

Specification for

Plastics/metal laminate collapsible tubes

Committees responsible for this British Standard

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Cosmetic, Toiletry and Perfumery Association Ltd.
Coopted members

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Foreword

This British Standard has been prepared under the direction of the Packaging and Freight Containers Standards Policy Committee.

Metal collapsible tubes have been used as a means of packaging for many years, but the last decade has seen the development and increasing use of collapsible tubes made from plastics/metal laminates. Originally used for dentifrice, plastics/metal laminate collapsible tubes are now gaining wide acceptance as containers for other products previously packed in metal collapsible tubes.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover 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.

1 Scope

This British Standard specifies the diameters, lengths, wall thickness and thread details for plastics/metal laminate collapsible tubes.

The material used in the manufacture of the tubes is specified as are the requirements for seal integrity, side-seam welding, shoulder welding, fill volumes, surface print restrictions and packaging.

NOTE The titles of the publications referred to in this standard are given on the inside back cover.

2 Definitions

For the purposes of this British Standard the following definitions apply.

2.1

collapsible tube

a cylinder of pliable plastics/metal laminate which can be sealed in such a manner that its contents, although readily discharged in any desired quantity, are protected from contact with air or moisture during the whole period of use as a container

2.2

shoulder

a moulded plastics component part of a total tube body which forms the nozzle end of the tube

2.3

nozzle

the outlet of a collapsible tube through which the contents are expelled by squeezing the wall of the tube

2.4

tamper-evident nozzle

a nozzle which has the orifice closed by, for example, a thin diaphragm which is capable of being pierced

2.5

cap

a screw closure for the nozzle end of a collapsible tube

3 Materials: design and manufacture

3.1 Tube body

The tube body shall be constructed from a laminate comprising a metal centre layer (preferably aluminium) and plastics outer layers. The laminate shall consist of not less than five layers in total. Two of the layers adjacent to the metal shall function as adhesive layers. The outer layers of the laminate shall be either white-pigmented or clear and the laminate shall be printed either by reverse printing the outer clear plastics layer prior to lamination or alternatively the finished laminate may be surface printed, in which case the whole of the print area shall also be over-varnished.

NOTE 1 It is current practice for the body material of tubes within the diameter range of 22 mm to 35 mm inclusive to have a thickness of 320 μm . Tubes of 25 mm diameter and less may be manufactured from body material of 275 μm thickness.

When required, the tube body shall be tested for laminate whiteness in accordance with Appendix A and for laminate interply adhesion in accordance with Appendix B.

NOTE 2 Acceptance criteria should be as agreed between the interested parties.

3.2 Tube shoulder

This shall be produced from a grade of plastics appropriate to the end use of the tube and attached to the body by either a moulding process or a welding process.

The shoulder shall be provided with a tamper-evident device if ordered by the final customer.

NOTE The tube shoulder may be fitted with a rondelle. This is a disc of material, usually body laminate material, cut to the dimensions of the exterior or interior shoulder, that has barrier properties.

3.3 Tube cap

Tubes shall be supplied fitted with the tube cap moulded from a grade of plastics material appropriate to the end use of the tube.

The integrity of the seal between the cap and the tube shall be tested in accordance with one of the procedures described in Appendix C. No leakage shall occur.

NOTE The test to be used and the rejection limits for leaking tubes should be agreed between the purchaser and the manufacturer.

3.4 Tube insert

When required, tubes shall be fitted with a shoulder insert moulded from a plastics material which has the appropriate barrier properties (e.g. polyester).

3.5 Welding

3.5.1 Side-seam welding

The effectiveness of the side-seam welding operation shall be examined by using the copper sulphate continuity test or the burst strength test, both of which are described in Appendix D.

The maximum conductivity limits for the continuity test shall be as given in Table 1.

Table 1 — Maximum conductivity limits for the continuity test

Tube length	Tube diameter	Limit (maximum)
mm	mm	mA
< 75	} All	25
76 to 100		35
101 to 150		50
151 to 200		75

3.5.2 Shoulder welding

The effectiveness of the body to shoulder welding shall be examined by the burst strength test as described in Appendix D. The tube shall not fail at any point.

4 Dimensions

4.1 General

The dimensions and shoulder angles of collapsible tubes shall be in accordance with Figure 1 and Figure 2.

NOTE When specifying collapsible tubes the purchaser's requirements should be stated in the following order:

- diameter;
- length;
- orifice diameter (when a choice is available);
- cap detail (when a choice is available).

The nomenclature of collapsible tubes is given in Figure 3.

4.2 Standard tube diameters

The nominal outside diameter, measured at the shoulder of the finished tube, shall be 19 mm, 22 mm, 25 mm, 28 mm, 30 mm, 32 mm, 35 mm or 40 mm.

For all diameters the tolerance $+0.5 \text{ mm} - 0.2 \text{ mm}$ shall apply.

The tube body shall be essentially cylindrical throughout its length, but some degree of ovality is permissible because of the inherent flexibility of the body material and this shall be most pronounced at the open end of the tube. Ovality shall be determined in accordance with Appendix E and shall be not greater than 10 %.

4.3 Tube lengths

For all lengths the tolerance $\pm 2.0 \text{ mm}$ shall apply.

NOTE By convention tube length refers to the length of the laminate body (standard tube lengths are in the range 75 mm to 200 mm in increments of 5 mm).

Tube lengths outside this range are special cases and should be agreed between user and supplier.

4.4 Typical fill volumes

The fill volume, i.e. the total volume of the product to be filled into the tube, shall be as follows for the given tube dimensions which also allow for ullage to enable tubes to be sealed.

Fill volume	Diameter	Length
15 ml	19 mm	85 mm
25 ml	22 mm	100 mm
30 ml	22 mm	105 mm
50 ml	25 mm	145 mm
75 ml	28 mm	165 mm
100 ml	32 mm	175 mm
125 ml	35 mm	185 mm
150 ml	35 mm	200 mm
150 ml	40 mm	175 mm

4.5 Tube shoulder mouldings

NOTE Complete standardization of shoulder mouldings is not possible as complete specification depends on the type of tube manufacturing system used.

Standardization of threads and orifice size shall be as follows:

Dentrifice tubes:	13.1 mm Butress thread 7.7 mm Orifice size
Pharmaceutical tubes	M11 or M15 threads 4.8 mm Orifice size
Caps:	Caps shall suit thread dimensions of shoulders. See Figure 4 and Figure 5 for cap dimensions. Tolerances on mouldings shall be as indicated on the drawings.

5 Surface print requirements for laminate tubes

5.1 Available print area

An area of the tube in the vicinity of both the body and the shoulder welds shall be left free from print and varnish. The available print areas for the various standard tube diameters shall be as specified in Figure 6.

NOTE There is less available print area on the reverse panel. This is because of the tube side seam weld, which is positioned on the reverse panel and away from what is the fold line when the tube is end-sealed.

5.2 Colour registration

A colour-to-colour registration tolerance of $\pm 0.5 \text{ mm}$ shall apply.

Where colours are inset 0.5 mm colour overlap shall be allowed to reduce the risk of a white outline.

5.3 Print and laquer adhesion and flexibility

When tested in accordance with Appendix F there shall be no cracking or loss of adhesion of the print and/or laquer at any of the folds.