

Specification for

Multi-trip glass bottles for beer and cider

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 British Food Manufacturing Industries Research Association
 British Paper and Board Industry Federation (PIF)
 British Stationery and Office Products Federation
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The organizations marked with an asterisk in the above list, together with the following, were directly represented on the Technical Committee entrusted with the preparation of this British Standard:

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 Brewers' Society
 British Soft Drinks Council
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 Pira (The Research Association for the Paper and Board, Printing and Packaging Industries)
 Process Plant Association
 Scotch Whisky Association
 Scottish Association of Soft Drinks Manufacturers
 Wine and Spirit Association of Great Britain
 Technical expert

This British Standard, having been prepared under the direction of the Packaging and Freight Containers Standards Committee, was published under the authority of the Executive Board and comes into effect on 30 September 1981

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The following BSI references relate to the work on this standard:
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Amendments issued since publication

Amd. No.	Date of issue	Comments
3958	March 1982	Change to clause 14
4813	April 1985	New Figure 1 and change to Figure 5
4887	July 1985	Change to equations in 13.1.4
10882	January 2001	Indicated by a sideline

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Foreword

This British Standard has been prepared under the direction of the Packaging and Freight Containers Standards Committee, at the request of the Glass Manufacturers' Federation, the Brewers' Society, and the National Association of Cider Makers.

The control of capacity is a statutory requirement as stipulated in the Measuring Container Bottles (EEC Requirements) Regulations 1977 (UK Statutory Instrument 1977 No. 932) which implements EEC Directive 75/107. The method of assessing compliance is given in full in the EEC Directive 75/107 on the approximation of the laws of member states relating to bottles used as measuring containers.

NOTE The design and dimensions of the neck finish shown in Figure 4 are based on glass container finish reference GF 319 prepared by the Glass Manufacturers' Federation, 19 Portland Place, London W1N 4BH.

This British Standard calls for the use of substances and/or procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and in no way absolves the user from statutory obligations relating to health and safety at any stage of manufacture or use. In particular, attention is drawn to the tests for internal pressure resistance and thermal shock resistance and to the use of monochlorobenzene in the test for light transmission of amber bottles.

This British Standard supersedes BS 5144 which is therefore withdrawn.

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 and ii, pages 1 to 12, an inside back cover and a back cover.

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1 Scope

This British Standard specifies the design and dimensions, neck finish, capacity, internal pressure resistance, verticality, thermal shock resistance, and markings for glass bottles for beer and cider of 275 ml, 550 ml and 1.13 litre nominal capacity intended for multi-trip use as measuring containers. The bottles are designed for a carbonation level not exceeding 3 volumes (6 g of carbon dioxide per litre), measured at 20 °C and 1 bar¹⁾ pressure.

Gauges for measuring dimensions, together with methods of test for capacity, internal pressure resistance, verticality, and thermal shock resistance, are also specified.

2 References

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

3 Definitions

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

3.1

carbonation level

the number of volumes of carbon dioxide gas dissolved in one volume of liquid, measured at 20 °C and 1 bar pressure. Alternatively, it can be expressed in grams of carbon dioxide per litre

3.2

filling level

the distance from the top of the neck finish to the centre of the meniscus measured on the centre line of the bottle

3.3

internal pressure resistance

the amount of internal pressure that the bottle can withstand for 60 s without breaking

NOTE This property was referred to in previous standards as "bursting strength".

3.4

multi-trip bottle

a bottle having strength characteristics that enable it to perform a number of trips

3.5

vacuity

the free space left above the liquid in a sealed container. It is expressed as a percentage of the nominal volume of the liquid

3.6

verticality

the horizontal deviation of the centre of the bore entrance from a vertical line through the centre of the base when the bottle is standing upright on a horizontal surface

(For the method of measurement, see 13.4.)

4 Material

The bottles shall be made from soda-lime glass of amber colour that allows transmission of between 25 % and 50 % of light at 550 nm wavelength, measured in air through glass of 2 mm thickness, when tested in accordance with 13.1.

5 Bottle design

The bottle designs shall be as shown in Figure 1, Figure 2 and Figure 3. The glass distribution shall be as uniform as possible.

The approximate mass of glass shall be as follows:

275 ml nominal capacity bottles	290 g
550 ml nominal capacity bottles	455 g
1.13 litre nominal capacity bottles	795 g

6 Dimensions

6.1 General. The bottle dimensions shall be as shown in Figure 1, Figure 2 and Figure 3.

Untoleranced dimensions are for mould-making purposes only.

Sampling and acceptance levels shall be in accordance with 12.1.

6.2 Measurement of body diameter. The toleranced body diameters (at the shoulder and the base, see Figure 1, Figure 2 and Figure 3) shall be measured by means of GO, NO-GO gauges, using a ring gauge for the maximum diameter, and a gap gauge with a 50 mm wide anvil for the minimum diameter.

6.3 Measurement of neck finish diameter. The diameter of the neck finish shall be measured using a Parnaby gauge as shown in Figure 6, in which each engaging surface subtends an angle of 36°.

7 Capacity

7.1 Capacity at filling level. The capacity at filling level, when tested in accordance with 13.2, shall be as follows:

275 ml nominal capacity bottles	275 ± 6 ml
550 ml nominal capacity bottles	550 ± 10 ml
1.13 litre nominal capacity bottles	1 130 ± 11.3 ml

¹⁾ 1 bar = 10⁵ N/m² = 100 kPa.

Sampling shall be in accordance with **12.2**.

7.2 Filling level. The filling level shall be as shown in Figure 1, Figure 2 and Figure 3, as appropriate.

7.3 Design vacuity. The approximate design vacuity shall be as follows:

275 ml nominal capacity bottles	6.5 %
550 ml nominal capacity bottles	7.1 %
1.13 litre nominal capacity bottles	4.3 %

NOTE The following values for brimful capacity are included for guidance, where displacement fillers are used:

275 ml nominal capacity bottles	293 ± 7 ml
550 ml nominal capacity bottles	589 ± 12 ml
1.13 litre nominal capacity bottles	1 181 ± 13.5 ml

8 Neck finish

8.1 Design and dimensions. The design and dimensions of the neck finish shall be as shown in Figure 4 for the 1.13 litre bottle, and as specified in BS 1918-2 for the 275 ml and 550 ml bottles.

Sampling and acceptance levels shall be in accordance with **12.1**.

8.2 Bore dimensions. Bore dimensions shall be measured using a gauge that enters the neck vertically.

8.3 Closure integrity. All sealing surfaces shall be essentially smooth and free from features that prevent adequate sealing.

9 Internal pressure resistance

The minimum resistance to internal pressure of the bottles, as tested on receipt by the bottler, shall be 11 bar sustained for 60 s, when tested in accordance with **13.3**.

Sampling and acceptance levels shall be in accordance with **12.1**.

NOTE 1 bar = 10⁵ Pa
1 bar = 0.98 kg/cm²
1 bar = 14.5 lbf/in²

10 Verticality

The maximum verticality (see **3.6**) of the bottles, when tested in accordance with **13.4**, shall not be greater than:

275 ml nominal capacity bottles	2.6 mm
550 ml nominal capacity bottles	3.1 mm
1.13 litre nominal capacity bottles	3.3 mm

Sampling and acceptance levels shall be in accordance with **12.1**.

11 Thermal shock resistance

The bottles shall resist, without breakage, the thermal shock imposed by a fall in temperature of 35 °C when tested in accordance with **13.5**.

Sampling and acceptance levels shall be in accordance with **12.1**.

12 Sampling and acceptance levels

12.1 Dimensions, neck finish, internal pressure resistance, verticality and thermal shock resistance. The sampling and acceptance levels for dimensions, neck finish, internal pressure resistance, verticality and thermal shock resistance shall be in accordance with Table 1.

12.2 Sampling for capacity at filling level test. The number of bottles in the sample for the capacity test shall be as follows, depending on the method to be used to determine compliance with UK Statutory Instrument No. 932 (see foreword).

a) *Standard deviation method:* the sample size shall be 35 bottles which are representative of one hour's production of the bottles.

b) *Mean range method:* the sample size shall be 40 bottles which are representative of one hour's production of the bottles. The sample of 40 bottles is subdivided into 8 subgroups of 5 bottles.

NOTE UK Statutory Instrument No. 932 (see foreword) refers primarily to determination of capacity by the manufacturer or inspector. For capacity testing by the bottle user or other interested party, consultation should be held with the bottle manufacturer in order to establish a scheme of sampling which complies with this subclause.

13 Test methods

13.1 Light transmission

13.1.1 Apparatus

13.1.1.1 A means of producing a beam of light with a wavelength band centred on 550 nm.

NOTE A band width between 530 nm and 570 nm, as obtained by means of an optical filter, is acceptable.

13.1.1.2 Equipment capable of passing the beam of light through a glass specimen and measuring the transmitted light intensity (I) in relation to the incident intensity (I_0). The equipment may be calibrated in % transmission [= (I/I_0) × 100] or in optical density [= log₁₀ (I_0/I)].

13.1.2 Specimen preparation. Use either an unpolished piece of glass cut from the wall of a bottle or grind and polish a glass specimen to give a glass plate of approximately 2 mm thickness. In either case, if the specimen is not exactly 2 mm thick, it will be necessary to measure the average thickness and correct the result as given in **13.1.4**.