean appearance in accordance with good current practice.

Compliance is checked by visual inspection.

5 Mechanical requirements

5.1 General requirements both for mounted and unmounted flanges

5.1.1 Holes

Holes which are intended as alignment holes shall be precision drilled and clearly indicated on the drawing.

Holes which are not intended for alignment, i.e. attachment holes, may be less accurately located than are the alignment holes, but shall then be of correspondingly larger diameter to ensure mating of the flanges (see 5.1.3).

5.1.2 Shank diameter of bolts used for alignment

The basic shank diameters are standardized, as given in Table 1:

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1 All flat flanges shall have this designation, including those that can be made pressure tight by using gaskets.

Table 1 – Shank diameters

mm
8,0
6,35
5,0
4,17
4,0
3,0

The deviation on the basic shank diameter shall be according to ISO fit h8.

5.1.3 Relation between shank or alignment pin and alignment hole diameters

For each individual flange, the proper mating of two flanges is ensured by specifying:

a) the location and the basic diameters of the holes and the deviations thereon;

b) the basic diameters of the shanks of coupling bolts with the appropriate fit.

The basic diameter of the holes shall be the same as that of the corresponding bolt shank or alignment pin.

The deviation on the hole diameter shall be specified for an ISO grade 9 fit for the alignment holes and for the corresponding ISO grade 15 fit for the attachment holes.

The positional tolerance on the holes shall be specified using either the rectilinear or the circular tolerancing method. Depending upon which method is used, the clearance between the maximum shank diameter (d_{max}) and the minimum hole diameter (D_{min}) shall conform to one of the following (the inequality sign prevents the possibility of an interference fit):

Rectilinear tolerances:

$$D_{min} - d_{max} > (2\sqrt{2})\delta$$

where

δ is the hole position tolerance in both directions;

D_{min} is the minimum hole diameter;

d_{max} is the maximum shank diameter.

NOTE The multiplication factor of $\sqrt{2}$ takes into account the displacement in two directions perpendicular to each other.

Circular tolerances:

$$D_{min} - d_{max} > Z$$

where

Z is the diameter of the circular tolerance zone.

5.1.4 Overall dimensions and thickness of flanges

The values quoted are taken from established designs and it should be noted that these values are based in general on the use of brass, but for other materials other values might be more appropriate.

5.1.5 Surface roughness of contact area of contact flanges

For subsequent study.

5.1.6 Flatness of contact area

The requirements on the flatness of the contact area shall be specified in the relevant specification.

5.1.7 Perpendicularity of the axis of the holes

The perpendicularity of the axis of the holes to the contact area of the flange shall be 90° ± 1/4°.

NOTE When the circular tolerancing method is applied to the position of the holes, a perpendicularity requirement is implied.

5.1.8 General requirements for mounted flanges (assemblies)

5.1.8.1 Positioning of the holes

Positioning of the holes shall be based on the theoretical symmetry lines of the inside cross-section of the waveguide.

5.1.8.2 Perpendicularity of the contact area

The perpendicularity of the contact area of the flange to the axis of the waveguide shall be 90° ± 1/4°.

5.2 Additional requirements for unmounted flanges

5.2.1 General

The drawings shown are for mounted flanges.

In the individual drawings, one or more methods are shown for the mounting of flanges to the waveguide by way of example.

This, however, does not exclude other methods of mounting.

5.2.2 Shape of aperture

The requirements for the dimensions of the aperture in the flange only apply to that part which affects mating between the flange and the waveguide.

The basic dimensions of the flange aperture shown in the tables are equal to the basic outside dimensions of the tubes according to the IEC 60153 series.

The deviation on the dimensions of the aperture will depend on the materials and the assembly methods and shall therefore be agreed upon between purchaser and manufacturer.

For socket-types, the front-aperture shall have dimensions within the tolerances specified for the inside cross-section of the appropriate size of waveguide.

5.2.3 Positioning of the holes

Positioning of the holes is based on the symmetry lines of the aperture of the flange.

5.2.4 Ordering information

When ordering unmounted flanges, an allowance should be made on certain specified dimensions to permit, if necessary, machining after mounting.

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