BS EN 60154-2:2016

BSI Standards Publication

Flanges for waveguides

Part 2: Relevant specifications for flanges for ordinary rectangular waveguides

National foreword

This British Standard is the UK implementation of EN 60154-2:2016. It is identical to IEC 60154-2:2016. It supersedes BS EN 60154-2:1997 which is withdrawn.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.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Date	Text affected

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NORME EUROPÉENNE

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English Version

Flanges for waveguides - Part 2: Relevant specifications for flanges for ordinary rectangular waveguides (IEC 60154-2:2016)

Brides pour guides d'ondes - Partie 2: Spécifications applicables relatives aux brides pour guides d'ondes rectangulaires normaux
(IEC 60154-2:2016)

Flansche für Hohlleiter - Teil 2: Allgemeine Anforderungen an Flansche für Rechteck-Hohlleite
(IEC 60154-2:2016)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

The text of document 46F/305/CDV, future edition 3 of IEC 60154-2, 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 60154-2:2016.

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) 2017-05-25
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2019-11-25

This document supersedes EN 60154-2:1997.

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The text of the International Standard IEC 60154-2:2016 was approved by CENELEC as a European Standard without any modification.

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_-- Part_102: Mathematics_- General concepts and linear algebra		series
IEC 60153-2	2016	Hollow metallic waveguides - Part 2: Relevant specifications for ordinary rectangular waveguides	EN 60153-2	2016
ISO/IEC Guide 98-3	2008	Uncertainty of measurement -- Part 3:- Guide to the expression of uncertainty in measurement (GUM:1995)		-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FLANGES FOR WAVEGUIDES –

Part 2: Relevant specifications for flanges for ordinary rectangular waveguides

FOREWORD

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International Standard IEC 60154-2 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 1980. 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 R 1200, i.e. R1,2k.

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

CDV	Report on voting
46F/305/CDV	46F/319/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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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, series of standards for flanges for waveguides, currently specifies the interface designs up to 40 GHz for rectangular waveguide. 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 60154-2 addresses these two issues by extending the frequency coverage to 3 300 GHz and by addressing current applications for this type of waveguide.

FLANGES FOR WAVEGUIDES –

Part 2: Relevant specifications for flanges for ordinary rectangular waveguides

1 Scope

This part of IEC 60154 specifies the dimensions of flanges for ordinary rectangular waveguide 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 60153-2:2016, *Hollow metallic waveguides – Part 2: Relevant specifications for ordinary rectangular waveguides*

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

3 Terms and definitions

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

4 General

4.1 Standardized types

The series of flanges for ordinary rectangular waveguides covered by this standard are shown in Tables 5 to 9 and Figures 1 to 29.

Flat flanges can be used with metal plate air seal gaskets or shims (an example is shown in Figure 13).

4.2 Flange designation

Waveguide flanges covered by the 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, flange style, viz:

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 flange 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 – UDR 120" denotes a flange without a gasket groove of Type D, for use with rectangular waveguide 60153 IEC – R 120.

5 Mechanical requirements

5.1 Dimensions

5.1.1 Alignment holes

Holes which are intended as alignment holes are clearly indicated in the drawings and shall be precision drilled. These alignment holes shall be those which are the nearest to the narrow side of the waveguide.

Holes which are not intended as alignment holes may be less accurately located than are the alignment holes, but shall be of correspondingly larger diameter to ensure mating of the flanges.

5.1.2 Shank diameter of fixing bolts used for alignment

The basic values and deviations thereon are specified in Tables 1 to 5 and Figures 15 to 21.

5.1.3 Relation between shank and alignment hole diameters

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

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

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

For practical reasons, the ISO fits given in Table 1 are recommended:

[1] All flat flanges shall have this designation, including those that can be made pressure tight by using gaskets as indicated in 4.1.

Table 1 – ISO specifications

Type of flange	Range of size	Fit
Rectangular flanges for type R waveguide	R12 and larger	All
	R 14 – R 32	A9
	R 40 – R 70	B9
	R 84 and smaller	C9
Circular flange for type R waveguide	All	B9

When electrical requirements make it necessary, the hole position tolerance should be reduced and the hole diameter fit to the shank should be improved accordingly.

Actual values are shown in the respective drawings and tables.

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 flanges

For subsequent study.

5.1.6 Flatness of contact area

The flatness of contact area shall be better than the values given in Table 2:

Table 2 – Requirements of root mean square of roughness on the contact area

Range of sizes	Requirement of root mean square of roughness mm
R 12 and larger dimensions	For subsequent study
R 14 – R 26	≤ 0,05
R 32 – R 180	≤ 0,02
R 220 and smaller dimensions	≤ 0,01

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°.

5.1.8 General requirements for assemblies

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

5.1.9 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 by way of example for the mounting of flanges to the waveguide. This, however, does not exclude socket or through-type methods of mounting if the actual dimensions allow this. For flanges having a choke groove, the socket type method should be used.

In the case of flange sizes PDR 3 to PDR 12 inclusive and UDR 3 to UDR 12 inclusive, the particular cross-section of the flanges to be used is left to the discretion of the individual user.

For the grooved flanges, a rectangular gasket is employed. An example is shown in Figure 14. The dimensions of the grooves and gaskets for flange sizes PDR 3 to PDR 12 inclusive have been left for subsequent study.

The flanges are designed for copper alloys, aluminium alloys and magnesium alloys. The particular type of alloy and finish is to be specified by the user. Unless otherwise specified, means shall be provided to reduce to a minimum galvanic or other corrosive action. The particular type of gasket and gasket material is to be specified by the user.

For pre-drilled flanges, the positioning of the holes should be based on the theoretic symmetry lines of the flange aperture.

5.2.2 Shape of aperture

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

The basic dimensions of the flange aperture shown in Table 1 are equal to the basic outside dimensions of the tubes according to IEC 60153-2.

The deviations for the dimensions of the aperture will depend on the materials and assembly methods and shall, therefore, be determined by agreement between purchaser and manufacturer.

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

5.2.3 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.

5.3 Information on reflection

The reflections at the flange joint are of three kinds:

a) those caused by the allowed deviations on the internal dimensions of the waveguides;

b) those caused by lateral displacements of the two flange assemblies;

c) those caused by the chokes (in the following, these reflections are not taken into account).

When the deviations on the dimensions of the waveguides (according to IEC 60153-2) and of the assemblies (according to this standard) sum up to cause maximum lateral displacement and maximum changes of the waveguide internal dimensions, the theoretical maximum reflection may be calculated by the ISO/IEC Guide 98-3: 2008 and equation (1):

$$\text{Return loss} = -10\log\left[\left(\frac{\lambda_g{}^2\Delta a}{4a^3}\right)^2 + \left(\frac{\Delta b}{b}\right)^2 + \left(\frac{4{,}934\lambda_g\Delta a'^2}{a^3}\right)^2 + \left(\frac{7{,}8957\Delta b'^2}{\lambda_g b}\right)^2\right] \quad \text{dB} \qquad (1)$$

where

a is the basic inside width of the waveguide;

b is the basic inside height of the waveguide;

λ_g is the waveguide wavelength;

Δa and Δb are the waveguide internal deviations;

$\Delta a'$ and $\Delta b'$ are displacements of the waveguide axes.

NOTE 1 The first term within brackets represents the worst case reflection component at a flange joint caused by changes of the waveguide internal dimensions.

NOTE 2 The second term within brackets represents the reflection component at a flange joint caused by the displacement of the flange assemblies.

At the high end of the waveguide frequency band, the reflection component is maximum when the displacement exists in the short wall direction only.

At the low end of the waveguide frequency band, the reflection component is maximum when the displacement exists in the long wall direction only.

NOTE 3 The maximum reflection at the high end of the waveguide frequency band is smaller than the maximum reflection at the low end of the band for the small magnitude of displacement.

NOTE 4 The "reflection loss" in decibels is given as a positive quantity.

Table 3 – The worst "return loss" in (positive) decibels for waveguides *(1 of 2)*

Flange type	**Type designation IEC 60153-1**	f**_min** in GHz	f**_max** in GHz	**Return loss at** f**_min** in dB	**Return loss at** f**_max** in dB
Type A	R 32	2,6	3,95	48	53
	R 40	3,22	4,9	45	48
	R 48	3,94	5,99	45	47
	R 58	4,64	7,05	45	48
	R 70	5,38	8,17	45	47
Type B	R 84	6,57	9,99	45	47
	R 100	8,2	12,5	45	47
	R 120	9,84	15	45	48
	R 140	11,9	18	46	48
	R 180	14,5	22	45	48
	R 220	17,6	26,7	44	46
	R 260	21,7	33	45	47
	R 320	26,3	40	44	46
Type C	R 220	17,6	26,7	44	46
	R 260	21,7	33	45	47
	R 320	26,3	40	45	46
	R 400	32,9	50,1	45	45
	R 500	39,2	59,6	44	43
Type D	R 14	1,13	1,73	45	48
	R 18	1,45	2,2	45	48
	R 22	1,72	2,61	45	48
	R 26	2,17	3,3	45	48
	R 32	2,6	3,95	45	47
	R 40	3,22	4,9	45	48
	R 48	3,94	5,99	45	47
	R 58	4,64	7,05	45	48
	R 70	5,38	8,17	45	47
	R 84	6,57	9,99	45	47
	R 100	8,2	12,5	45	47
	R 120	9,84	15	45	48
	R 140	11,9	18	46	48
	R 180	14,5	22	45	47
Type E	R 32	2,6	3,95	45	47
	R 40	3,22	4,9	45	48
	R 48	3,94	5,99	45	47
	R 58	4,64	7,05	45	48
	R 70	5,38	8,17	45	47
	R 84	6,57	9,99	45	47
	R 100	8,2	12,5	45	47

Table 3 *(2 of 2)*

Flange type	**Type IEC 60153-1**	***f*_min** in GHz	***f*_max** in GHz	**Return loss at *f*_min** in dB	**Return loss at *f*_max** in dB
Type F	R 400	32,9	50,1	46	48
	R 500	39,2	59,6	45	47
	R 620	50	75	37	40
	R 740	60	90	38	40
	R 900	75	110	37	40
	R 1.2k	90	140	37	40
	R 1.4k	110	170	37	40
	R 1.8k	140	220	37	40
	R 2.2k	170	260	38	40
	R 2.6k	220	330	38	40
	R 3.2k	260	400	36	38
	R 4k	330	500	36	38
	R 5k	400	600	37	38
	R 6.2k	500	750	34	35
	R 7.4k	600	900	29	31
	R 9k	750	1100	27	28
	R 12k	900	1400	24	25
	R 14k	1100	1700	21	22
	R 18k	1400	2200	17	18
	R 22k	1700	2600	14	15
	R 36k	2200	3300	11	11
Type G	R 400	32,9	50,1	46	48
	R 500	39,2	59,6	45	47
	R 620	50	75	37	40
	R 740	60	90	38	40
	R 900	75	110	38	40
	R 1.2k	90	140	37	40
	R 1.4k	110	170	37	40
	R 1.8k	140	220	37	40
	R 2.2k	170	260	38	41
	R 2.6k	220	330	38	40
	R 3.2k	260	400	36	39
	R 4k	330	500	37	39
	R 5k	400	600	38	40
	R 6.2k	500	750	36	33
	R 7.4k	600	900	31	33
	R 9k	750	1100	29	31
	R 12k	900	1400	28	30
	R 14k	1100	1700	26	28
	R 18k	1400	2200	21	23
	R 22k	1700	2600	20	21
	R 36k	2200	3300	17	18

Table 4 – Flange types *(1 of 2)*

<table>
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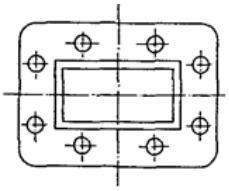
<tr><td>R3</td><td rowspan="19"> 
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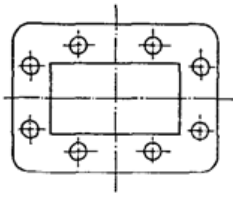
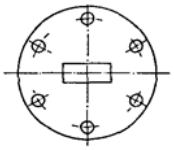
<tr><td>R32</td><td>R32</td><td rowspan="6"> 
Type E</td><td>R32</td><td rowspan="5"> 
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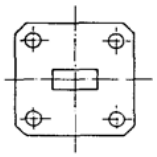
<tr><td>R84</td><td>R84</td><td>R84</td><td rowspan="4"> 
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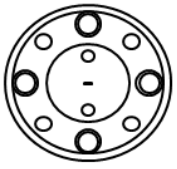
<tr><td>R400</td><td>R400</td><td>R400</td><td rowspan="37"> 
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 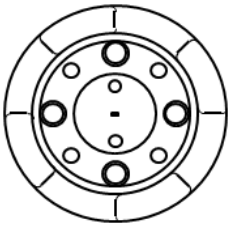
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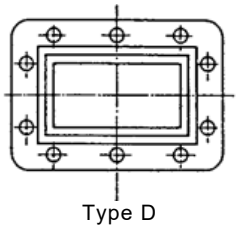
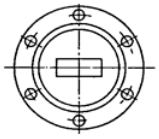
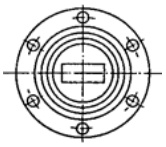
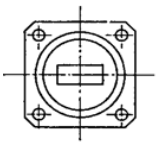
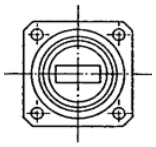
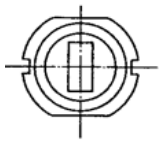
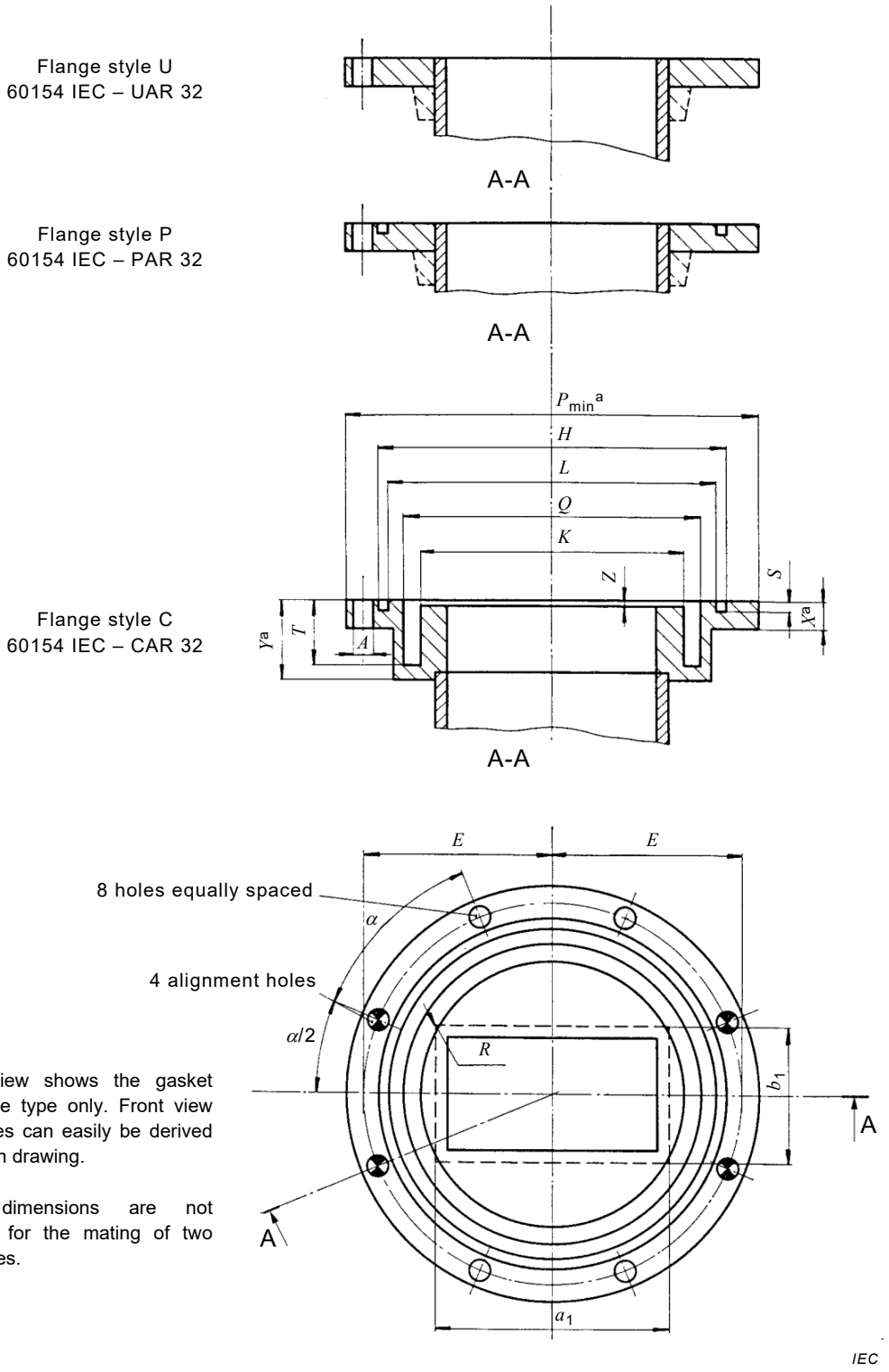
<tr><td>R1.8k</td><td>R1.8k</td><td>R1.8k</td></tr>
<tr><td>R2.2k</td><td>R2.2k</td><td>R2.2k</td></tr>
<tr><td>R2.6k</td><td>R2.6k</td><td>R2.6k</td></tr>
<tr><td>R3.2k</td><td>R3.2k</td><td>R3.2k</td></tr>
<tr><td>R4k</td><td>R4k</td><td>R4k</td></tr>
<tr><td>R5k</td><td>R5k</td><td>R5k</td></tr>
<tr><td>R6.2k</td><td>R6.2k</td><td>R6.2k</td></tr>
<tr><td>R7.4k</td><td>R7.4k</td><td>R7.4k</td></tr>
<tr><td>R9k</td><td>R9k</td><td>R9k</td></tr>
<tr><td>R12k</td><td>R12k</td><td>R12k</td></tr>
<tr><td>R14k</td><td>R14k</td><td>R14k</td></tr>
<tr><td>R18k</td><td>R18k</td><td>R18k</td></tr>
<tr><td>R22k</td><td>R22k</td><td>R22k</td></tr>
<tr><td>R36k</td><td>R36k</td><td>R36k</td></tr>
</table>

Table 4 *(2 of 2)*

Gasket groove; No choke				Gasket groove and choke	
Guided waveguide	**Bride flange**	**Guided waveguide**	**Bride flange**	**Guided waveguide**	**Bride flange**
R3	 Type D	R3		R3	
R4		R4		R4	
R5		R5		R5	
R6		R6		R6	
R8		R8		R8	
R9		R9		R9	
R12		R12		R12	
R14		R14		R14	
R18		R18		R18	
R20		R20		R20	
R26		R26		R26	
R32		R32	 Type A	R32	 Type A
R40		R40		R40	
R48		R48		R48	
R58		R58		R58	
R70		R70		R70	
R84		R84	 Type B	R84	 Type B
R100		R100		R100	
R120		R120		R120	
R140		R140		R140	
R180		R180		R180	
R220	 Type C	R220		R220	
R260		R260		R260	
R320		R320		R320	
R400		R400		R400	
R500		R500		R500	
R620		R620		R620	
R740		R740		R740	
R900		R900		R900	
R1.2k		R1.2k		R1.2k	
R1.4k		R1.4k		R1.4k	
R1.8k		R1.8k		R1.8k	
R2.2k		R2.2k		R2.2k	
R2.6k		R2.6k		R2.6k	
R3.2k		R3.2k		R3.2k	
R4k		R4k		R4k	
R5k		R5k		R5k	
R6.2k		R6.2k		R6.2k	
R7.4k		R7.4k		R7.4k	
R9k		R9k		R9k	
R12k		R12k		R12k	
R14k		R14k		R14k	
R18k		R18k		R18k	
R22k		R22k		R22k	
R36k		R36k		R36k	



This front view shows the gasket groove, choke type only. Front view for other types can easily be derived from the given drawing.

[a] These dimensions are not essential for the mating of two assemblies.

Figure 1 – Flange type A: 60154 IEC-AR 32

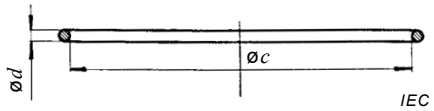
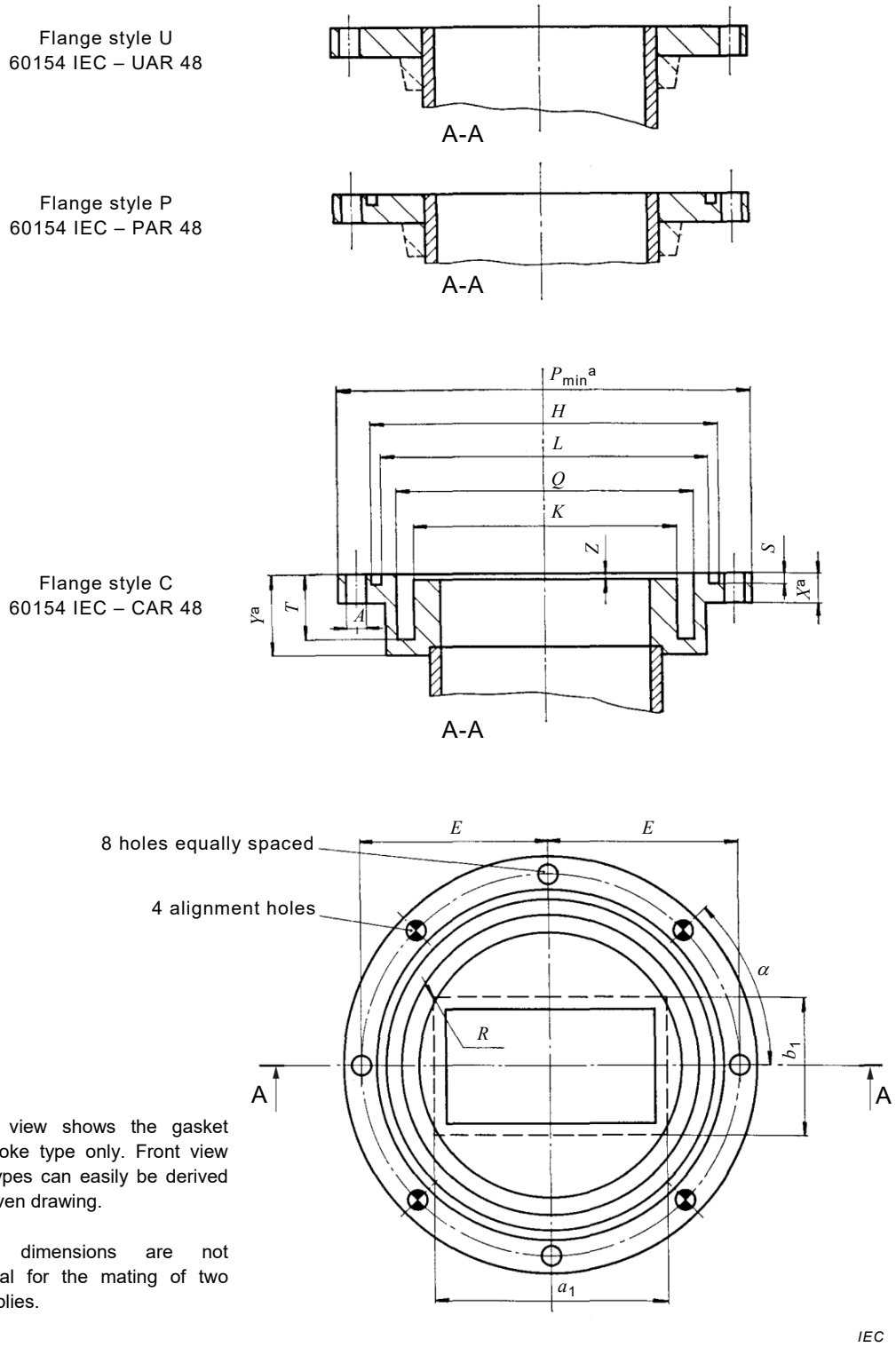


Figure 2 – Flange type A: 60154 IEC-AR 32 gasket



This front view shows the gasket groove, choke type only. Front view for other types can easily be derived from the given drawing.

[a] These dimensions are not essential for the mating of two assemblies.

Figure 3 – Flange type A: 60154 IEC-AR 48

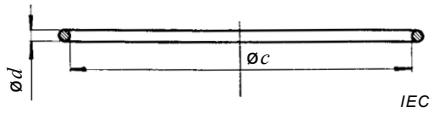
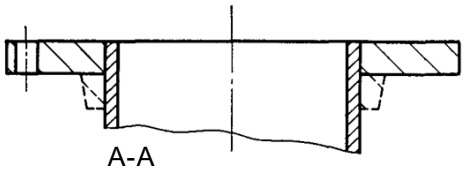
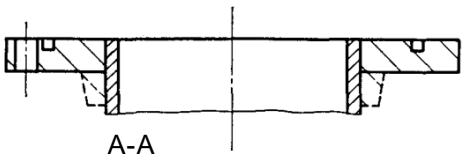


Figure 4 – Flange type A: 60154 IEC-AR 48 gasket

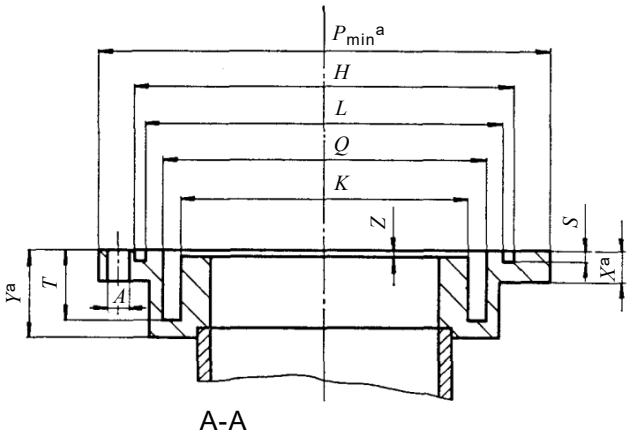
Flange style U
60154 IEC – UAR 58-70

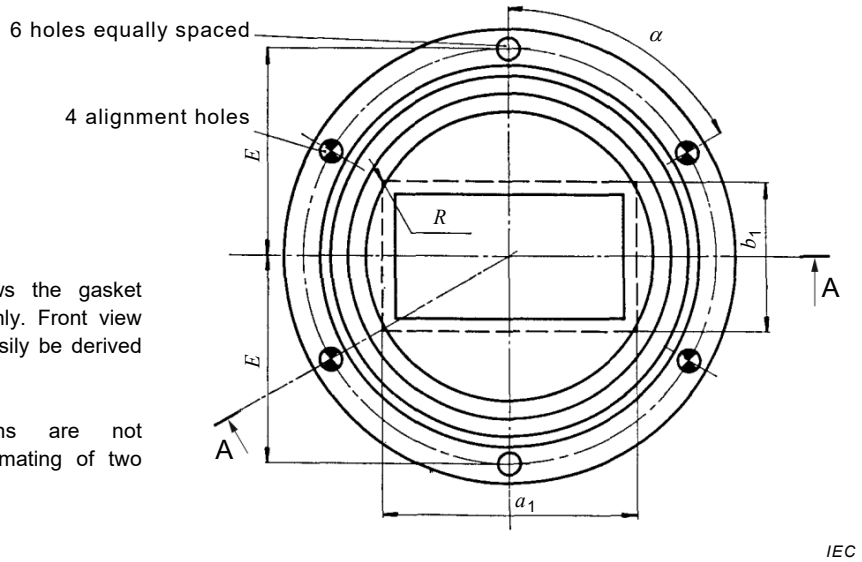


Flange style P
60154 IEC – PAR 58-70



Flange style C
60154 IEC – CAR 58-70





This front view shows the gasket groove, choke type only. Front view for other types can easily be derived from the given drawing.

[a] These dimensions are not essential for the mating of two assemblies.

Figure 5 – Flange type A: 60154 IEC-AR 58-70

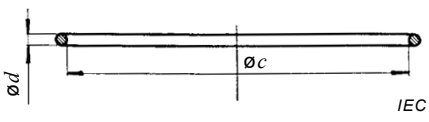


Figure 6 – Flange type A: 60154 IEC-AR 58-70 gasket

Table 5 – Dimensions of type A flange for ordinary rectangular waveguides *(1 of 2)*

Type UAR – without choke or gasket groove																Type PAR – without choke; with gasket groove					
Type designation of waveguide flange 60154 IEC-...	To be used with waveguide 60153 IEC-...	Figure	Alignment holes				a	a	c	c											
			Diameter A_{basic}	ISO – fit	Deviation		a_1	b_1	p_{min}	X	R_{max}	a	Deviation on a in radians ±	$2E$	Deviation on E ±	L	Deviation on L ±	H	Deviation on H ±	S	Deviation on S ±
					Lower	Upper															
Dimensions in millimeters																					
CAR PAR UAR 32	R 32	1	6,350	B9	+0,150	+0,186	76,20	38,10	134,9	7,9	1,0	45°	0,001	120,65	0,05	100,66	0,05	112,95	0,05	4,42	0,10
40	R 40		For subsequent study	B9	For subsequent study		61,42	32,33	For subsequent study												
48	R 48	3	5,000	B9	+0,140	+0,170	50,80	25,40	92,2	6,4	0,8	45°	0,0012	82,55	0,05	68,15	0,05	76,17	0,05	2,87	0,10
58	R 58	5	5,000	B9	+0,140	+0,170	43,64	23,44	85,9	6,4	0,8	60°	0,0015	76,20	0,05	59,92	0,05	68,55	0,05	2,67	0,10
70	R 70	5	5,000	B9	+0,140	+0,170	38,10	19,05	79,5	6,4	0,8	60°	0,0015	69,85	0,05	51,08	0,05	60,63	0,05	2,67	0,10
Dimensions in inches																					
CAR PAR UAR 32	R 32	1	0,2500	B9	+0,0060	+0,0074	3,000	1,500	5,31	0,31	0,04	45°	0,001	4,750	0,002	3,963	0,002	4,447	0,002	0,174	0,004
40	R 40		For subsequent study	B9	For subsequent study		2,418	1,273	For subsequent study												
48	R 48	3	0,1970	B9	+0,0050	+0,0062	2,000	1,000	3,63	0,25	0,03	45°	0,0012	3,250	0,002	2,683	0,002	2,999	0,002	0,083	0,004
58	R 58	5	0,1970	B9	+0,0050	+0,0062	1,718	0,923	3,38	0,25	0,03	60°	0,0015	3,000	0,002	2,359	0,002	2,699	0,002	0,105	0,004
70	R 70	5	0,1970	B9	+0,0050	+0,0062	1,500	0,750	3,13	0,25	0,03	60°	0,0015	2,750	0,002	2,011	0,002	2,387	0,002	0,105	0,004

Table 5 *(2 of 2)*

Type designation of waveguide flange 60154 IEC-...	To be used with waveguide 60153 IEC-...	Figure	Type CAR – with choke and gasket groove: Alignment holes: Diameter A_{basic}	ISO – fit	Deviation: Lower	Deviation: Upper	K	Deviation on K ±	Q	Deviation on Q ±	T [b]	Deviation on T ±	Y [b]	Z [b]	Dimensions for gaskets when made of neoprene: c	Deviation on c ±	d	Deviation on d ±	Figure	Dimensions for alignment bolts: Shank diameter	ISO – fit	Deviation: Lower	Deviation: Upper
			Dimensions in millimeters																				
CAR PAR UAR 32	R 32	1	6,350	B9	+0,150	+0,186	84,33	0,05	98,55	0,05	21,84	0,10	25,40	0,91	100,97	0,38	5,34	0,13	2	6,350	h8	–0,022	
CAR PAR UAR 40	R 40		For subsequent study	B9	For subsequent study															For subsequent study	h8	For subsequent study	
CAR PAR UAR 48	R 48	3	5,000	B9	+0,140	+0,170	55,63	0,05	64,93	0,05	14,48	0,10	17,48	0,64	69,44	0,38	3,53	0,10	4	5,000	h8	–0,018	
CAR PAR UAR 58	R 58	5	5,000	B9	+0,140	+0,170	47,37	0,05	55,14	0,05	11,99	0,10	For subsequent study	0,51	59,92	0,25	3,53	0,10	6	5,000	h8	–0,018	
CAR PAR UAR 70	R 70	5	5,000	B9	+0,140	+0,170	40,59	0,05	47,24	0,05	10,29	0,10	12,70	0,43	53,57	0,25	3,53	0,10	6	5,000	h8	–0,018	
			Dimensions in inches																				
CAR PAR UAR 32	R 32	1	0,2500	B9	+0,0060	+0,0074	3,320	0,002	3,880	0,002	0,860	0,004	1,000	0,036	3,975	0,015	0,210	0,005	2	0,2500	h8	–0,0009	
CAR PAR UAR 40	R 40		For subsequent study	B9	For subsequent study															For subsequent study	h8	For subsequent study	
CAR PAR UAR 48	R 48	3	0,1970	B9	+0,0050	+0,0062	2,190	0,002	2,556	0,002	0,570	0,004	0,688	0,025	2,734	0,015	0,139	0,004	4	0,1970	h8	–0,0007	
CAR PAR UAR 58	R 58	5	0,1970	B9	+0,0050	+0,0062	1,865	0,002	2,171	0,002	0,472	0,004	For subsequent study	0,020	2,359	0,010	0,139	0,004	6	0,1970	h8	–0,0007	
CAR PAR UAR 70	R 70	5	0,1970	B9	+0,0050	+0,0062	1,598	0,002	1,860	0,002	0,405	0,004	0,500	0,017	2,109	0,010	0,139	0,004	6	0,1970	h8	–0,0007	

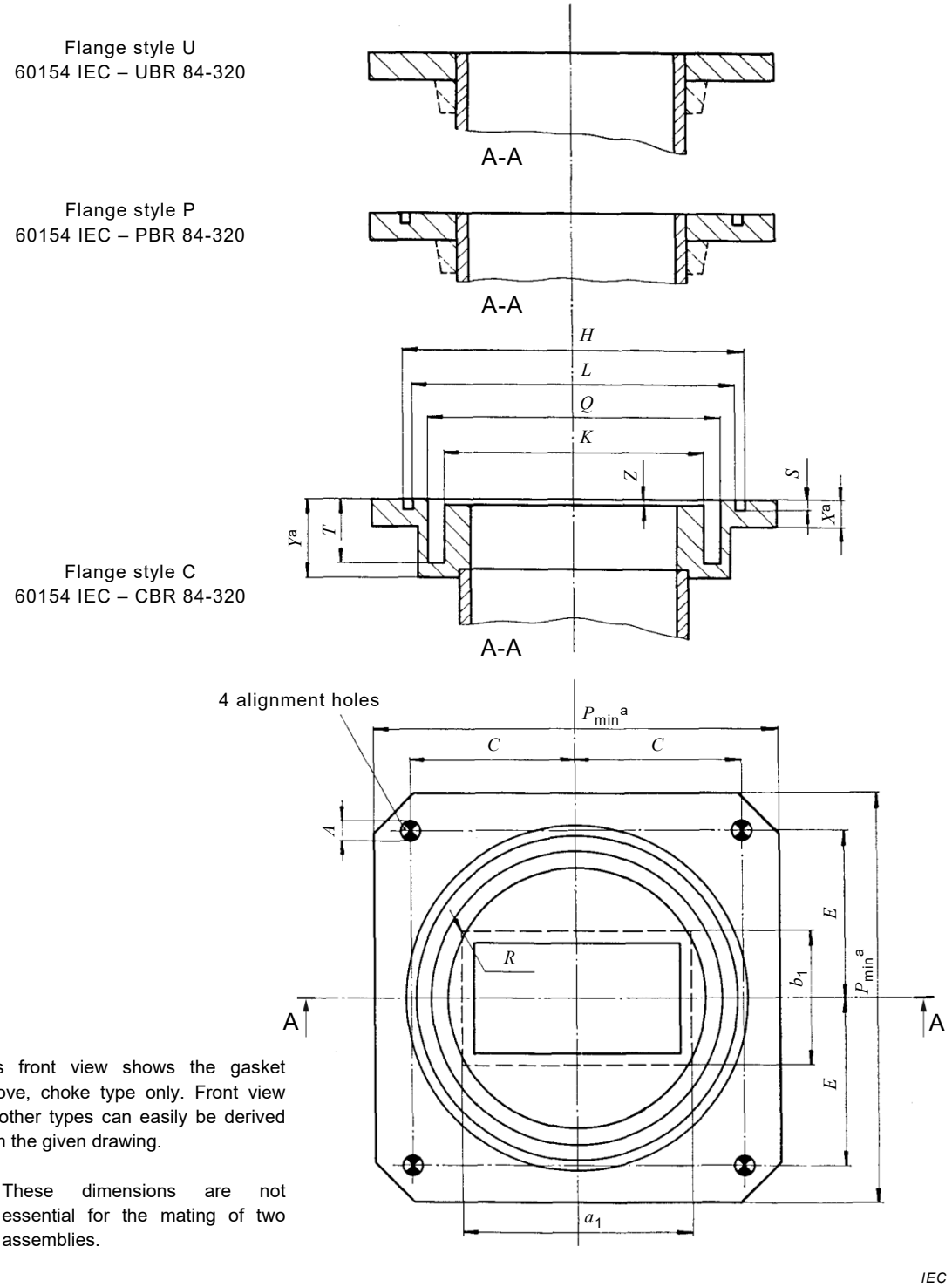
[a] These values are basic values of the outside cross-section of the waveguide according to IEC publication 60153. They should be regarded as basic values for the aperture according to 5.2.2, that apply to unmounted flanges only.

For through-type flanges, the actual range of deviations for the mounting aperture depends on the assembling method and should therefore be agreed between customer and manufacturer.

For socket flanges, the front-aperture shall have dimensions within the deviations specified for the inside cross-section of the appropriate size of wavegide.

[b] These dimensions are given for guidance as being suitable with regard to broadband performance. Actual values should be agreed between customer and manufacturer.

[c] These dimensions are not essential for the mating of two assemblies.



This front view shows the gasket groove, choke type only. Front view for other types can easily be derived from the given drawing.

[a] These dimensions are not essential for the mating of two assemblies.

Figure 7 – Flange type B: 60154 IEC-BR 84-320

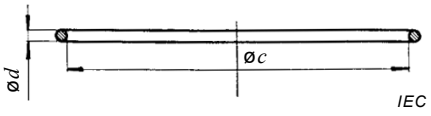


Figure 8 – Flange type B: 60154 IEC-BR 84-320 gasket

Table 6 – Dimensions of type B flange for ordinary rectangular waveguides *(1 of 2)*

Type designation of waveguide flange 60154 IEC-...		To be used with waveguide 60153 IEC-...	Figure	Alignment holes				Type UBR – without choke or gasket groove									Type PBR – without choke; with gasket groove					
				Diameter A_{basic}	ISO – fit	Deviation		a a_1	a b_1	c p_{min}	c X	c R_{max}	$2C$	Deviation on C ±	$2E$	Deviation on E ±	L	Deviation on L ±	H	Deviation on H ±	S	Deviation on S ±
						Lower	Upper															
				Dimensions in millimeters																		
CBR PBR UBR	84	R 84	7	4,170	C9	+0,070	+0,100	31,75	15,88	47,8	6,4	0,80	34,340	0,025	37,440	0,025	39,73	0,05	45,73	0,05	2,13	0,07
	100	R 100	7	4,170	C9	+0,070	+0,100	25,40	12,70	41,4	4,1	0,65	30,990	0,025	32,510	0,025	32,89	0,05	39,39	0,05	2,03	0,07
	120	R 120	7	4,000	C9	+0,070	+0,100	21,59	12,06	For subsequent study												
	140	R 140	7	4,000	C9	+0,070	+0,100	17,83	9,93	33,3	4,8	0,50	25,250	0,025	24,280	0,025	22,66	0,05	29,26	0,05	2,03	0,07
	180	R 180	7	For subsequent study	C9	For subsequent study		14,99	8,51	For subsequent study												
	220	R 220	7	3,000	C9	+0,060	+0,085	12,70	6,35	22,4	4,1	0,50	16,260	0,020	17,020	0,020	14,910	0,025	19,330	0,025	1,37	0,05
	260	R 260	7	For subsequent study	C9	For subsequent study		10,67	6,35	For subsequent study												
	320	R 320	7	3,000	C9	+0,060	+0,085	9,14	5,59	19,1	2,8	0,50	12,700	0,020	13,460	0,020	10,260	0,025	14,700	0,025	1,37	0,05
				Dimensions in inches																		
CBR PBR UBR	84	R 84	7	0,1640	C9	+0,0028	+0,0040	1,250	0,625	1,88	0,25	0,030	1,352	0,001	1,474	0,001	1,564	0,002	1,800	0,002	0,084	0,003
	100	R 100	7	0,1640	C9	+0,0028	+0,0040	1,000	0,500	1,63	0,16	0,025	1,220	0,001	1,280	0,001	1,295	0,002	1,551	0,002	0,080	0,003
	120	R 120	7	0,1580	C9	+0,0028	+0,0040	0,850	0,475	For subsequent study												
	140	R 140	7	0,1580	C9	+0,0028	+0,0040	0,702	0,391	1,31	0,19	0,020	0,994	0,001	0,956	0,001	0,892	0,002	1,152	0,002	0,080	0,003
	180	R 180	7	For subsequent study	C9	For subsequent study		0,590	0,335	For subsequent study												
	220	R 220	7	0,1180	C9	+0,0025	+0,0035	0,500	0,250	0,88	0,16	0,020	0,6400	0,0008	0,6700	0,0008	0,587	0,001	0,761	0,001	0,054	0,002
	260	R 260	7	For subsequent study	C9	For subsequent study		0,420	0,250	For subsequent study												
	320	R 320	7	0,1180	C9	+0,0025	+0,0035	0,360	0,220	0,75	0,11	0,020	0,5000	0,0008	0,5300	0,0008	0,404	0,001	0,579	0,001	0,054	0,002

Table 6 *(2 of 2)*

Type designation of waveguide flange 60154 IEC-...	To be used with waveguide 60153 IEC-...	Figure	Type UBR – without choke or gasket groove: Alignment holes: Diameter A_{basic}	ISO – fit	Deviation: Lower	Deviation: Upper	K	Deviation on K ±	Q	Deviation on Q ±	T [b]	Deviation on T ±	Y [c]	Z [b]	Type PBR – without choke; with gasket groove: Dimensions for gaskets when made of neoprene: c	Deviation on c ±	d	Deviation on d ±	Figure	Dimensions for alignment bolts: Shank diameter	ISO – fit	Deviation: Lower	Deviation: Upper
			Dimensions in millimeters																				
CBR PBR UBR	84	R 84	7	4,170	C9	+0,070	+0,100	32,26	0,05	37,95	0,05	8,76	0,07	15,88	0,38	39,34	0,25	2,62	0,08	8	4,170	h8	–0,018	0
	100	R 100	7	4,170	C9	+0,070	+0,100	25,78	0,05	31,12	0,05	6,73	0,07	11,12	0,38	32,99	0,15	2,62	0,08	8	4,170	h8	–0,018	0
	120	R 120	7	4,000	C9	+0,070	+0,100	For subsequent study															–0,018	0
	140	R 140	7	4,000	C9	+0,070	+0,100	18,34	0,05	21,03	0,05	4,83	0,07	7,95	0,19	23,47	0,15	2,62	0,08	8	4,000	h8	–0,018	0
	180	R 180	7	For subsequent study	C9			For subsequent study															For subsequent study	0
	220	R 220	7	3,000	C9	+0,060	+0,085	12,190	0,025	13,610	0,025	3,28	0,07	7,24	0,13	15,60	0,13	1,78	0,08	8	3,000	h8	–0,014	0
	260	R 260	7	For subsequent study	C9			For subsequent study															For subsequent study	0
	320	R 320	7	3,000	C9	+0,060	+0,085							5,33	0,08	10,82	0,13	1,78	0,08	8	3,000	h8	–0,014	0
			Dimensions in inches																					
CBR PBR UBR	84	R 84	7	0,1640	C9	+0,0028	+0,0040	1,270	0,002	1,494	0,002	0,345	0,003	0,625	0,015	1,549	0,010	0,103	0,003	8	0,1640	h8	–0,0007	0
	100	R 100	7	0,1640	C9	+0,0028	+0,0040	1,015	0,002	1,225	0,002	0,265	0,003	0,438	0,015	1,299	0,006	0,103	0,003	8	0,1640	h8	–0,0007	0
	120	R 120	7	0,1580	C9	+0,0028	+0,0040	For subsequent study															–0,0007	0
	140	R 140	7	0,1580	C9	+0,0028	+0,0040	0,722	0,002	0,828	0,002	0,190	0,003	0,313	0,008	0,924	0,006	0,103	0,003	8	0,1580	h8	–0,0007	0
	180	R 180	7	For subsequent study	C9			For subsequent study															For subsequent study	0
	220	R 220	7	0,1180	C9	+0,0025	+0,0035	0,480	0,001	0,536	0,001	0,129	0,003	0,285	0,005	0,614	0,005	0,070	0,003	8	0,1180	h8	–0,0006	0
	260	R 260	7	For subsequent study	C9											For subsequent study							For subsequent study	0
	320	R 320	7	0,1180	C9	+0,0025	+0,0035	For subsequent study						0,210	0,003	0,426	0,005	0,070	0,003	8	0,1180	h8	–0,0006	0

[a] These values are basic values of the outside cross-section of the waveguide according to IEC publication 60153. They should be regarded as basic values for the aperture according to 5.2.2, that apply to unmounted flanges only.

For through-type flanges, the actual range of deviations for the mounting aperture depends on the assembling method and should therefore be agreed between customer and manufacturer.

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

[b] These dimensions are given for guidance as being suitable with regard to broadband performance. Actual values should be agreed between customer and manufacturer.

[c] These dimensions are not essential for the mating of two assemblies.

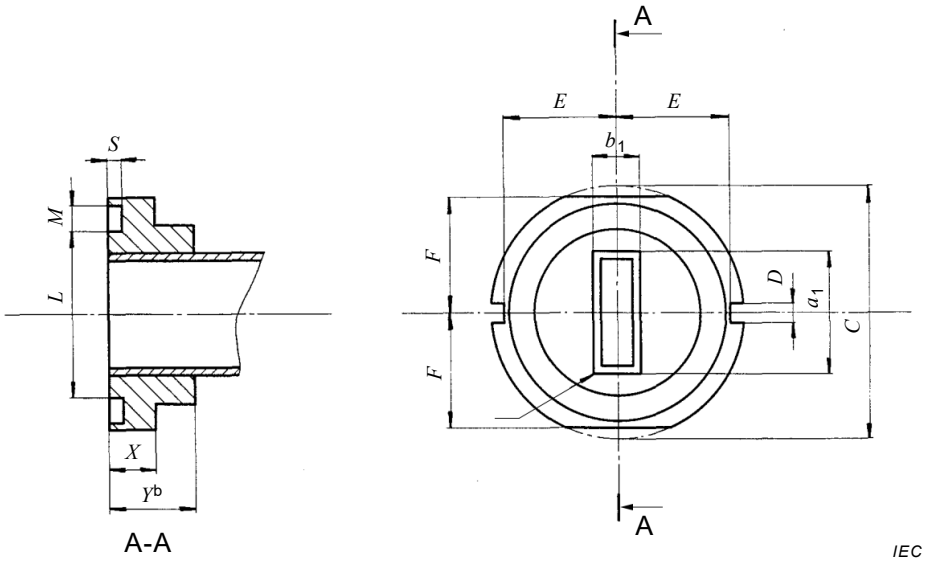


Figure 9 – Flange type C: 60154 IEC-PCR 220-500

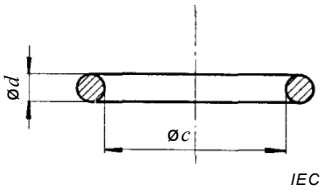


Figure 10 – Flange type C: 60154 IEC-PCR 220-500 gasket

Table 7 – Dimensions of type C flange for ordinary rectangular waveguides *(1 of 2)*

Type designation of waveguide flange 60154 IEC-...	To be used with waveguide 60153 IEC-...	Figure	[a] a_1	[a] b_1	C	Deviation on C ±	F_{max}	E	Deviation on E ±	D	Deviation on D ±	X	R_{max}	L	Deviation on L ±	M	Deviation on M ±	S	Deviation on S ±	[b] Y	Dimensions for gaskets when made of neoprene		
																					c_{basic}	d_{basic}	Figure
Dimensions in millimeters																							
220	R 220	9	12,70	6,35	21,600	+0,007 −0,005	9,65	9,61	0,04	2,29	+0,03 −0,00	4,83	0,31	14,66	0,03	1,83	0,03	1,190	0,025	8,13	14,58	1,61	10
260	R 260	9	10,67	6,35	21,600	+0,007 −0,005	9,65	9,61	0,04	2,29	+0,03 −0,00	4,83	0,31	14,66	0,03	1,83	0,03	1,190	0,025	8,13	14,58	1,61	10
320	R 320	9	9,14	5,59	18,620	+0,007 −0,005	8,08	7,99	0,06	2,38	+0,04 −0,00	4,88	0,25	12,09	0,05	1,75	0,03	1,230	0,038	7,11	11,81	1,52	10
400	R 400	9	7,72	4,88	18,620	+0,007 −0,005	8,08	7,99	0,06	2,38	+0,04 −0,00	4,88	0,25	12,09	0,05	1,75	0,03	1,230	0,038	7,11	11,81	1,52	10
500	R 500	9	6,81	4,42	14,990	+0,007 −0,005	6,22	6,21	0,06	2,38	+0,04 −0,00	3,63	0,25	8,61	0,05	1,60	0,03	1,110	0,038	5,33	8,26	1,40	10
Dimensions in inches																							
220	R 220	9	0,500	0,250	0,8500	+0,0003 −0,0002	0,380	0,3780	0,0015	0,090	+0,001 −0,000	0,190	0,012	0,577	0,001	0,072	0,001	0,047	0,001	0,320	0,574	0,064	10
260	R 260	9	0,420	0,250	0,8500	+0,0003 −0,0002	0,380	0,3780	0,0015	0,090	+0,001 −0,000	0,190	0,012	0,577	0,001	0,072	0,001	0,047	0,001	0,320	0,574	0,064	10
320	R 320	9	0,360	0,220	0,7330	+0,0003 −0,0002	0,318	0,3150	0,0025	0,0940	+0,0014 −0,0000	0,192	0,010	0,476	0,002	0,069	0,001	0,049	0,002	0,280	0,465	0,060	10
400	R 400	9	0,304	0,192	0,7330	+0,0003 −0,0002	0,318	0,3150	0,0025	0,0940	+0,0014 −0,0000	0,192	0,010	0,476	0,002	0,069	0,001	0,049	0,002	0,280	0,465	0,060	10
500	R 500	9	0,268	0,174	0,5900	+0,0003 −0,0002	0,245	0,2450	0,0025	0,0940	+0,0014 −0,0000	0,143	0,010	0,339	0,002	0,063	0,001	0,044	0,002	0,210	0,325	0,055	10

Table 7 *(2 of 2)*

Type designation of waveguide flange 60154 IEC-...		To be used with waveguide 60153 IEC-...	*G*	*H*	Deviation on *H* ±	*J*	Deviation on *J* ±	*K*	Deviation on *K* ±	*N*	Deviation on *N* ±	*P*	Deviation on *P* ±	*G*	*Q* [a]	*T*	*U*	Deviation on *U* ±	*V* [1)]	*W*
			Dimensions in millimeters																	
PCR	220	R 220	25,40	8,890	0,130	21,625	0,015	9,767	0,064	2,248	0,013	9,767	0,064	25,40	5,207	4,445	20,383	0,064	For subsequent study	30,48
	260	R 260	25,40	8,890	0,130	21,625	0,015	9,767	0,064	2,248	0,013	9,767	0,064	25,40	5,207	4,445	20,383	0,064		30,48
	320	R 320	22,23	8,636	0,130	18,657	0,013	8,167	0,064	2,350	0,013	8,332	0,127	22,23	7,874	4,572	17,394	0,127	20,83	25,40
	400	R 400	22,23	8,636	0,130	18,657	0,013	8,167	0,064	2,350	0,013	8,332	0,127	22,23	7,874	4,572	17,394	0,127	20,83	25,40
	500	R 500	17,45	6,604	0,130	15,024	0,013	6,515	0,064	2,350	0,013	6,731	0,127	17,45	5,944	3,404	13,970	0,051	15,24	19,05
			Dimensions in inches																	
PCR	220	R 220	1,000	0,350	0,005	0,8514	0,0006	0,3845	0,0025	0,0885	0,0005	0,3845	0,0025	1,000	0,2050	0,175	0,8025	0,0025	For subsequent study	1,200
	260	R 260	1,000	0,350	0,005	0,8514	0,0006	0,3845	0,0025	0,0885	0,0005	0,3845	0,0025	1,000	0,2050	0,175	0,8025	0,0025		1,200
	320	R 320	0,875	0,340	0,005	0,7345	0,0005	0,3215	0,0025	0,0925	0,0005	0,3280	0,0050	0,875	0,3100	0,180	0,6850	0,0050	0,820	1,000
	400	R 400	0,875	0,340	0,005	0,7345	0,0005	0,3215	0,0025	0,0925	0,0005	0,3280	0,0050	0,875	0,3100	0,180	0,6850	0,0050	0,820	1,000
	500	R 500	0,688	0,260	0,005	0,5915	0,0005	0,2565	0,0025	0,0925	0,0005	0,2650	0,0050	0,688	0,2340	0,134	0,5500	0,0020	0,600	0,750

[a] These dimensions are not essential for the mating of two assemblies.

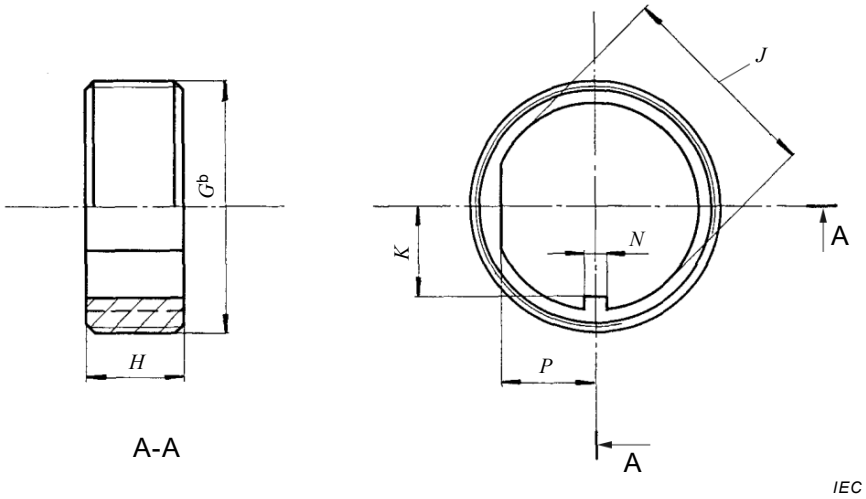


Figure 11 – Flange type C: 60154 IEC-PCR 220-500

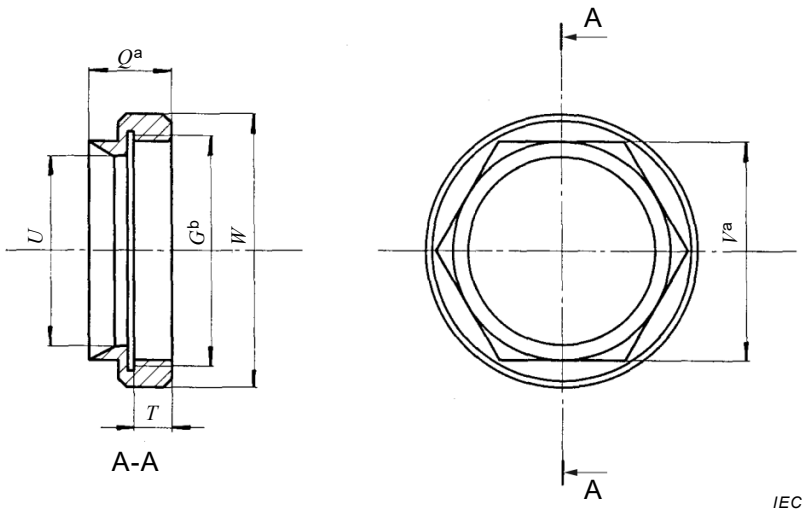
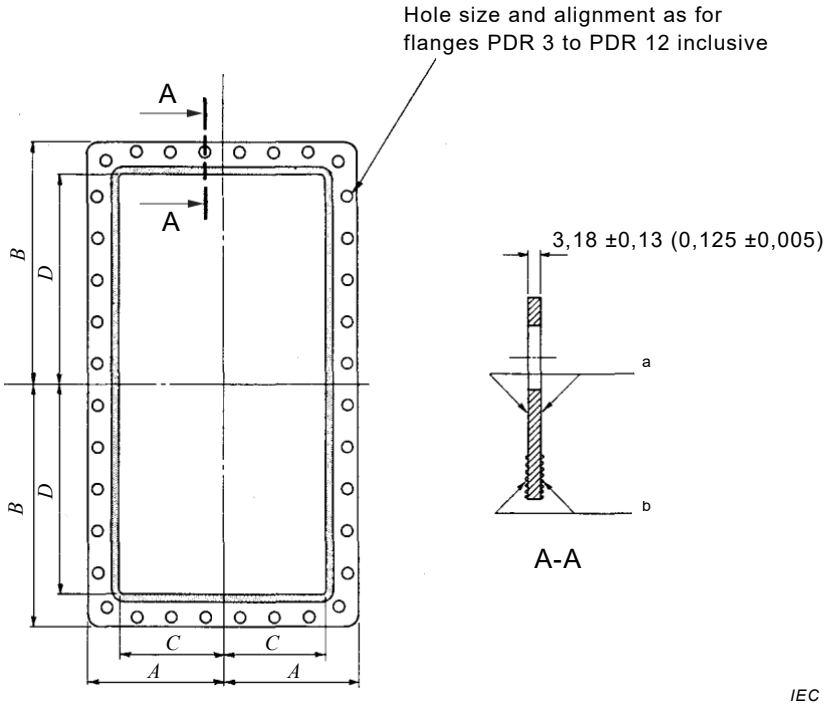


Figure 12 – Flange type C: 60154 IEC-PCR 220-500 gasket

Dimensions in millimetres (dimensions in inches)



Flange	*A*		*B*		*C*		*D*	
	mm	in	mm	in	mm	in	mm	in
UDR 3	192,08 ± 0,40	7,562 ± 0,016	338,12 ± 0,40	13,312 ± 0,016	146,05	5,750	292,10	11,500
UDR 4	179,38 ± 0,40	7,062 ± 0,016	312,72 ± 0,40	12,312 ± 0,016	133,35	5,250	266,70	10,500
UDR 5	158,75 ± 0,40	6,250 ± 0,016	273,05 ± 0,40	10,750 ± 0,016	114,30	4,500	228,60	9,000
UDR 6	139,70 ± 0,40	5,500 ± 0,016	234,95 ± 0,40	9,250 ± 0,016	95,25	3,750	190,50	7,500
UDR 7	117,48 ± 0,40	4,625 ± 0,016	190,50 ± 0,40	7,500 ± 0,016	73,02	2,875	146,05	5,750
UDR 9	106,38 ± 0,40	4,188 ± 0,016	168,28 ± 0,40	6,625 ± 0,016	61,92	2,438	123,82	4,875
UDR 12	93,68 ± 0,40	3,688 ± 0,016	142,47 ± 0,40	5,609 ± 0,016	48,90	1,925	97,79	3,850

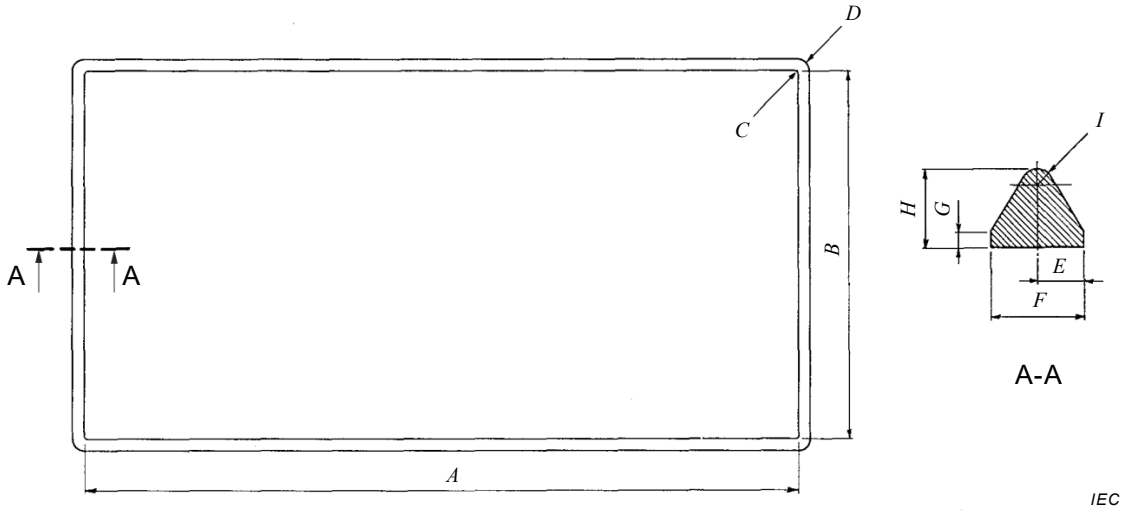
c

a These surfaces incorporate pressure seals.

b These surfaces include raised electrical contact areas. These areas shall start at inside dimensions of waveguide.

c The inside dimensions of the waveguide tubing at the flanges, as shown on the drawings, shall be made to agree to the dimensions and deviations of waveguide tubing in the latest issue of IEC Publication 60153-2.

Figure 13 – Recommended gaskets for flanges without gasket groves



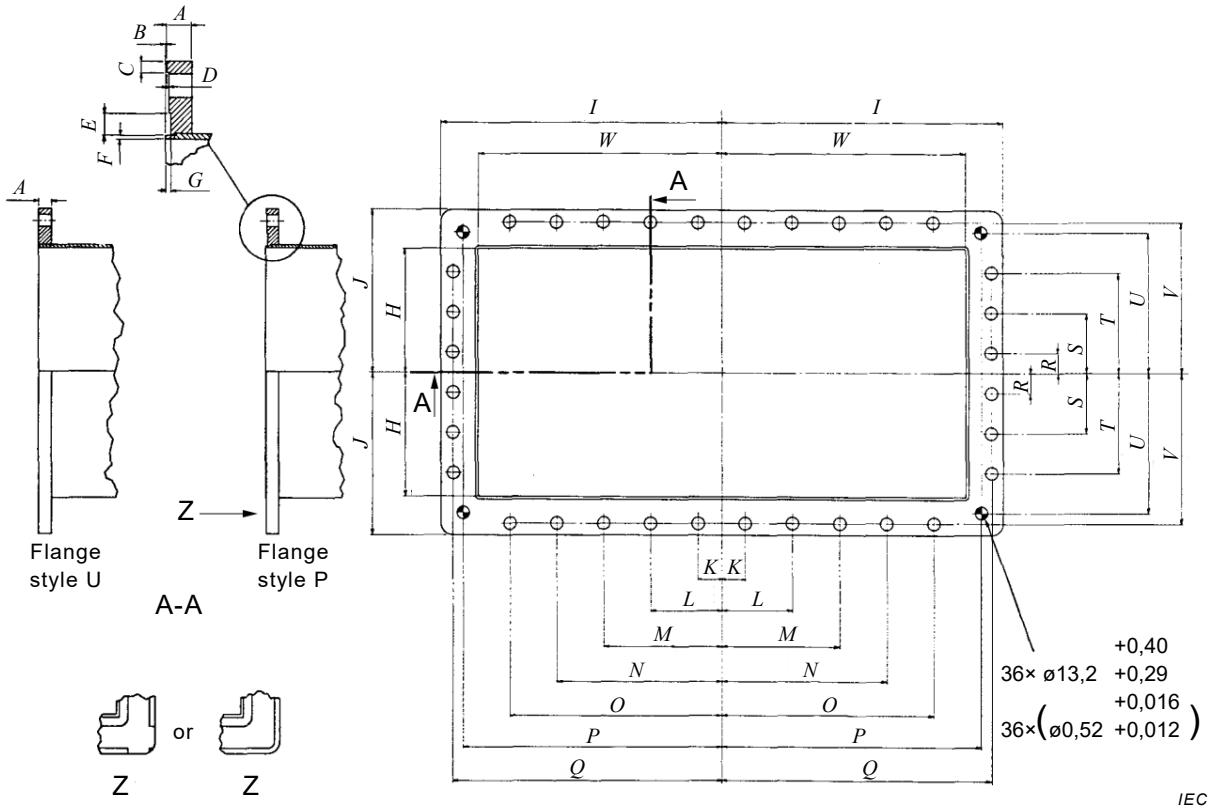
Flange	*A*		*B*	
	mm	in	mm	in
PDR 3				
PDR 4				
PDR 5				
PDR 6				
PDR 8				
PDR 9				
PDR 12				

Dimension	*C*	*D*	*E*	*F*	*G*	*H*	*I*
mm							
±Δmm							
in							
±Δin							

All dimensions are for subsequent study.

Figure 14 – Recommended gaskets for type PDR 3 to 12 flanges

Dimensions in millimetres (dimensions in inches)



Diameters for bolts			
		mm	in
Shank diameter		12,000	0,472[b]
ISO-fit		h11	h11
Deviation	Upper	0,000	0,000
	Lower	–0,110	–0,004

Dimension	*A*[c]	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*[c]	*J*[c]	*K*	*L*
mm	15,88	0,00	6,35	1,14	For subsequent study			146,05	338,15	192,10	28,35	84,96
±Δmm	0,40	+0,25 –0,00	0,40	0,64				a	0,40	0,40	0,28	0,28
in	0,625	0,00	0,250	0,045				5,750	13,313	7,563	1,116	3,345
±Δin	0,016	+0,010 –0,000	0,016	0,025				a	0,016	0,016	0,011	0,011

Dimension	*M*	*N*	*O*	*P*	*Q*	*R*	*S*	*T*	*U*	*V*	*W*
mm	141,58	198,20	254,81	311,43	323,85	23,62	70,87	118,14	165,38	177,80	292,10
±Δmm	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	a
in	5,574	7,803	10,032	12,261	12,750	0,930	2,790	4,651	6,511	7,000	11,500
±Δin	0,011	0,011	0,011	0,011	0,011	0,011	0,011	0,011	0,011	0,011	a

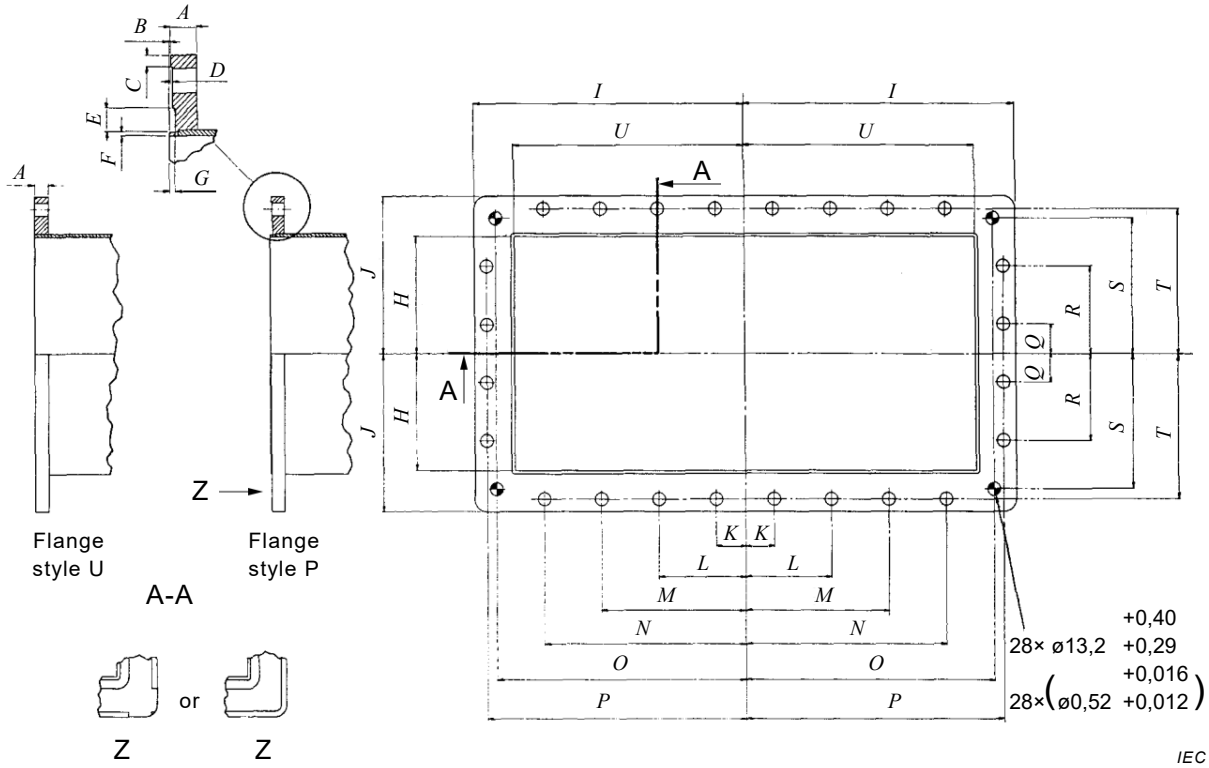
a The dimensions of the waveguide tubing at the flanges, as shown on the drawing, shall be made to agree to the dimensions and deviations of waveguide tubing as shown in the latest issue of IEC Publication 60153-2.

b This value has been standardized for flanges originally designed to take bolts with a 0,500 in basic shank diameter. However, clearance and positional deviations for these flanges were so chosen that bolts with 12,70 mm (0,500 in) as well as 12 mm (0,472 in) can be used without violating the electrical requirements.

c These dimensions are not essential for the mating of two assemblies.

Figure 15 – Flange type D: 60154 IEC-PDR 3 AND UDR 3

Dimensions in millimetres (dimensions in inches)



Diameters for bolts			
		mm	in
Shank diameter		12,000	0,472[b]
ISO-fit		h11	h11
Deviation	Upper	0,000	0,000
	Lower	–0,110	–0,004

Dimension	*A*[c]	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*[c]	*J*[c]	*K*	*L*
mm	15,88	0,00	6,35	1,14	For subsequent study			133,35	312,75	179,40	33,17	99,49
±Δmm	0,40	+0,25 –0,00	0,40	0,64				a	0,40	0,40	0,28	0,28
in	0,625	0,00	0,250	0,045				5,250	12,313	7,063	1,306	3,917
±Δin	0,016	+0,010 –0,000	0,016	0,025				a	0,016	0,016	0,011	0,011

Dimension	*M*	*N*	*O*	*P*	*Q*	*R*	*S*	*T*	*U*
mm	165,81	232,13	287,30	298,45	33,02	99,06	153,95	165,10	266,70
±Δmm	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	a
in	6,528	9,139	11,311	11,750	1,300	3,900	6,061	6,500	10,500
±Δin	0,011	0,011	0,011	0,011	0,011	0,011	0,011	0,011	a

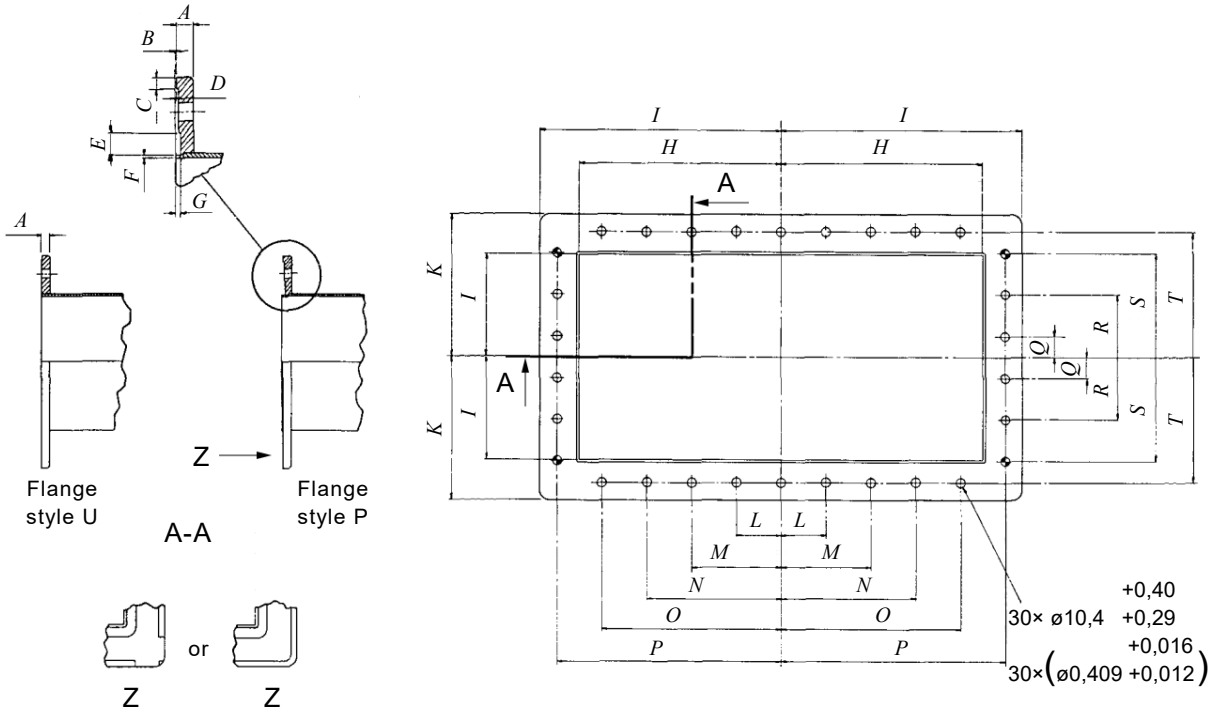
a The dimensions of the waveguide tubing at the flanges, as shown on the drawing, shall be made to agree to the dimensions and deviations of waveguide tubing as shown in the latest issue of IEC Publication 60153-2.

b This value has been standardized for flanges originally designed to take bolts with a 0,500 in basic shank diameter. However, clearance and positional deviations for these flanges were so chosen that bolts with 12,70 mm (0,500 in) as well as 12 mm (0,472 in) can be used without violating the electrical requirements.

c These dimensions are not essential for the mating of two assemblies.

Figure 16 – Flange type D: 60154 IEC-PDR 4 AND UDR 4

Dimensions in millimetres (dimensions in inches)



Diameters for bolts			
		mm	in
Shank diameter		10,000	0,394[b]
ISO-fit		h11	h11
Deviation	Upper	0,000	0,000
	Lower	–0,090	–0,0035

Dimension	*A*[c]	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*[c]	*K*[c]	*L*
mm	9,52	0,00	6,35	1,14	For subsequent study			228,60	114,30	273,05	158,75	50,80
±Δmm	0,40	+0,25 –0,00	0,40	0,64				a	a	0,40	0,40	0,24
in	0,375	0,00	0,250	0,045				9,000	4,500	10,750	6,250	2,0000
±Δin	0,016	+0,010 –0,000	0,016	0,025				a	a	0,016	0,016	0,0095

Dimension	*M*	*N*	*O*	*P*	*Q*	*R*	*S*	*T*
mm	101,60	152,40	203,20	254,00	23,04	69,06	115,11	139,70
±Δmm	0,24	0,24	0,24	0,24	0,24	0,24	0,24	0,24
in	4,0000	6,0000	8,0000	10,0000	0,9070	2,7190	4,5320	5,5000
±Δin	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095

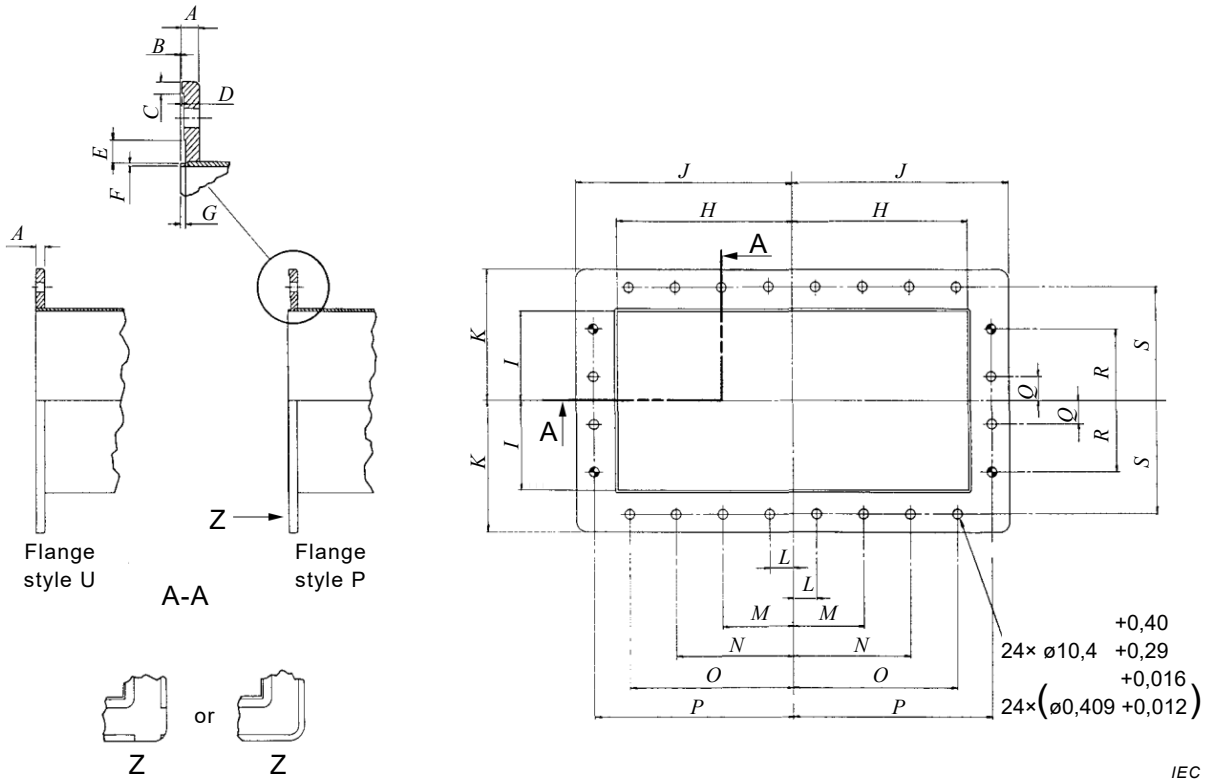
a The dimensions of the waveguide tubing at the flanges, as shown on the drawing, shall be made to agree to the dimensions and deviations of waveguide tubing as shown in the latest issue of IEC Publication 60153-2.

b This value has been standardized for flanges originally designed to take bolts with a 0,375 in basic shank diameter. However, clearance and positional deviations for these flanges were so chosen that bolts with 9,53 mm (0,375 in) as well as 10 mm (0,394 in) can be used without violating the electrical requirements.

c These dimensions are not essential for the mating of two assemblies.

Figure 17 – Flange type D: 60154 IEC-PDR 5 AND UDR 5

Dimensions in millimetres (dimensions in inches)



Diameters for bolts			
		mm	in
Shank diameter		10,000	0,394[b]
ISO-fit		h11	h11
Deviation	Upper	0,000	0,000
	Lower	–0,090	–0,0035

Dimension	*A*[c]	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*[c]	*K*[c]	*L*
mm	9,52	0,00	6,35	1,14	For subsequent study			190,50	95,25	234,95	139,70	25,40
±Δmm	0,40	+0,25 –0,00	0,40	0,64				a	a	0,40	0,40	0,24
in	0,375	0,00	0,250	0,045				7,500	3,750	9,250	5,500	1,0000
±Δin	0,016	+0,010 –0,000	0,016	0,025				a	a	0,016	0,016	0,0095

Dimension	*M*	*N*	*O*	*P*	*Q*	*R*	*S*
mm	76,20	127,00	177,80	215,90	25,40	76,20	120,65
±Δmm	0,24	0,24	0,24	0,24	0,24	0,24	0,24
in	3,0000	5,0000	7,0000	8,5000	1,0000	3,0000	4,7500
±Δin	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095

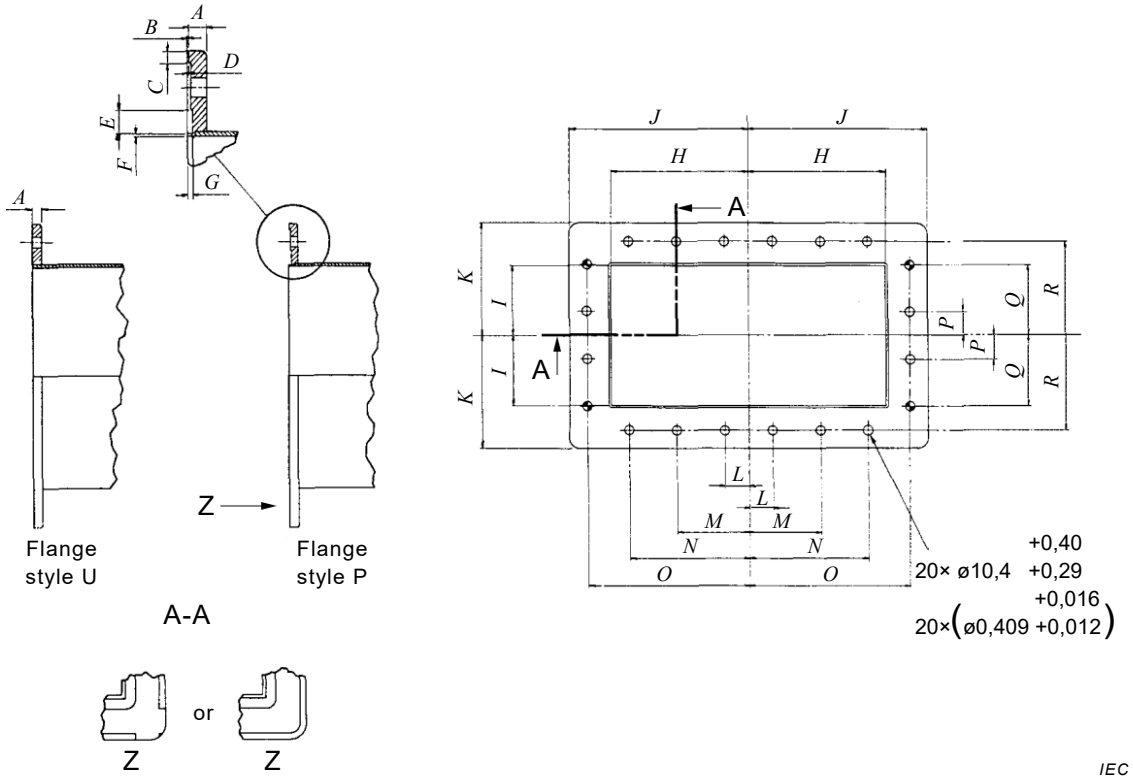
a The dimensions of the waveguide tubing at the flanges, as shown on the drawing, shall be made to agree to the dimensions and deviations of waveguide tubing as shown in the latest issue of IEC Publication 60153-2.

b This value has been standardized for flanges originally designed to take bolts with a 0,375 in basic shank diameter. However, clearance and positional deviations for these flanges were so chosen that bolts with 9,53 mm (0,375 in) as well as 10 mm (0,394 in) can be used without violating the electrical requirements.

c These dimensions are not essential for the mating of two assemblies.

Figure 18 – Flange type D: 60154 IEC-PDR 6 AND UDR 6

Dimensions in millimetres (dimensions in inches)



Diameters for bolts			
		mm	in
Shank diameter		10,000	0,394[b]
ISO-fit		h11	h11
Deviation	Upper	0,000	0,000
	Lower	–0,090	–0,0035

Dimension	*A*[c]	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*[c]	*K*[c]	*L*
mm	9,52	0,00	6,35	1,14	For subsequent study			146,05	73,02	190,50	117,48	25,40
±Δmm	0,40	+0,25 –0,00	0,40	0,64				a	a	0,40	0,40	0,24
in	0,375	0,00	0,250	0,045				5,750	2,875	7,500	4,625	1,0000
±Δin	0,016	+0,010 –0,000	0,016	0,025				a	a	0,016	0,016	0,0095

Dimension	*M*	*N*	*O*	*P*	*Q*	*R*
mm	76,20	127,00	171,45	24,61	73,84	98,42
±Δmm	0,24	0,24	0,24	0,24	0,24	0,24
in	3,0000	5,0000	6,7500	0,9690	2,9070	3,8750
±Δin	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095

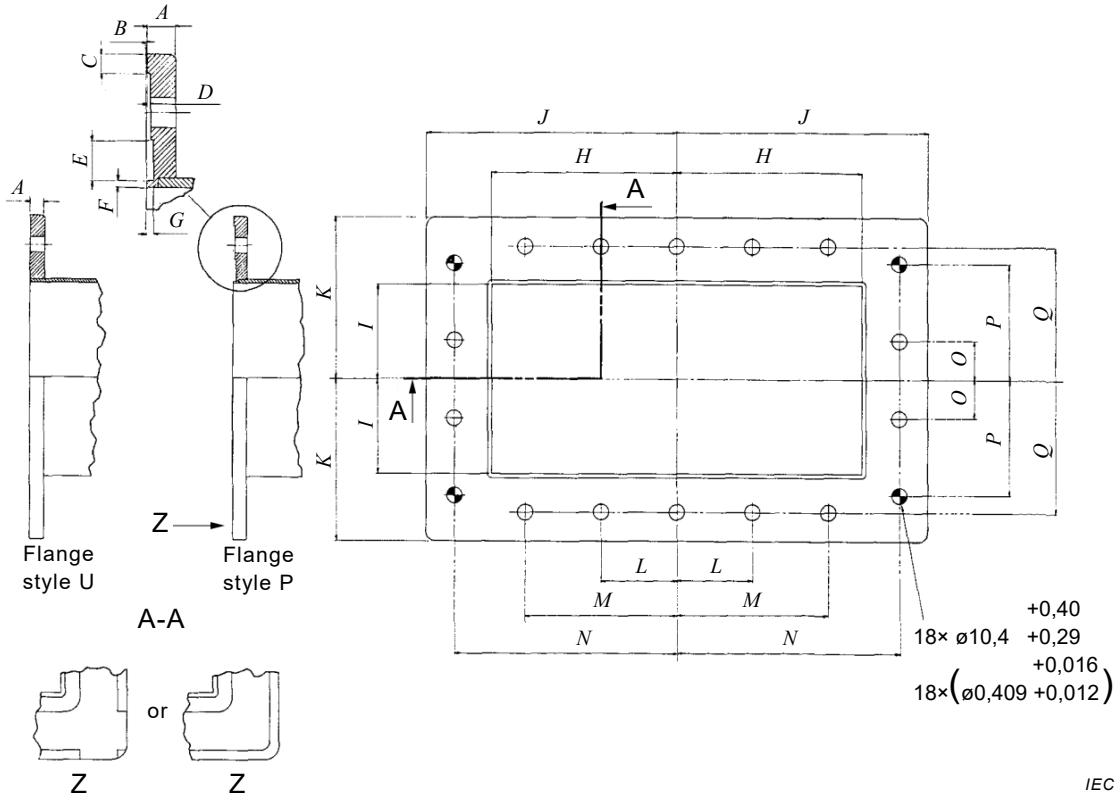
a The dimensions of the waveguide tubing at the flanges, as shown on the drawing, shall be made to agree to the dimensions and deviations of waveguide tubing as shown in the latest issue of IEC Publication 60153-2.

b This value has been standardized for flanges originally designed to take bolts with a 0,375 in basic shank diameter. However, clearance and positional deviations for these flanges were so chosen that bolts with 9,53 mm (0,375 in) as well as 10 mm (0,394 in) can be used without violating the electrical requirements.

c These dimensions are not essential for the mating of two assemblies.

Figure 19 – Flange type D: 60154 IEC-PDR 8 AND UDR 8

Dimensions in millimetres (dimensions in inches)



Diameters for bolts			
		mm	in
Shank diameter		10,000	0,394[b]
ISO-fit		h11	h11
Deviation	Upper	0,000	0,000
	Lower	–0,090	–0,0035

Dimension	*A*[c]	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*[c]	*K*[c]	*L*
mm	9,52	0,00	6,35	1,14	For subsequent study			123,83	61,93	168,28	106,38	50,80
±Δmm	0,40	+0,25 –0,00	0,40	0,64				a	a	0,40	0,40	0,24
in	0,375	0,00	0,250	0,045				4,875	2,438	6,625	4,188	2,0000
±Δin	0,016	+0,010 –0,000	0,016	0,025				a	a	0,016	0,016	0,0095

Dimension	*M*	*N*	*O*	*P*	*Q*
mm	101,60	149,22	25,40	76,20	87,30
±Δmm	0,24	0,24	0,24	0,24	0,24
in	4,0000	5,8740	1,0000	3,0000	3,4380
±Δin	0,0095	0,0095	0,0095	0,0095	0,0095

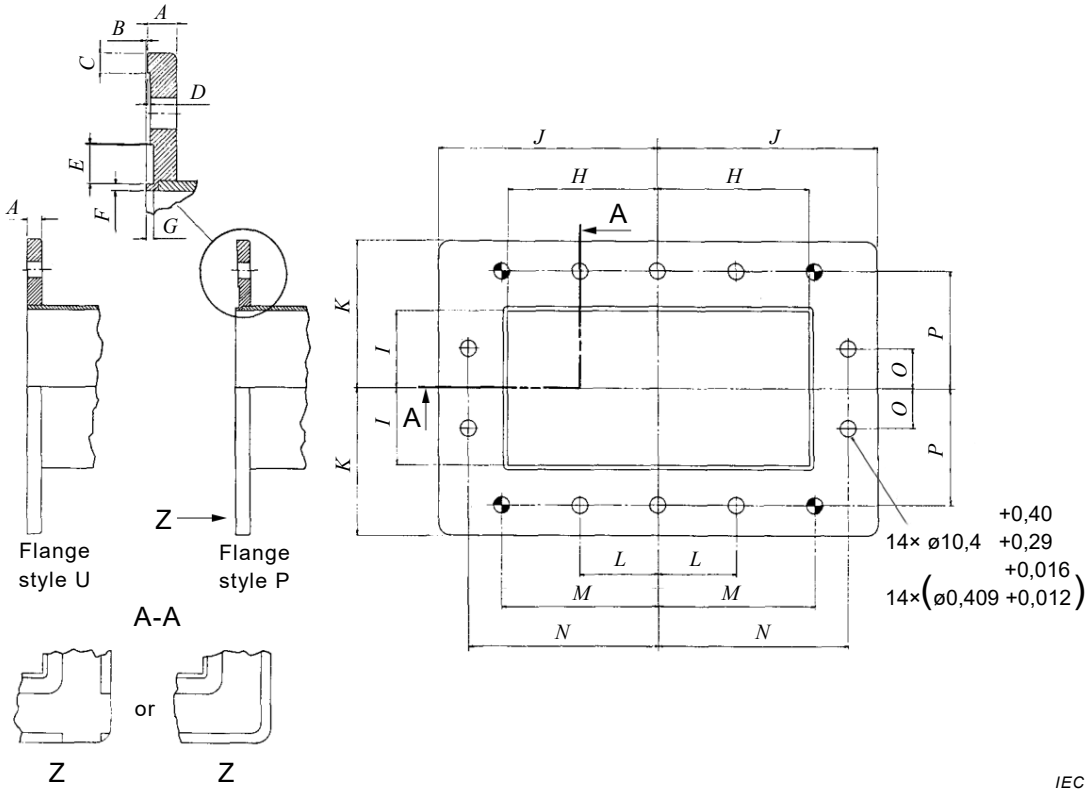
a The dimensions of the waveguide tubing at the flanges, as shown on the drawing, shall be made to agree to the dimensions and deviations of waveguide tubing as shown in the latest issue of IEC Publication 60153-2.

b This value has been standardized for flanges originally designed to take bolts with a 0,375 in basic shank diameter. However, clearance and positional deviations for these flanges were so chosen that bolts with 9,53 mm (0,375 in) as well as 10 mm (0,394 in) can be used without violating the electrical requirements.

c These dimensions are not essential for the mating of two assemblies.

Figure 20 – Flange type D: 60154 IEC-PDR 9 AND UDR 9

Dimensions in millimetres (dimensions in inches)



Diameters for bolts			
		mm	in
Shank diameter		10,000	0,394[b]
ISO-fit		h11	h11
Deviation	Upper	0,000	0,000
	Lower	–0,090	–0,0035

Dimension	*A*[c]	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*[c]	*K*[c]	*L*
mm	9,52	0,00	6,35	1,14	For subsequent study			97,79	48,90	142,49	93,68	50,80
±Δmm	0,40	+0,25 –0,00	0,40	0,64				a	a	0,40	0,40	0,24
in	0,375	0,00	0,250	0,045				3,850	1,925	5,610	3,688	2,0000
±Δin	0,016	+0,010 –0,000	0,016	0,025				a	a	0,016	0,016	0,0095

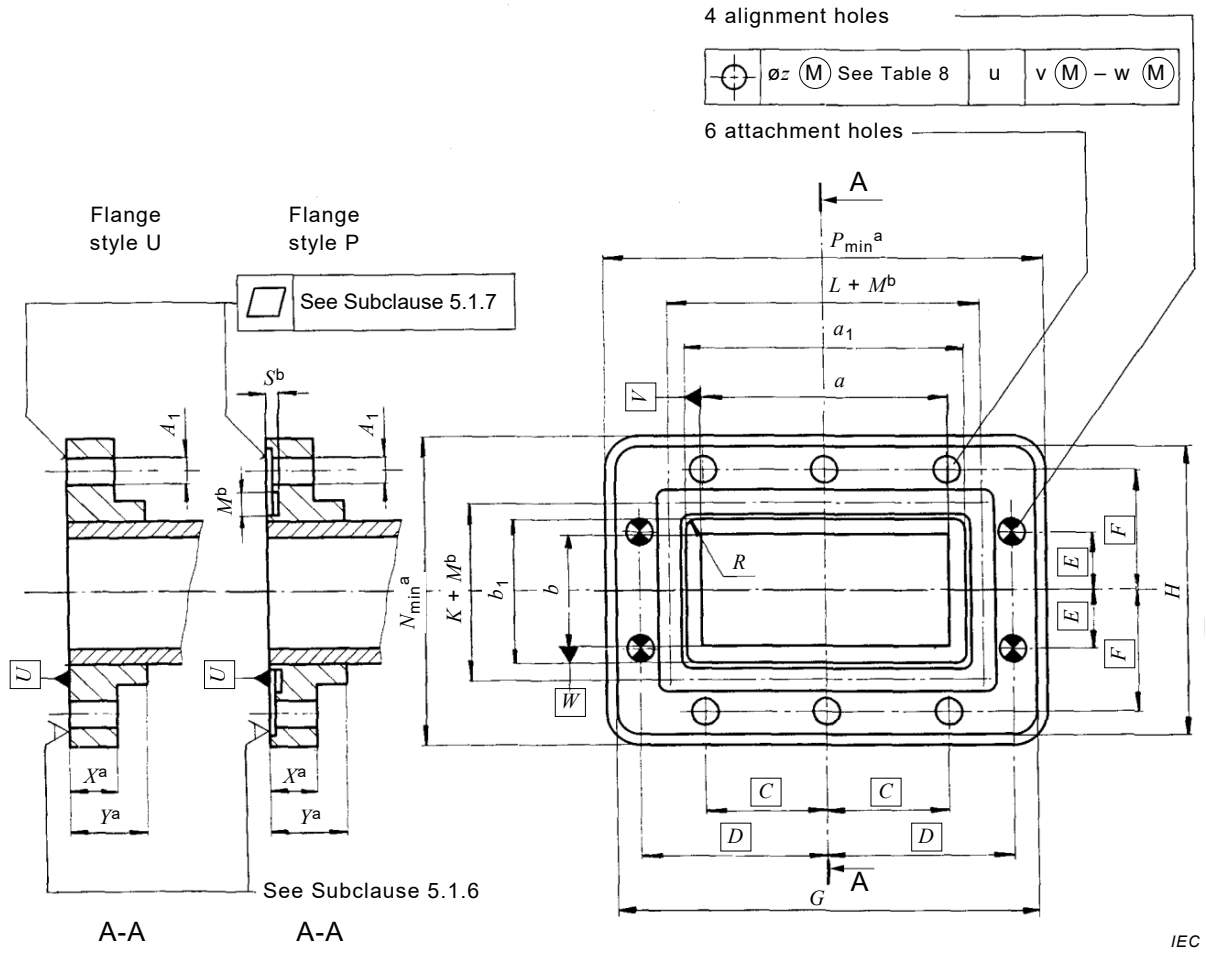
Dimension	*M*	*N*	*O*	*P*
mm	101,60	123,19	25,40	74,30
±Δmm	0,24	0,24	0,24	0,24
in	4,0000	4,8500	1,0000	2,9250
±Δin	0,0095	0,0095	0,0095	0,0095

a The dimensions of the waveguide tubing at the flanges, as shown on the drawing, shall be made to agree to the dimensions and deviations of waveguide tubing as shown in the latest issue of IEC Publication 60153-2.

b This value has been standardized for flanges originally designed to take bolts with a 0,375 in basic shank diameter. However, clearance and positional deviations for these flanges were so chosen that bolts with 9,53 mm (0,375 in) as well as 10 mm (0,394 in) can be used without violating the electrical requirements.

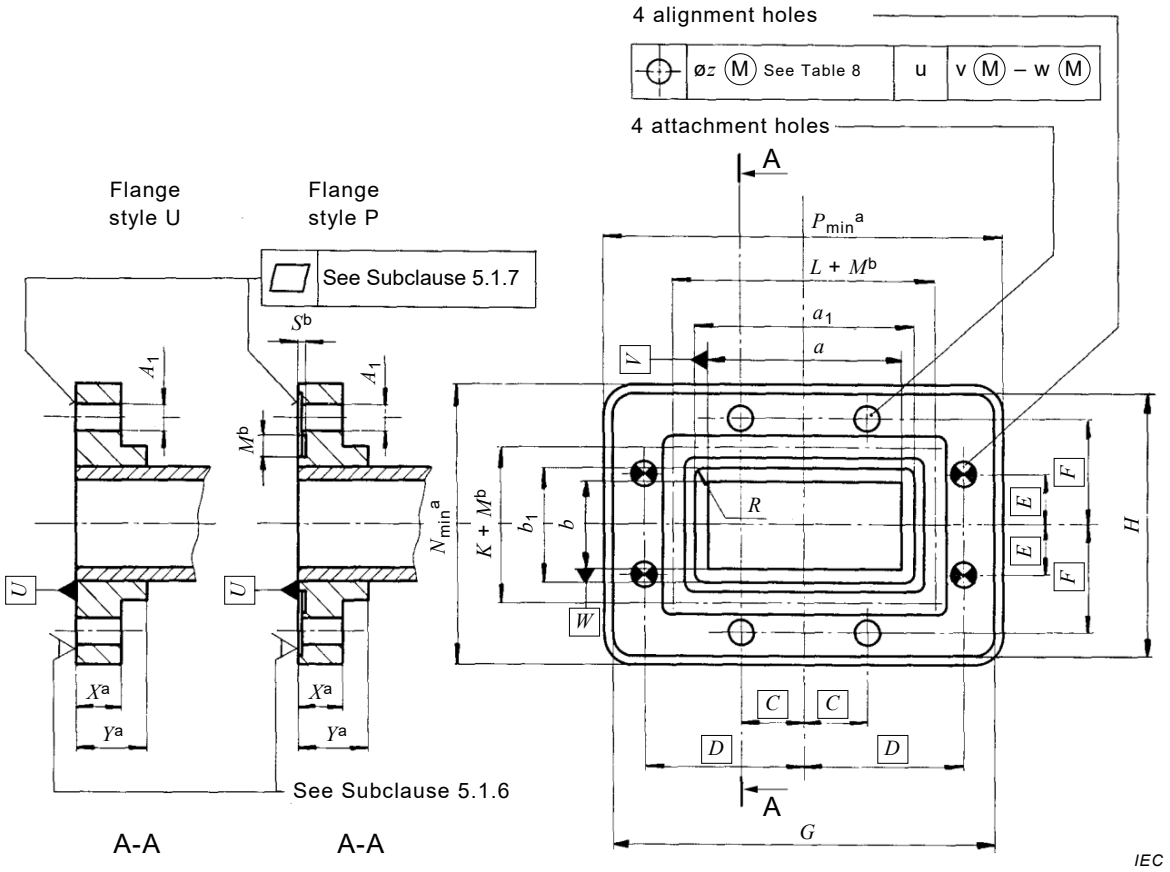
c These dimensions are not essential for the mating of two assemblies.

Figure 21 – Flange type D: 60154 IEC-PDR 12 AND UDR 12



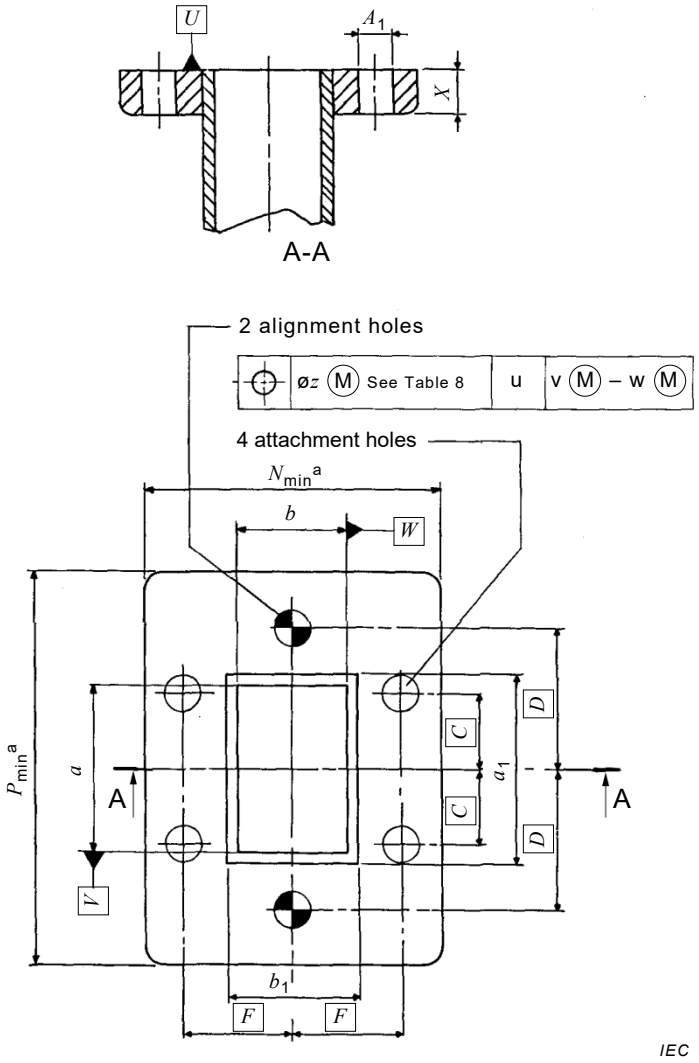
Dimensions are given in Table 8.

Figure 22 – Flange type D: 60154 IEC-PDR 14 – 40



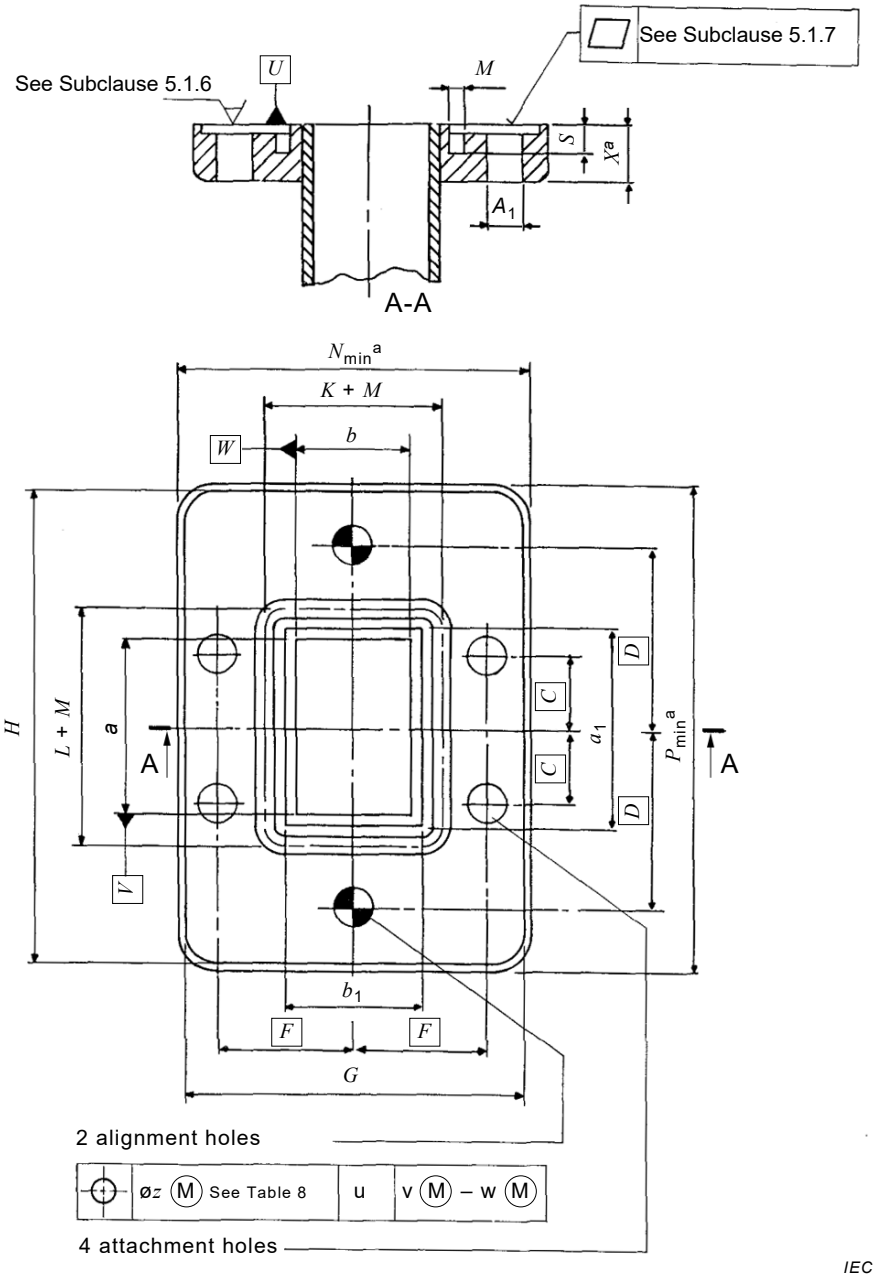
Dimensions are given in Table 8.

Figure 23 – Flange type D: 60154 IEC-PDR 48 – 100



Dimensions are given in Table 8.

Figure 24 – Flange type D: 60154 IEC-UDR 120 – 180



Dimensions are given in Table 8.

Figure 25 – Flange type D: 60154 IEC-PDR 120 – 180

Table 8 – Dimensions of type D flange for ordinary rectangular waveguides *(1 of 2)*

Type UDR without choke or gasket groove																				
Type designation of waveguide flanges 60154 IEC-...	To be used with waveguide 60153 IEC-...	Figure	Dimensions for holes							a	a	b	b	b						
			Diameter $A_{1\ basic}$	Alignment holes			Attachment holes			a_1	b_1	P_{min}	N_{min}	X	R_{max}	$2C$	$2D$	$2E$	$2F$	$\varnothing Z$ Positional tolerance
				ISO-fit	Deviation		ISO-fit	Deviation												
					Lower	Upper		Lower	Upper											
Dimensions in millimetres																				
PDR UDR	14	R 14	22	8,000	A9	+0,280	+0,316	A15	+0,280	+0,860	169,16	86,61	220,7	138,1	12,7	0,60	120,60	200,00	63,46	117,38	0,20
	18	R 18	22	8,000	A9	+0,280	+0,316	A15	+0,280	+0,860	133,60	68,83	185,0	120,0	12,7	0,60	100,08	165,00	50,04	100,08	0,20
	22	R 22	22	6,350	A9	+0,280	+0,316	A15	+0,280	+0,860	113,28	58,67	161,1	106,4	12,7	0,60	90,78	141,98	47,64	87,38	0,20
	26	R 26	22	6,350	A9	+0,280	+0,316	A15	+0,280	+0,860	90,42	47,24	138,1	95,3	12,7	0,60	68,28	119,06	34,08	76,20	0,20
	32	R 32	22	6,350	A9	+0,280	+0,316	A15	+0,280	+0,860	76,20	38,10	114,3	76,2	10,0	0,60	65,08	97,22	29,36	59,14	0,20
	40	R 40	22	6,350	B9	+0,150	+0,186	B15	–0,150	+0,730	61,42	32,33	98,4	69,9	10,0	0,50	54,36	82,30	25,40	53,34	0,10
	48	R 48	23	6,350	B9	+0,150	+0,186	B15	+0,150	+0,730	50,80	25,40	88,9	63,5	10,0	0,50	28,58	71,82	22,22	46,44	0,10
	58	R 58	23	6,350	B9	+0,150	+0,186	B15	+0,150	+0,730	43,64	23,44	81,0	61,9	10,0	0,50	25,40	64,66	19,04	44,46	0,10
	70	R 70	23	5,000	B9	+0,140	+0,170	B15	+0,140	+0,620	38,10	19,05	68,3	49,2	10,0	0,50	22,22	55,58	15,88	36,52	0,10
	84	R 84	23	4,000	C9	+0,070	+0,100	C15	+0,070	+0,550	31,75	15,88	63,5	44,5	7,5	0,50	19,04	48,42	15,88	32,54	0,05
	100	R 100	23	4,000	C9	+0,070	+0,100	C15	+0,070	+0,550	25,40	12,70	53,2	40,5	7,5	0,40	15,88	42,06	15,88	29,36	0,05
	120	R 120	d	4,000	C9	+0,070	+0,100	C15	+0,070	+0,550	21,59	12,06	49,0	39,50	7,50	For subsequent study	15,88	38,10	Not applicable	28,58	0,05
	140	R 140	d	4,000	C9	+0,070	+0,100	C15	+0,070	+0,550	17,83	9,93	44,5	36,50	7,50		11,94	33,34		25,40	0,05
	180	R 180	d	4,000	C9	+0,070	+0,100	C15	+0,070	+0,550	14,99	8,51	42,0	35,50	7,50		11,94	31,75		25,40	0,05
Dimensions in inches																					
PDR UDR	14	R 14	22	0,3150	A9	+0,0100	+0,0114	A15	+0,0100	+0,0338	6,660	3,410	8,69	5,44	0,50	0,024	4,748	7,874	2,498	4,621	0,008
	18	R 18	22	0,3150	A9	+0,0100	+0,0114	A15	+0,0100	+0,0338	5,260	2,710	7,28	4,72	0,50	0,024	3,946	6,496	1,970	3,940	0,008
	22	R 22	22	0,2500	A9	+0,0100	+0,0114	A15	+0,0100	+0,0338	4,460	2,310	6,34	4,19	0,50	0,024	3,574	5,590	1,876	3,440	0,008
	26	R 26	22	0,2500	A9	+0,0100	+0,0114	A15	+0,0100	+0,0338	3,560	1,860	5,44	3,75	0,50	0,024	2,688	4,687	1,342	3,000	0,008
	32	R 32	22	0,2500	A9	+0,0100	+0,0114	A15	+0,0100	+0,0338	3,000	1,500	4,50	3,00	0,39	0,024	2,562	3,827	1,156	2,328	0,008
	40	R 40	22	0,2500	B9	+0,0060	+0,0074	B15	+0,0060	+0,0287	2,418	1,273	3,87	2,75	0,39	0,020	2,140	3,240	1,000	2,100	0,004
	48	R 48	23	0,2500	B9	+0,0060	+0,0074	B15	+0,0060	+0,0287	2,000	1,000	3,50	2,50	0,39	0,020	1,125	2,827	0,875	1,828	0,004
	58	R 58	23	0,2500	B9	+0,0060	+0,0074	B15	+0,0060	+0,0287	1,718	0,923	3,19	2,44	0,39	0,020	1,000	2,546	0,750	1,750	0,004
	70	R 70	23	0,1970	B9	+0,0050	+0,0062	B15	+0,0050	+0,0244	1,500	0,750	2,69	1,94	0,39	0,020	0,875	2,188	0,625	1,438	0,004
	84	R 84	23	0,1580	C9	+0,0028	+0,0040	C15	+0,0028	+0,0217	1,250	0,625	2,50	1,75	0,30	0,020	0,750	1,906	0,625	1,281	0,002
	100	R 100	23	0,1580	C9	+0,0028	+0,0040	C15	+0,0028	+0,0217	1,000	0,500	2,10	1,60	0,30	0,016	0,625	1,656	0,625	1,156	0,002
	120	R 120	d	0,1580	C9	+0,0028	+0,0040	C15	+0,0028	+0,0217	0,850	0,475	1,929	1,555	0,295	For subsequent study	0,625	1,500	Not applicable	1,125	0,002
	140	R 140	d	0,1580	C9	+0,0028	+0,0040	C15	+0,0028	+0,0217	0,702	0,391	1,752	1,437	0,295		0,470	1,312		1,000	0,002
	180	R 180	d	0,1580	C9	+0,0028	+0,0040	C15	+0,0028	+0,0217	0,590	0,335	1,654	1,398	0,295		0,470	1,250		1,000	0,002

Table 8 *(2 of 2)*

Type designation of waveguide flanges 60154 IEC-...	To be used with waveguide 60153 IEC-...	Figure	Type PDR – without choke; with gasket or groove															
			b, c	b, c	b, c							Dimensions for gaskets when made on neoprene			Dimensions of alignment bolts			
			G	H	Deviations $G + H$ ±	$K + M$	Deviations $K + M$ ±	$L + M$	Deviations $L + M$ ±	M	S (for information only)	C_{basic}	d_{basic}	Figure	Shank diameter	ISO-fit	Deviation	
																	Lower	Upper
			Dimensions in millimetres															
PDR UDR	14	R 14	22	210,7	128,10	0,50	99,5	For subsequent study	182,1	For subsequent study	For subsequent study	5,90	For subsequent study			8,000	h8	–0,022	0
	18	R 18	22	175,0	110,00	0,50	82,3		147,3			5,90				8,000	h8	–0,022	0
	22	R 22	22	151,1	96,40	0,50	71,1		125,7			5,90				6,350	h8	–0,022	0
	26	R 26	22	128,1	85,30	0,50	59,7		102,9			5,90				6,350	h8	–0,022	0
	32	R 32	22	106,3	68,20	0,40	46,1		84,2			3,90				6,350	h8	–0,022	0
	40	R 40	22	90,4	61,90	0,40	40,2		69,3			3,90				6,350	h8	–0,022	0
	48	R 48	23	80,9	55,50	0,40	33,3		58,7			3,90				6,350	h8	–0,022	0
	58	R 58	23	73,0	53,90	0,40	31,3		51,5			3,90				6,350	h8	–0,022	0
	70	R 70	23	63,3	44,20	0,30	25,8		44,8			3,90				5,000	h8	–0,018	0
	84	R 84	23	55,3	39,50	0,30	22,6		38,5			3,90				4,000	h8	–0,018	0
	100	R 100	23	49,2	36,50	0,20	19,5		32,2			3,90				4,000	h8	–0,018	0
	120	R 120	[d]	45,0	35,50	0,20	18,860	0,135	28,180	0,165	3,58	3,90				4,000	h8	–0,018	0
	140	R 140	[d]	40,5	32,50	0,20	16,280	0,135	24,200	0,165	3,58	3,90				4,000	h8	–0,018	0
	180	R 180	[d]	38,0	31,50	0,20	15,000	0,165	21,500	0,165	3,58	3,90				4,000	h8	–0,018	0
			Dimensions in inches															
PDR UDR	14	R 14	22	8,300	5,040	0,020	3,92	For subsequent study	7,17	For subsequent study	For subsequent study	0,232	For subsequent study			0,3150	h8	–0,009	0
	18	R 18	22	6,890	4,330	0,020	3,24		5,80			0,232				0,3150	h8	–0,009	0
	22	R 22	22	5,950	3,800	0,020	2,80		4,95			0,232				0,2500	h8	–0,009	0
	26	R 26	22	5,040	3,360	0,020	2,35		4,05			0,232				0,2500	h8	–0,009	0
	32	R 32	22	4,190	2,690	0,016	1,81		3,31			0,153				0,2500	h8	–0,009	0
	40	R 40	22	3,560	2,440	0,016	1,58		2,73			0,153				0,2500	h8	–0,009	0
	48	R 48	23	3,190	2,190	0,016	1,31		2,31			0,153				0,2500	h8	–0,009	0
	58	R 58	23	2,870	2,120	0,016	1,23		2,03			0,153				0,2500	h8	–0,009	0
	70	R 70	23	2,490	1,740	0,012	1,02		1,76			0,153				0,1970	h8	–0,007	0
	84	R 84	23	2,180	1,560	0,012	0,89		1,52			0,153				0,1580	h8	–0,007	0
	100	R 100	23	1,940	1,440	0,008	0,77		1,27			0,153				0,1580	h8	–0,007	0
	120	R 120	[d]	1,770	1,400	0,008	0,735	0,006	1,109	0,006	0,141	0,153				0,1580	h8	–0,007	0
	140	R 140	[d]	1,590	1,280	0,008	0,641	0,005	0,953	0,006	0,141	0,153				0,1580	h8	–0,007	0
	180	R 180	[d]	1,500	1,240	0,008	0,591	0,005	0,846	0,006	0,141	0,153				0,1580	h8	–0,007	0

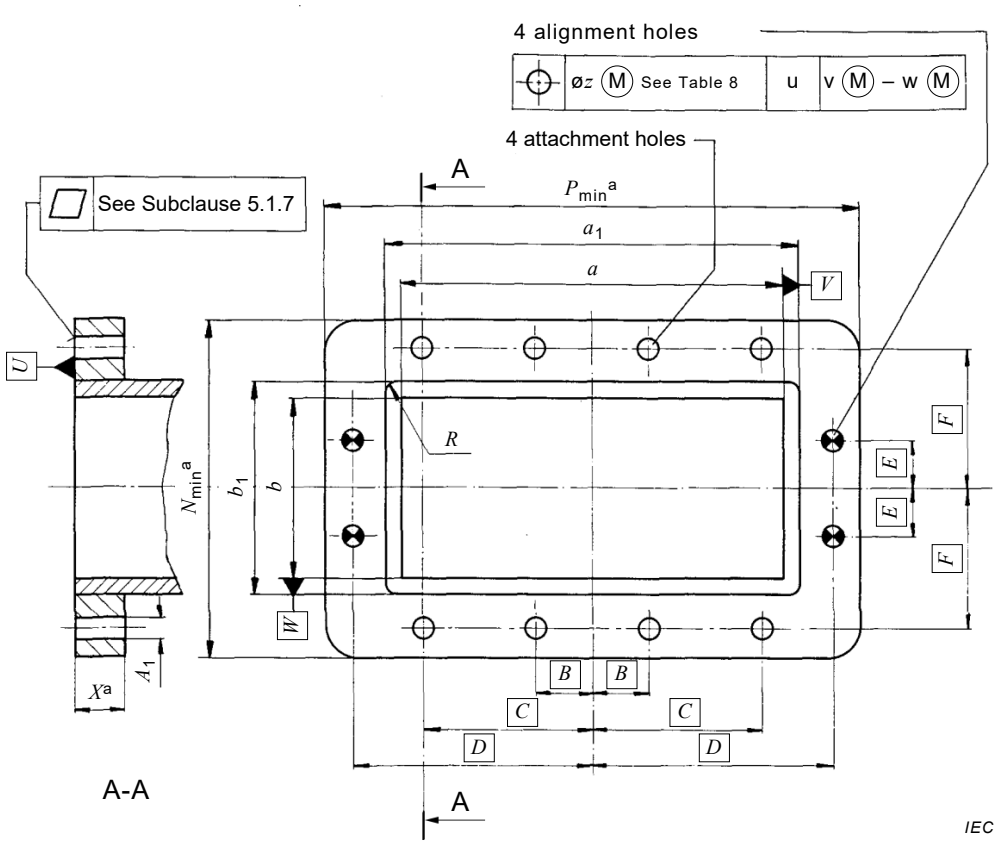
[a] These values are basic values of the outside cross-section of the waveguide according to IEC Publication 60153. They should be regarded as basic values for the aperture according to 5.2.2 that apply to unmounted flanges only.

For through flanges, the actual range of deviations for the mounting aperture depends on the assembling method and should therefore be agreed between customer and manufacturer.

[b] These dimensions are not essential for the mating of two assemblies.

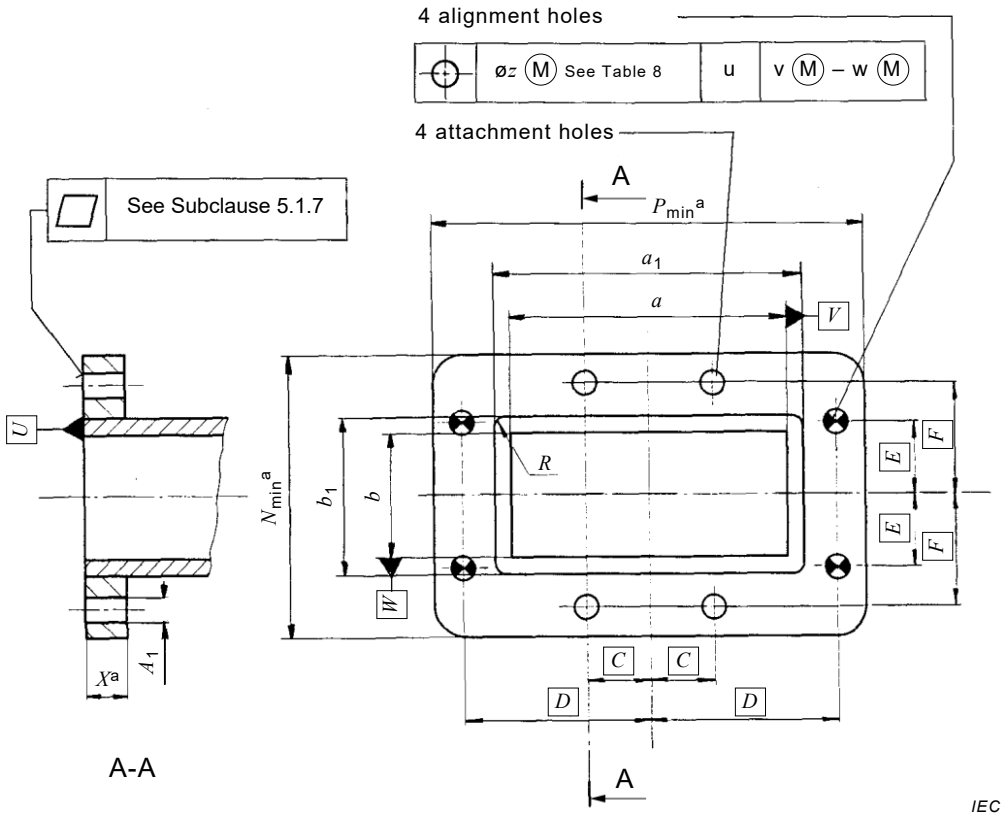
[c] Electrical considerations require that the inner rim and the outer rim should have the same height.

[d] Figure 24 for flanges without gasket grooves and Figure 16 for flanges with gasket grooves.



Dimensions are given in Table 8.

Figure 26 – Flange type E: 60154 IEC-UER 32



Dimensions are given in Table 8.

Figure 27 – Flange type E: 60154 IEC-UER 40-100

Table 9 – Dimensions of type E flange for ordinary rectangular waveguides *(1 of 2)*

Dimensions of type E flanges without choke or gasket grooves for ordinary rectangular waveguides																												
Type designation of waveguide flanges 60154 IEC-...		To be used with waveguide 60153 IEC-...	Figure	Dimensions for holes							ØZ	a	a	b	b	b								Dimensions for alignment holes			
					Alignment holes			Attachment holes																				
				Diameter $A_{1\ basic}$	ISO –fit	Deviation		ISO –fit	Deviation		Positional tolerance	a_1	b_1	P_{min}	N_{min}	X	R_{max}	$2B$	$2C$	$2D$	$2E$	$2F$	Shank diameter	ISO –fit	Deviation	
						Lower	Upper		Lower	Upper															Lower	Upper
				Dimensions in millimetres																								
UER	3	R 3		For subsequent study								For subsequent study																
	4	R 4																										
	5	R5																										
	6	R 6																										
	8	R 8																										
	9	R 9																										
	12	R 12																										
	14	R 14																										
	18	R 18																										
	22	R 22																										
	26	R 26																										
	32	R 32	226	4,000	A9	+0,270	+0,300	A15	+0,270	+0,750	0,20	76,20	38,10	98,68	59,50	9,00	0,60	20,68	62,04	88,64	17,02	50,54	4,000	h8	–0,018	0
	40	R 40	27	4,000	B9	+0,140	+0,170	B15	+0,140	+0,620	0,10	61,42	32,33	80,20	50,80	6,40	0,50	–	25,40	72,24	20,62	42,88	4,000	h8	–0,018	0
	48	R 48	27	4,000	B9	+0,140	+0,170	B15	+0,140	+0,620	0,10	50,80	25,40	70,60	45,20	6,40	0,50	–	20,58	61,72	23,78	36,32	4,000	h8	–0,018	0
	58	R 58	27	4,000	B9	+0,140	+0,170	B15	+0,140	+0,620	0,10	43,64	23,44	63,50	44,50	6,40	0,50	–	18,38	53,90	24,34	33,68	4,000	h8	–0,018	0
	70	R 70	27	4,000	B9	+0,140	+0,170	B15	+0,140	+0,620	0,10	38,10	19,05	57,94	38,90	6,40	0,50	–	16,36	49,02	17,42	29,98	4,000	h8	–0,018	0
	84	R 84	27	4,000	C9	+0,070	+0,100	C15	+0,070	+0,550	0,05	31,75	15,88	51,20	34,90	6,40	0,50	–	14,08	42,16	14,22	26,26	4,000	h8	–0,018	0
	100	R 100	27	4,000	C9	+0,070	+0,100	C15	+0,070	+0,550	0,05	25,40	12,70	44,90	32,30	6,40	0,40	–	11,94	35,82	11,42	23,12	4,000	h8	–0,018	0

Table 9 *(2 of 2)*

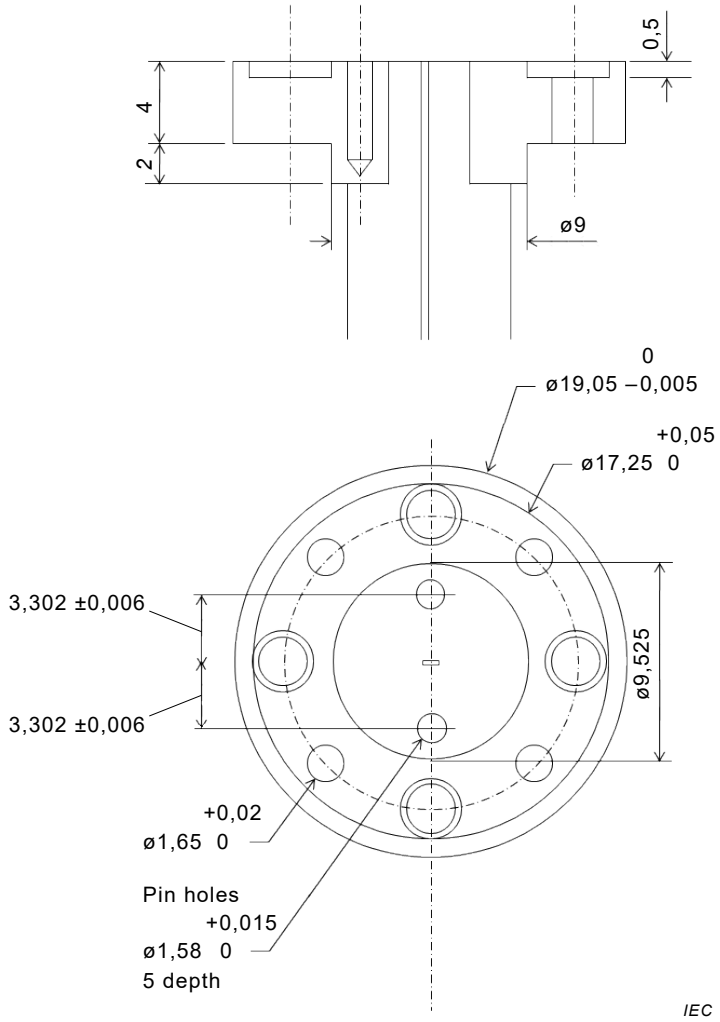
Dimensions of type E flanges without choke or gasket grooves for ordinary rectangular waveguides																											
Type designation of waveguide flanges 60154 IEC-...		To be used with waveguide 60153 IEC-...	Figure	Dimensions for holes							ØZ	a	a	b	b	b								Dimensions for alignment holes			
					Alignment holes			Attachment holes																			
				Diameter $A_{1\ basic}$	ISO –fit	Deviation		ISO –fit	Deviation		Positional tolerance	a_1	b_1	P_{min}	N_{min}	X	R_{max}	$2B$	$2C$	$2D$	$2E$	$2F$	Shank diameter	ISO –fit	Deviation	
						Lower	Upper		Lower	Upper															Lower	Upper
				Dimensions in inches																							
UER	3	R 3		For subsequent study								For subsequent study															
	4	R 4																									
	5	R 5																									
	6	R 6																									
	8	R 8																									
	9	R 9																									
	12	R 12																									
	14	R 14																									
	18	R 18																									
	22	R 22																									
	26	R 26																									
	32	R 32	26	0,1580	A9	+0,0100	+0,0112	A15	+0,0100	+0,0338	0,008	3,000	1,500	3,844	2,343	0,354	0,024	0,814	2,442	3,490	0,670	1,990	0,1580	h8	–0,0007	0
	40	R 40	27	0,1580	B9	+0,0050	+0,0062	B15	+0,0050	+0,0244	0,004	2,418	1,273	3,157	2,000	0,252	0,020	–	1,000	2,844	0,812	1,689	0,1580	h8	–0,0007	0
	48	R 48	27	0,1580	B9	+0,0050	+0,0062	B15	+0,0050	+0,0244	0,004	2,000	1,000	2,780	1,780	0,252	0,020	–	0,810	2,430	0,936	1,430	0,1580	h8	–0,0007	0
	58	R 58	27	0,1580	B9	+0,0050	+0,0062	B15	+0,0050	+0,0244	0,004	1,718	0,923	2,500	1,752	0,252	0,020	–	0,724	2,122	0,958	1,326	0,1580	h8	–0,0007	0
	70	R 70	27	0,1580	B9	+0,0050	+0,0062	B15	+0,0050	+0,0244	0,004	1,500	0,750	2,281	1,532	0,252	0,020	–	0,644	1,930	0,686	1,180	0,1580	h8	–0,0007	0
	84	R 84	27	0,1580	C9	+0,0028	+0,0040	C15	+0,0028	+0,0217	0,002	1,250	0,625	2,016	1,374	0,252	0,020	–	0,555	1,660	0,560	1,034	0,1580	h8	–0,0007	0
	100	R 100	27	0,1580	C9	+0,0028	+0,0040	C15	+0,0028	+0,0217	0,002	1,000	0,500	1,768	1,268	0,252	0,016	–	0,470	1,410	0,450	0,910	0,1580	h8	–0,0007	0

[a] These values are basic values of the outside cross-section of the waveguide according to IEC Publication 60153. They should be regarded as basic values for the aperture according to 5.2.2, that apply to unmounted flanges only.

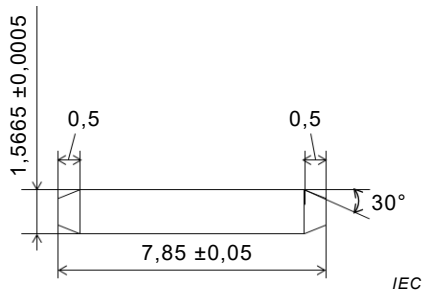
For through type flanges, the actual aperture limits depend on the assembling method and should therefore be agreed between customer and manufacturer.

[b] These dimensions are not essential for the mating of two assemblies.

Dimensions in millimetres

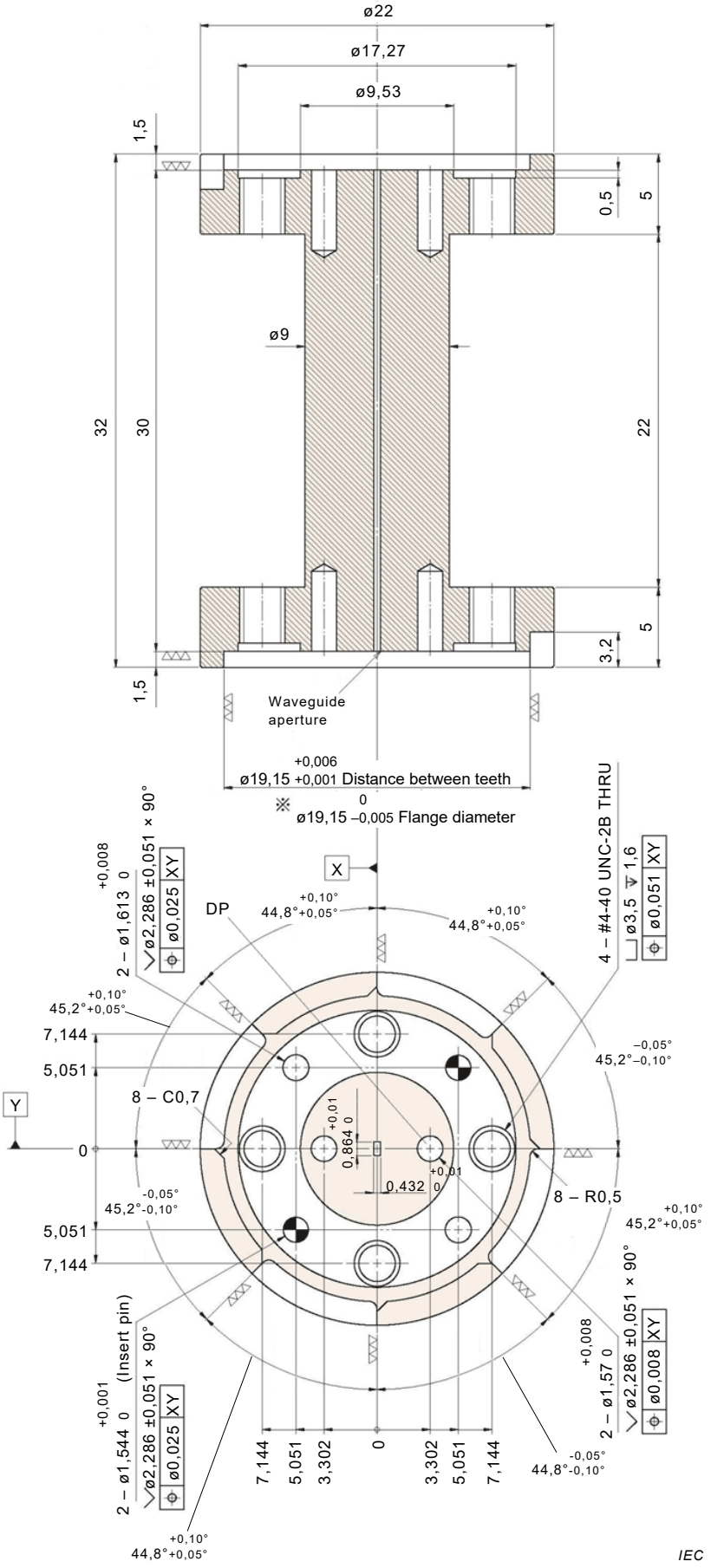


Flange



Alignment pin

Figure 28 – Flange type F: 60154 IEC-UFC without choke or gasket groove


ø22
ø17,27
ø9,53
1,5
0,5
5
ø9
32
30
22
5
3,2
1,5
Waveguide aperture
+0,006
ø19,15 +0,001 Distance between teeth
0
※ ø19,15 –0,005 Flange diameter
X
Y
DP
+0,10°
44,8°+0,05°
+0,10°
44,8°+0,05°
4 – #4-40 UNC-2B THRU
ø3,5 ↧ 1,6
ø0,051 XY
+0,008
2 – ø1,613 0
ø2,286 ±0,051 × 90°
ø0,025 XY
+0,10°
45,2°+0,05°
7,144
5,051
8 – C0,7
0
–0,05°
45,2°–0,10°
+0,01
0,864 0
+0,01
0,432 0
8 – R0,5
-0,05°
45,2°-0,10°
+0,10°
45,2°+0,05°
5,051
7,144
+0,008
2 – ø1,57 0
ø2,286 ±0,051 × 90°
ø0,008 XY
+0,001
2 – ø1,544 0
(Insert pin)
ø2,286 ±0,051 × 90°
ø0,025 XY
7,144
5,051
3,302
0
3,302
5,051
7,144
-0,05°
44,8°-0,10°
+0,10°
44,8°+0,05°
IEC

Flange

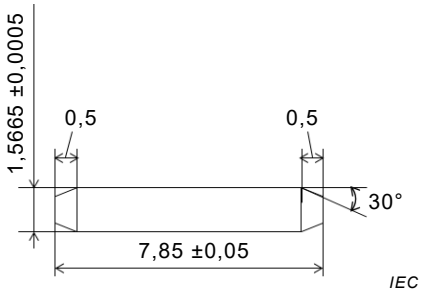


Figure 29 – Flange type G: 60154 IEC-UGC without choke or gasket groove

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