SLOVENSKI STANDARD
SIST HD 129.6 S1:2004

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Flanges for waveguides - Part 6: Relevant specifications for flanges for medium flat rectangular waveguides (IEC 60154-6:1983)

Flansche für Hohlleiter - Teil 6: Allgemeine Anforderungen für Flansche für mittelflache Rechteck-Hohlleiter (IEC 60154-6:1983)

Brides pour guides d'ondes - Partie 6: Spécifications particulières de brides pour guides d'ondes rectangulaires plats moyens (CEI 60154-6:1983)

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FLANGES FOR WAVEGUIDES
PART 6: RELEVANT SPECIFICATIONS FOR FLANGES FOR MEDIUM FLAT RECTANGULAR WAVEGUIDES

Brides pour guides d'ondes
Sixième partie: Spécifications particulières de brides pour guides d'ondes rectangulaires plats moyens

Flansche für Hohlleiter
Teil 6: Allgemeine Anforderungen für Flansche für mittelflache Rechteck-Hohlleiter

BODY OF HD

The Harmonization Document consists of:

- **IEC 154-6 (1983) edition 1; IEC/SC 46B,** not appended

This Harmonization Document was approved by CENELEC on **11 September 1984.**

The English and French versions of this HD are provided by the text of the IEC publication and the German version is the official translation of the IEC text.

According to the CENELEC Internal Regulations the CENELEC member National Committees are bound:

to announce the existence of this Harmonization Document at national level

by or before **1985-03-01**

to publish their new harmonized national standard

by or before **1986-03-01**

to withdraw all conflicting national standards

by or before **1986-03-01.**

Harmonized national standards are listed on the HD information sheet, which is available from the CENELEC National Committees or from the CENELEC General Secretariat.

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Brides pour guides d'ondes

Sixième partie: Spécifications particulières de brides pour guides d'ondes rectangulaires plats moyens

Flanges for waveguides

Part 6: Relevant specifications for flanges for medium flat rectangular waveguides

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FLANGES FOR WAVEGUIDES

Part 6: Relevant specifications for flanges for medium flat rectangular waveguides

FOREWORD

1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.

3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

4) The IEC has not laid down any procedure concerning marking as an indication of approval and has no responsibility when an item of equipment is declared to comply with one of its recommendations.

PREFACE

This standard has been prepared by Sub-Committee 46B: Waveguides and their Accessories, of IEC Technical Committee No.46: Cables, Wires and Waveguides for Telecommunication Equipment.

It forms the sixth part of IEC Publication 154 dealing with flanges for waveguides, and should be used in conjunction with Part 1: General Requirements and Measuring Methods.

Relevant specifications for other types of flanges have been issued in separate publications.

The general outline of this standard was first discussed at the meeting held in Bucharest in 1974. As a result of this meeting, a revised draft was discussed at the meeting held in Stockholm in 1976. As a result of this meeting, a draft, Document 46B(Central Office)82, was submitted to the National Committees for approval under the Six Months' Rule in May 1978.

The National Committees of the following countries voted explicitly in favour of publication:

Belgium	Korea (Republic of)
Canada	Poland
Egypt	Sweden
France	Switzerland
Germany	Turkey
Italy	United Kingdom

Some editorial comments were discussed and accepted at the meeting held in Dubrovnik in 1981.

The choice of material should be agreed upon between the purchaser and the manufacturer.

DIMENSIONAL DEVIATIONS

The values for the permissible deviations in this standard follow the principles given in ISO Recommendation R286, where:

Deviation is defined as:

algebraical difference between a size (actual, maximum, etc.) and the corresponding basic size.

Upper deviation is defined as:

algebraical difference between the maximum limit of size and the corresponding basic size.

And lower deviation is defined as:

algebraical difference between the minimum limit of size and the corresponding basic size.

It should be noted that the upper and lower deviations may have like signs, unlike signs or either deviation may be zero. This permits the basic sizes of mating shafts and holes to be identical.

The older concept of plus tolerances and minus tolerances has an undesirable limitation, in that the basic sizes of mating shafts and holes cannot be identical for clearance fits.

Other IEC publications quoted in this standard:

Publications Nos. 154-1: Flanges for Waveguides, Part 1: General Requirements.

153-6: Hollow Metallic Waveguides, Part 6: Relevant Specifications for Medium Flat Rectangular Waveguides.

FLANGES FOR WAVEGUIDES

Part 6: Relevant specifications for flanges for medium flat rectangular waveguides

Information on reflections

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 Publication 153-6: Hollow Metallic Waveguides, Part 6: Relevant Specifications for Medium Flat Rectangular Waveguides) 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 from:

$$\text{reflection loss} = 10 \log_{10} \frac{1}{\left[\frac{\lambda_g^2 \Delta a}{4a^3} + \frac{\Delta b}{b}\right]^2 + \left[\frac{4.9348 \lambda_g (\Delta a')^2}{a^3} - \frac{7.8957 (\Delta b')^2}{\lambda_g b}\right]^2} \text{ dB}$$

where:

a = basic inside width of the waveguide

b = basic inside height of the waveguide

λ_g = waveguide wavelength

Δa and Δb are the waveguide internal deviations

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

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

2. — The second term within brackets represents the worst case reflection component at a flange joint caused by the displacement of the two 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.

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 same magnitude of displacement.

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

The worst "reflection loss" in (positive) decibels for waveguides M12 to M100

Frequences	M12 (dB)	M14 to M100 (dB)
$f = 1.25\ f_c$	42.1	42.1 to 41.9
$f = 1.50\ f_c$	44.8	44.8 to 44.2
$f = 1.90\ f_c$	45.8	46.3 to 45.5

Clause No.	Item
1.	**General**
1.1	*Standardized types* The series of flanges for medium flat rectangular waveguides covered by this standard are given in Tables I and II and Figures 1 to 6, pages 16 to 23.
1.2	*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 (154). *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). U = a flange having neither a gasket groove nor a choke groove (formerly called unpressurizable*). *e)* A letter for the flange type according to the drawing. *f)* The letter and number of the waveguide for which the flange is designed. *Example:* 154 IEC – ULM 40 denotes L type flange without gasket groove for use with medium flat rectangular waveguides 153 IEC – M40. * All flat flanges shall have this designation.
2.	**Mechanical requirements**
2.1	*Dimensions*
2.1.1	*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.
2.1.2	*Shank diameter of the bolts used for alignment* The basic values and deviations thereon are specified in Tables I and II.

Clause No.	Item
2.1.3	*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. The recommended ISO fits are given in Tables I and II. *Note.* – When electrical requirements make it necessary, the hole position tolerance may be reduced and the hole diameter fit improved accordingly.
2.1.4	*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 different materials other values might be more appropriate.
2.1.5	*Surface roughness of contact area of flat flanges* For subsequent study.
2.1.6	*Flatness of contact area* The flatness of contact area shall be better than the values given in the following table:
2.1.7	*Perpendicularity of the axis of the holes* The perpendicularity of the axis of the holes to the contact area of the flange shall be $90 \pm 1/4°$.
2.2	*General requirements for assemblies*
2.2.1	*Positioning of the holes* Positioning of the holes shall be based on the theoretical symmetry lines of the inside cross-section of the waveguide unless otherwise specified.

Range of sizes	Requirement	
	(mm)	(in)
M12	For subsequent study	
M14–M26	0.05	0.002
M32–M100	0.02	0.0008