

Specification for

Rigid waveguide tubing of assessed quality: Generic data and methods of test

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- British Electrical and Allied Manufacturers' Association
- British Radio Equipment Manufacturers' Association
- British Radio Valve Manufacturers' Association*
- British Railways Board
- Cable and Wireless Ltd.
- Crown Agents for Oversea Governments and Administrations*
- Department of Employment and Productivity (H.M. Factory Inspectorate)
- Electrical Contractors' Association (Incorporated)
- Electrical Research Association
- Electricity Council, the Central Electricity Generating Board and the Area Boards, in England and Wales
- Electronic Engineering Association*
- Electronic Valve and Semiconductor Manufacturers' Association*
- Institution of Electrical Engineers
- Institution of Electronic and Radio Engineers
- Institution of Production Engineers
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- Ministry of Technology
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- Relay Services Association of Great Britain
- Science Research Council — Radio and Space Research Station
- Scientific Instrument Manufacturers' Association
- Society of British Aerospace Companies
- Telecommunication Engineering and Manufacturing Association*

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committees entrusted with the preparation of this British Standard:

- British Non-ferrous Metals Federation — High Conductivity Copper Group
- Copper Development Association
- Electric Cable Makers' Confederation
- Ministry of Public Building and Works

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Committee references TLE/6 and TLE/6/6
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Contents

	Page
Co-operating organizations	Inside front cover
Foreword	iii
Section 1. Principles and mandatory procedures	
1.1 General matters	1
1.1.1 Scope	1
1.1.2 Related documents	1
1.1.3 Terminology	1
1.1.4 Letter symbols, signs and abbreviations	1
1.1.5 Graphical symbols	1
1.1.6 Marking of the part and package	2
1.1.7 Eligibility for qualification approval	3
1.1.8 Structurally similar parts	3
1.1.9 Delayed delivery	3
1.1.10 Supplementary procedure for qualification approval	3
1.1.11 Certified test records (CTRs)	3
1.1.12 Standard ratings and characteristics	4
1.1.13 Unchecked parameters	4
1.1.14 Procedure to be followed in the event of failures at Group D inspection	4
1.1.15 Ordering information	4
1.1.16 Release prior to completion of Group B tests	4
1.1.17 Protection	4
1.2 Test procedures	4
1.2.1 Measurement conditions	4
1.2.2 Visual inspection	4
1.2.3 Dimensioning and gauging procedures	4
1.2.3.1 Dimensions	4
1.2.3.2 Eccentricity	4
1.2.3.3 Bow	4
1.2.3.4 Twist	4
1.2.3.5 Shape of cross section	4
1.2.3.6 Ellipticity (of circular waveguide)	4
1.2.4 Electrical test procedures	4
1.2.5 Mechanical test procedures	5
1.2.6 Environmental test procedures	5
1.2.7 Endurance test procedures	5
Section 2. Rules for the preparation of detail specifications	
2.1 Basic information	5
2.1.1 Originator of the specification	5
2.1.2 Specification number	5
2.1.3 Description of the part and intended application	5
2.1.4 Outline drawing	5
2.1.5 Ratings (including limiting conditions of use)	5
2.1.6 Characteristics	5
2.1.7 Related documents	5
2.1.8 Additional information	5
2.1.9 Marking	6

	Page
2.2 Inspection requirements	6
2.2.1 Group A inspection	6
2.2.2 Group B inspection	6
2.2.3 Group C inspection	6
2.2.4 Group D inspection	6
2.3 Certified test records	6
2.3.1 General	6
2.3.2 Attributes information	6
2.3.3 Measurements information	6
Appendix A Example of certified test record	8
Appendix B Example of a detail specification	11
Table 1A — Dimensions for ordinary rectangular waveguide type R	15
Table 1B — Dimensions for ordinary rectangular waveguide type R	16
Table 2 — Surface roughness in micrometers and micro-inches	17
Table 3 — Weight data for ordinary rectangular waveguide — type R	18

Foreword

This British Standard, which has been prepared under the authority of the Telecommunication Industry Standards Committee, is the generic specification for rigid waveguide tubing in the system of standards for electronic parts of assessed quality.

This standard covers principles and mandatory procedures in Section 1, and rules for the preparation of detail specifications in Section 2. It takes account of IEC Publication 153, "Hollow metallic waveguides".

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 18 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. Principles and mandatory procedures

1.1 General matters

1.1.1 Scope. This British Standard gives details of test requirements and other general information relating to rigid waveguide tubing of assessed quality of the following types:

- 1) Ordinary rectangular waveguide.
- 2) Rectangular waveguide with circular outside cross section.
- 3) Medium flat waveguide.
- 4) Flat rectangular waveguide.
- 5) Circular waveguide.
- 6) Ridged waveguide.
- 7) Square waveguide.

It is intended to be read in conjunction with BS 9000 and with the relevant detail specifications which give the dimensions, ratings and test requirements for specific types.

Rules governing the contents and presentation of the detail specifications, for use by BSI technical panels or parts manufacturers, are given in Section 2 and the appendices to this standard.

1.1.2 Related documents

BS 204, *Glossary of terms used in telecommunication (including radio) and electronics.*

BS 1134, *Centre-line-average height method for the assessment of surface texture.*

BS 1471, *Wrought aluminium and aluminium alloys for general engineering purposes. Drawn tube.*

BS 1991, *Letter symbols, signs and abbreviations.*

BS 2870, *Specification for rolled copper and copper alloys: sheet, strip and foil.*

BS 2871, *Schedule of copper and copper alloys. Tubes.*

BS 3839, *Oxygen-free, high-conductivity copper for electronic valves and semiconductor devices.*

BS 3939, *Graphical symbols for electrical power, telecommunications and electronics diagrams.*

BS 4000, *Sizes of paper and board.*

BS 9000, *General requirements for electronic parts of assessed quality.*

1.1.3 Terminology. The terms and their definitions which are employed in this generic specification and/or in the associated detail specifications shall, wherever possible, be in accordance with BS 204. In addition to the terms in BS 204 the following specific terms and their definitions are applicable to the family of parts covered by this generic specification.

1) *Lot.* The production quantity of any one size and material of rigid waveguide tubing which is processed at any one production run, subject to the quantity not comprising more than the production from seven consecutive days (including if necessary a break in production not exceeding two days).

2) *Unit of product.* The finite length of rigid waveguide tubing presented for inspection. These lengths shall, where possible, be the stock lengths or shorter.

3) *Eccentricity.* The eccentricity of the inside to the outside cross section is defined as half the difference between the measured thickness of the opposite walls, at a given cross section.

4) *Twist.* (Not applicable to circular waveguide). The relative rotation of two external cross sections of a piece of waveguide about its longitudinal axis, the cross sections being normal to this axis and a specified distance apart.

5) *Bow.* The maximum deviation of the actual axis of waveguide from a straight line connecting two points on the axis separated by a specified length.

6) *Ellipticity* (Of circular waveguide).

Ellipticity $E = \frac{D_{\max} - D_{\min}}{D_{\text{nom}}}$ where, at a given

cross section,

D_{nom} = the nominal inside diameter,

$D_{\max}$ = the largest measured inside dimension,

$D_{\min}$ = the smallest measured inside dimension.

7) *Nominal wall thickness.* Half the difference between nominal outside and inside dimensions in the original system of units.

1.1.4 Letter symbols, signs and abbreviations.

Any letter, symbols, signs and abbreviations which are employed shall be in conformity with BS 1991¹⁾ or shall be derived in accordance with the principles of that standard.

1.1.5 Graphical symbols. Any graphical symbols which are employed shall be in conformity with BS 3939²⁾ or shall be derived in accordance with the principles of that standard.

¹⁾ BS 1991, "Letter symbols, signs and abbreviations".

1.1.6 Marking of the part and package

1.1.6.1 Marking. Each waveguide and its package shall be clearly and indelibly marked with the following information:

- 1) Type, size and material designation (see 1.1.6.2).
- 2) Date code (including lot identification, see BS 9000).
- 3) Manufacturer's identification.

The marking shall be made near one end of the length of waveguide. For small sizes where such marking is not practicable the marking shall be as prescribed in the relevant detail specification.

The method of marking shall not be detrimental to the performance of the waveguide.

1.1.6.2 Type, size and material designation.

Waveguides defined by this specification shall be designated by a code comprising the following information in the order shown:

- 1) The BS number of the detail specification.
- 2) A letter indicating the shape of the waveguide cross section as follows:

R = Rectangular (in which the ratio of width to height is substantially 2 : 1).

P = Rectangular with circular outside cross section.

M = Medium flat (in which the ratio of width to height is substantially greater than 4 : 1).

F = Flat rectangular (in which the ratio of width to height is in principle 8.33 : 1).

C = Circular.

S = Single ridge (2.4 bandwidth).

Z = Single ridge (3.6 bandwidth).

D = Double ridge (2.4 bandwidth).

T = Double ridge (3.6 bandwidth).

- 3) A code number for each size in accordance with those shown in the detail specifications. This number is indicative of the centre frequency (in units of 0.1 GHz) of the waveguide.

- 4) A letter designating the material used (see 1.1.12.1):

Class 1 materials. Class 1 materials are aluminium or aluminium alloys containing not less than 95 % aluminium. The following materials are included in Class 1:

A = Aluminium conforming to TIC of BS 1471³⁾.

B = Aluminium alloy conforming to NT4 of BS 1471.

C = Aluminium alloy conforming to NT6 of BS 1471.

D = Aluminium alloy conforming to HT9 of BS 1471.

E = Aluminium alloy conforming to HT15 of BS 1471.

F = Aluminium alloy conforming to HT20 of BS 1471.

G = Aluminium alloy conforming to HT30 of BS 1471.

Class 2 materials. Class 2 materials are copper-zinc alloys containing between 1 % and 35 % zinc. The following materials are included in Class 2:

H = Brass conforming to CZ101 of BS 2870⁴⁾.

J = Brass conforming to CZ105 of BS 2871⁵⁾.

Class 3 materials. Class 3 materials are copper with not more than 1 % of other materials. The following materials are included in Class 3:

K = Copper conforming to C101 or C102 of BS 2871⁵⁾.

L = Copper conforming to C103 of BS 2871.

M = Copper conforming to C106 of BS 2871.

N = Copper conforming to BS 3839⁶⁾.

Class 4 materials. Class 4 materials are silver or silver copper alloys containing not less than 87 % silver. The following material is included in Class 4:

S = Silver (92.5 % silver 7.5 % copper).

Other materials

X = Other materials (composition to be specified in the detail specification).

²⁾ BS 3939, "Graphical symbols for electrical power, telecommunications and electronics diagrams".

³⁾ BS 1471, "Wrought aluminium and aluminium alloys for general engineering purposes. Drawn tube".

⁴⁾ BS 2870, "Specification for rolled copper and copper alloys: sheet, strip and foil".

⁵⁾ BS 2871, "Schedule of copper and copper alloys. Tubes".

⁶⁾ BS 3839, "Oxygen-free, high-conductivity copper for electronic valves and semiconductor devices".