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EIA SPECIFICATION

Circular Waveguides and Flanges

EIA-200-B
(Revision of EIA-RS-200-A)

April 2018



Electronic Components Industry Association

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(From Standards Proposal No. PN-5383, formulated under the cognizance of the CE-2.2 Committee on RF Connectors and Rigid Coax Connectors and previously published in EIA- RS-200A)

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CONTENTS

Clause	Page
1. Introduction.....	1
1.1 Scope.....	1
2. Size.....	1
2.1 Definitions of Terminology	1
2.2 Out-of-Roundness	1
2.3 Mean Wall Thickness	1
2.4 Tolerances	1
2.5 Wall Thickness.....	1
2.6 Dimensions	1
3. Frequency Range	2
4. Bow	2
5. Material and Workmanship.....	2
5.1 Workmanship:.....	2
6. EIA Type Designation	3
6.1 Marking.....	3
7. Packaging And Packing	3

LIST OF TABLES

Table	Page
Table 1 – Dimensions, Tolerances, And Frequency Range For Rigid Circular Waveguides	4

LIST OF FIGURES

Figure	Page
Figure 1 – 0.875 Flange	6
Figure 2 – 1.625 Flange	7
Figure 3 – 2.125 Flange	8
Figure 4 – 3.00 Flange	9
Figure 5 – 4.00 Flange	10
Figure 6 – 5.00 Flange	11
Figure 7 – 6.25 Flange	12
Figure 8 – 7.1875 Flange	13
Figure 9 – 8.00 Flange	14
Figure 10 – 9.1875 Flange	15

Circular Waveguides

(From EIA Standards Proposal No. PN-5383, formulated under the cognizance of the EIA CE-2.2 Committee on Circular Waveguides, and previously published as RS-200A)

1. Introduction

1.1 Scope

This standard pertains exclusively to circular waveguide and their flanges. This standard does not apply to any semi-flexible transmission lines or connectors. It is the intent of this standard to provide complete mechanical interchangeability for all lines.

2. Size

2.1 Definitions of Terminology

Diameter, Mean- The mean diameter (I.D. and O.D.) is the average, at one cross section, of the maximum and minimum measured diameters usually found at, or very close to, 90° from each other.

$$\text{Mean I.D.} = \frac{\text{Max.I.D.} + \text{Min.I.D.}}{2}$$

2.2 Out-of-Roundness

Out-of-roundness of the inside of the waveguide is the total difference, found at any-one cross-section, between the individual maximum and minimum Inside Diameters which usually occurs at, or about, 90° from each other. Out-of-roundness is not expressed as plus and minus.

$$\text{Out-of-Roundness} = \text{Max. I.D} - \text{Min. I.D.}$$

2.3 Mean Wall Thickness

Mean Wall thickness is defined as one-half the difference between corresponding mean inside and outside diameters at any cross section perpendicular to the longitudinal axis.

2.4 Tolerances

The tolerance on mean diameters and the out-of-roundness are specified in Table .

2.5 Wall Thickness

The actual wall thickness as measured at any point around the periphery shall not deviate from the mean wall thickness at that cross section by more than $\pm 10\%$.

2.6 Dimensions

Dimensions and tolerances for the lines are specified in Table 1. Dimensions and tolerances for the connectors are shown on Figure 1 thru Figure 10.

3. Frequency Range

- a. Recommended frequency range for each size is specified in Table
- b. Specified frequency range assumes operation in the dominant (TE_{11}) mode or in the circular electric (TE_{01}) mode.
- c. Each specified frequency range for the TE_{01} mode operation is within 1.21 times the cutoff frequency for the TE_{01} mode and 0.91 times the cutoff frequency of the TE_{02} mode. Each specified frequency range for the TE_{11} mode operation is within 1.15 times the cutoff frequency for the TE_{11} mode and 0.95 times the cutoff frequency of the TE_{21} mode.
- d. To permit selection of optimum waveguide sizes, two overlapping series are specified.

4. Bow

- a. Bow is the departure from a straight longitudinal line connecting any two points two feet apart on the external surface of the waveguide.
- b. Bow shall not exceed 0.010 inch.
- c. Measurement of bow shall not be altered by gravity or any other forces. The size of a coaxial line is defined as the nominal outside diameter of the line, expressed in inches. The size of the connector is defined by the nominal outside diameter of the line with which it is used. Metric dimensions are for reference only and are based upon 1.0 inch equals 25.4 mm.

5. Material and Workmanship

To be specified by user. These waveguides and flanges are designed for copper alloys, aluminum 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, consistent with satisfactory electrical contact. Flanges are designed to accommodate standard cap screws and hex nuts.

5.1 Workmanship:

The interior surfaces of the finished waveguide tubing and flanges shall be as free from burrs, die marks, chatter marks, inclusions, and scratches as best commercial practice will permit. Waveguides and flanges shall be commercially uniform in composition, as straight and smooth from end to end, as uniform in wall thickness, and as free from dirt, grease, scale, and splinters as best commercial practice will permit. No folds or laps will be permitted.