IEC 60154-4

Edition 2.0 2017-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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Flanges for waveguides –
Part 4: Relevant specifications for flanges for circular waveguides

Brides pour guides d'ondes –
Partie 4: Spécifications particulières applicables aux brides pour guides d'ondes circulaires

IEC 60154-4:2017-03(en-fr)

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ICS 33.120.10

ISBN 978-2-8322-4109-7

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FLANGES FOR WAVEGUIDES –

Part 4: Relevant specifications for flanges for circular waveguides

FOREWORD

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International Standard IEC 60154-4 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 second edition cancels and replaces the first edition published in 1969. This edition constitutes a technical revision.

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

a) revise the estimation for return loss at connection interface of waveguides;
b) add two type of waveguide flange for high frequency application, i.e. over 50 GHz;
c) expand the operation frequency range up to 3,3 THz;
d) rename the frequency band over R1200, i.e. R1.2K.

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

CDV	Report on voting
46F/346A/CDV	46F/358/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 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 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- withdrawn,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
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FLANGES FOR WAVEGUIDES –

Part 4: Relevant specifications for flanges for circular waveguides

1 Scope

This part of IEC 60154-4 specifies the dimensions of flanges for circular waveguides for use in electronic equipment.

It covers requirements for flanges drilled before or after mounting on waveguides.

The aim of this document 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 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.

IEC 60154-1:2016, *Flanges for waveguides – General requirements*

3 Terms and definitions

No terms and definitions are listed in this document.

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 flanges for circular waveguides covered by this document is shown in Figures B.1 to B.4.

Dimensions of flanges for preferred waveguide sizes are given in Table A.1.

Dimensions of flanges for both intermediate and preferred waveguide sizes are given in Table B.1.

4.2 Type designation

For the standardized types of flanges, the type designation comprises:

- the code: 60154 IEC;

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- a dash;
- a letter relating to the basic construction of the flange, viz.:
  - P = pressurizable
  - U = unpressurizable
- a letter for the type according to the drawing;
- the letter and number of the waveguide for which the flange is designed.

EXAMPLE 60154 IEC – PJC 18 denotes a pressurizable type flange for circular waveguide 60153 IEC – C 18.

5 Mechanical requirements

5.1 General requirements both for assemblies and for unmounted flanges

5.1.1 Materials

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

The cross-section of the circlip shown in Figures B.1. to B.4 is given for information only. The actual cross-section may assume any shape that does not adversely affect the mating of the flanges.

5.1.2 Locating holes

Not applicable, because location is not effected by bolts and holes.

5.1.3 Shank diameter of fixing bolts used for location

Not applicable, because location is not effected by bolts and holes.

5.1.4 Relation between shank and locating hole diameters

Not applicable, because location is not effected by bolts and holes.

5.1.5 Over-all dimensions and thickness of flanges

The over-all dimensions and thickness of flanges shall conform to the requirements specified in IEC 60154-1.

5.1.6 Surface roughness of contact area of contact flanges

The surface roughness of contact area of contact flanges shall conform to the requirements specified in IEC 60154-1.

5.1.7 Flatness of contact area

The flatness of contact area shall be better than the values given in Table 1.

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Table 1 – Flatness of contact area

Range of Type C waveguide size	Requirements
	mm
C 14 and larger dimensions	For subsequent study
C 16 to C 28.7	0,03
C 30 to C 53.9	0,02
C 56 to X 136	0,01
C 140 and smaller dimensions	For further study

5.2 General requirements for assemblies

5.2.1 Positioning of the holes

Positioning of the holes shall be as shown in Figures B.1 to B.4 and in Tables 1, A.1 and B.1.

5.2.2 Perpendicularity of the contact area

As specified in IEC 60154-1, the perpendicularity of the contact area of the flange to the axis of the waveguide shall be 90° ± 1/4°.

5.3 Additional requirements for unmounted flanges

5.3.1 General

Figures B.1 to B.4 are for mounted flanges. In the individual drawings, the through type mounting of flanges to the waveguide is shown by way of example. This, however, does not exclude another method of mounting if the actual dimensions allow this.

It should be noted that for optimum electrical performance, post-drilling of the alignment holes after mounting is recommended.

5.3.2 Shape of aperture

The shape of aperture shall conform to the requirements specified in IEC 60154-1.

5.3.3 Positioning of the holes

Positioning of the holes shall be as shown in Figures B.1 to B.4 and in Tables 1, A.1 and B.1.

5.3.4 Ordering information

When ordering unmounted flanges, an allowance should be made on certain of the specified dimensions to cover the effects of possible machining after mounting.

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Annex A
(normative)

Dimensions of flanges for preferred waveguide sizes

The values given in Table A.1 are the basic (nominal) values of the outside cross-section of the waveguide according to IEC 60153 (all parts), and should be regarded as nominal values for the aperture according to IEC 60154-1:2016, 5.2.2, and they apply to unmounted flanges only.

When the outside D1 of circular waveguide sizes C 18, C 22, and C 25 are standardized, it may be necessary to modify some dimensions of these flanges to ensure compatibility with the waveguide.

The outer diameters D1 for waveguide sizes C 30 to C 89 were increased some time after the major dimensions in this document were approved and the gasket grooves may, in some cases, cut into the waveguide wall. It will be necessary in such cases to machine the gasket groove after assembly. Alternatively, a socket type flange could be used.

Each flange is comprised of a castellated ring and a part which is fixed to the waveguide. For this series of flanges, location depends on the fit between each castellated ring and both fixed parts. The diameter of the fixed part is called “shaft” in the table and the diameter of the castellated ring aperture is called “hole”. The fit between these dimensions is ISO F7/h7 for sizes C 18 up to C 140.

Example: Flange 60154 IEC – PJC 18

- The maximum shaft diameter is 133,00 mm.
- The minimum shaft diameter is 132,960 mm.
- The maximum hole diameter is 133,083 mm.
- The minimum hole diameter is 133,043 mm.

The actual position of any hole shall be within a tolerance zone diameter ϕ of 0,4 mm, concentric to the theoretical position of the hole.

The symbol ◎ indicates the maximum eccentricity of the flange dimension C with respect to the waveguides inside cross-section dimension D (see IEC 60153-4).

The figures given in Table A.1, which are given for information only, are calculated maximum values of the axial offset resulting from the most unfavourable combinations of deviations and eccentricities.

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Table A.1 – Dimensions of pressurizable type J flanges for circular waveguides (preferred sizes)

Dimensions in millimetres

Type designation of waveguide flange		To be used with waveguide 153 IEC	Figure	*D*1	*P*			*X*	*B*			*C*					*E*	◎	Offset of axis
					Basic	Deviation			Basic	Deviation		Basic	Shaft deviation		Hole deviation				
						Upper	Lower			Upper	Lower		Upper	Lower	Upper	Lower			
154-PJC	18	C 18	B.1	For subsequent study	158,0	+0,5	-0,5	For subsequent study	126,0	+0,2	-0,2	133,0	0	-0,04	+0,083	+0,043	144,0	0,05	0,22
	22	C 22	B.1		141,0	+0,5	-0,5		109,0	+0,2	-0,2	116,0	0	-0,035	+0,071	+0,036	127,0	0,05	0,21
	25	C 25	B.1		127,0	+0,5	-0,5		95,0	+0,2	-0,2	102,0	0	-0,035	+0,071	+0,036	113,0	0,05	0,21
	30	C 30	B.2	78,029	114,0	+0,4	-0,4		82,0	+0,2	-0,2	90,0	0	-0,035	+0,071	+0,036	100,5	0,05	0,21
	35	C 35	B.2	67,64	103,0	+0,4	-0,4		71,0	+0,2	-0,2	78,0	0	-0,03	+0,060	+0,030	89,0	0,05	0,19
	40	C 40	B.2	57,074	94,0	+0,4	-0,4		62,0	+0,2	-0,2	69,0	0	-0,03	+0,060	+0,030	80,0	0,05	0,19
	48	C 48	B.3	49,53	87,0	+0,4	-0,4		55,0	+0,2	-0,2	62,0	0	-0,03	+0,060	+0,030	73,0	0,05	0,19
	56	C 56	B.3	42,164	81,0	+0,4	-0,4		49,0	+0,2	-0,2	56,0	0	-0,03	+0,060	+0,030	67,0	0,05	0,19
	65	C 65	B.3	36,601	75,0	+0,4	-0,4		43,0	+0,2	-0,2	50,0	0	-0,025	+0,050	+0,025	61,0	0,05	0,17
	76	C 76	B.4	31,09	69,0	+0,4	-0,4		37,0	+0,2	-0,2	44,0	0	-0,025	+0,050	+0,025	55,0	0,05	0,17
	89	C 89	B.4	27,127	65,0	+0,4	-0,4		33,0	+0,2	-0,2	40,0	0	-0,025	+0,050	+0,025	51,0	0,05	0,17
	104	C 104	B.4	22,784	62,0	+0,4	-0,4		30,0	+0,2	-0,2	37,0	0	-0,025	+0,050	+0,025	48,0	0,05	0,17
	120	C 120	B.4	20,015	59,0	+0,4	-0,4		27,0	+0,2	-0,2	34,0	0	-0,025	+0,050	+0,025	45,0	0,04	0,15
	140	C 140	B.4	17,12	56,0	+0,4	-0,4		24,0	+0,2	-0,2	31,0	0	-0,025	+0,050	+0,025	42,0	0,04	0,15
Note	The footnotes for this table are contained in Annex A.																		

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Annex B
(normative)

Dimensions of flanges for both intermediate and preferred waveguide sizes

The designations given for the preferred sizes were rounded off before the intermediate sizes were given their designations. This accounts for the small step which occasionally occurs between a preferred size designation and an adjacent intermediate size designation.

These values are the basic (nominal) values of the outside cross-section of the waveguide according to IEC 60153 (all parts) and should be regarded as nominal values for the aperture according to IEC 60154-1:2016, 5.2.2, and they apply to un mounted flanges only.

When the outside diameters D1 for preferred waveguide sizes C 18, C 22, C 25 and the intermediate sizes in Table B.1 are standardized, it may be necessary to modify certain dimensions of these flanges to ensure compatibility with the waveguide.

The outer diameters D1 for waveguide sizes C 30 to C 89 were increased some time after the major dimensions in this document were approved and the gasket grooves may, in some cases, cut into the waveguide wall. It will be necessary in such cases to machine the gasket groove after assembly. Alternatively, a socket type flange could be used.

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The symbol ◎ indicates the maximum eccentricity of the flange dimension C with respect to the waveguide inside cross-section dimension D in IEC 60153-4.

These figures, which are given for information only, are calculated maximum values of the axial offset resulting from the most unfavourable combinations of deviations and eccentricities.

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