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SPECIFICATION FOR GLASS BOTTLES WITH CROWN FINISH (650 ml and 325 ml)

> ලංකා පුමිති කාර්යාංශය BUREAU OF CEYLON STANDARDS

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SPECIFICATION FOR GLASS BOTTLES WITH CROWN FINISH (650 ml and 325 ml)

S.L.S. 228: 1973 (Attached AMD 75)

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Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This Standard does not purport to include all the necessary provisions of a contract.

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CEYLON STANDARD SPECIFICATION FOR GLASS BOTTLES WITH CROWN FINISH (650 ml and 325 ml)

FOREWORD

This Sri Lanka Standard Specification was prepared by the Drafting Committee on Glass Bottles with Crown Finish (Capacities 650 ml and 325 ml). It was approved by the Metric Divisional Committee of the Bureau of Ceylon Standards and was authorised for adoption and publication by the Council of the Bureau on 12th November, 1973.

This Standard covers only the glass bottles with crown cork finish used for packing edibles such as beers, oils, etc., and non-edibles such as agricultural and industrial chemicals. Two types of bottles, one to be used for packing edibles and the other to be used for packing non-edibles are specified. The nominal capacities given in this standard are chosen such that it will not be necessary to change the existing types of bottles used for packing edibles as well as non-edibles.

For size grading, C.S. Sieves conforming to C.S. 124: 1972—Test Sieves are specified. Where these sieves are not available other equivalent Standard sieves as judged by the aperture, may be used.

All standard values given in this standard specification are in SI (Metric) units. Equivalent values in imperial units given in brackets are for guidance; These equivalents have been calculated in accordance with C.S. 116: 1971—Principles of Conversion.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or observation shall be rounded off in accordance with C.S. 102: 1971—Presentation of Numerical Values. The number of figures to be retained in the rounded off value shall be the same as that of the specified value in this standard.

Amended 1. SCOPE

This Sri Lanka Standard specifies the requirements and methods of test for glass bottles with crown cork finish and of nominal capacities, 650 ml (22.9 fl.oz) and 325 ml (11.4 fl.oz).

2. TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

- 2.1 Nominal capacity—The volume of the fluid normally expected to be filled in the bottles at $27\pm2^{\circ}$ C.
- 2.2 Brimful capacity—The volume of fluid required to fill the bottle completely at 27±2°C.
- 2.3 Cords—Glassy inclusions of different composition particularly in the form of drawn out lines and possessing optical and other properties differing from those of the surrounding glass.
- 2.4 Bubble—A cavity within glass.
- 2.5 Blisters—Bubbles of more than 2.0 mm in diameter. It shall be measured by the average of the maximum and minimum dimensions.
- 2.6 Stones—Imperfections in glass resulting from inclusions from such sources as batch materials, refractories and blow pipes or resulting from devitrification of glass.
- 2.7 Hairline Crack—A crack in the form of a faint line on the glass surface.
- 2.8 Wedged Bottom—A bottom which is thick at one side and thin at the other side.
- 2.9 The terms sealing surface, Finish, Bead, Neck, Body, Insweep, Bottom, Base and Push-up shall be as defined in Fig. 5.

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S.L.S 228: 1973

3. TYPES

Bottles shall be of the following two types:—

Type I: Bottles to be used for packing edibles.

Type II: Bottles to be used for packing non-edibles.

4. REQUIREMENTS

4.1 Quality of Glass and Workmanship—The glass shall be free from cords, bubbles, blisters, stones, hair line cracks and any other visible defects, that may impair the strength, efficiency or appearence of the bottle.

The bottle shall have a smooth internal finish. They shall be well formed with uniform distributions of glass all over the walls and the base, avoiding any wedge bottom and particularly thin sections in the wall. The sealing surface shall be perfectly smooth and the mould seam of the neck finish shall have no protruding edges. The bottle shall have an insweep at the base of the body and the bottom of the body shall have the minimum amount of push-up necessary to obviate the bottle rocking on its base.

4.2 Limit of Alkalinity—The bottle shall pass the test prescribed in Clause 6.2.

Shapes and Dimensions—The general shape of the Type I—bottle shall be as in Fig. 1 and that of the Type II—bottle shall be as in Fig. 2. The height and body diameter of the bottles of Types I and II shall be as given in Figures 1 and 2 respectively. The crown finish shall conform to the dimensions given in Appendix A.

Note: The dimensions given in Appendix A may be superseded by a Ceylon Standard on Glass Container finishes.

Brimful Capacities—Brimful capacities of the bottles, when determined as mentioned in Clause 6.4 shall be as follows:

Nominal Capacity	Brimful Capacity			
ml (fl. oz.)	min. ml (fl. oz.)	max. ml (fl. oz.)		
650 (22.9) 325 (11.4)	670 (23.6) 350 (12.3)	680 (23.9) 356 (12.5)		

Note—If the contents are filled under pressure the filling capacities shall be 625 ml (22.0 fl. oz.) and 325 ml (11.4 fl. oz.).

And:

4.5 Mass—The maximum permitted mass of the bottles shall be as follows:—

650 ml bottle: 600g.

325 ml bottle: 362g.

- 4.6 Thermal Shock Test—The bottles when subjected to the test prescribed in Clause 6.6 shall not break or show signs of crack.
- 4.7 Impact Test—The bottles shall pass the impact test mentioned in Clause 6.7
- 4.8 Bursting Strength Test—The bottles of Type I shall not break or show signs of crack when subjected to bursting strength test, prescribed in Clause 6.8.
- 4.9 Parallelism between the Base and the Top Sealing Surface—The base of the bottle shall be parallel to the top sealing surface to within 0.75° when tested as described in Clause 6.9.
- 4.10 Verticality—The bottles shall pass the verticality test mentioned in Clause 6.10.
- **4.11 Colour**—The colour of the bottles shall be as agreed to between the manufacturer and the purchaser.

5. PACKING AND MARKING

- 5.1 Packing—The bottles shall be packed as agreed to between the purchaser and the supplier.
- 5.2 Marking—The bottles shall be permanently and legibly marked on its surface with the following information.
 - (i) Maker's name, or registered trade mark, if any,
 - (ii) Nominal Capacity followed by letters 'ml'.
 - (iii) Production year or identification number.

6. METHODS OF TEST

6.1 Quality of Glass and Workmanship

Bottles shall be examined for the requirements of Clause 4.1 by visual inspection.

6.2 Test for Alkalinity

6.2.1 Apparatus

- 6.2.1.1 Erlenmeyer Flask Assembly—Of chemically resistant glass, preferably borosilicate; consisting of Erlenmeyer flask of 250 ml capacity with a suitable reflux condenser with ground glass joints.
- 6.2.1.2 Graduated Flask—Of chemically resistant glass, of known brand (preferably borosilicate), 250 ml capacity.
- 6.2.1.3 Mortar—A suitable mortar made of steel.
- 6.2.1.4 Test Sieves—Two, one of apperture size 425 μ m and the other of aperture size 600 μ m (see C.S. 124: 1971—Test Sieves)

6.2.2 Reagents

- 6.2.2.1 Quality of Reagents—Unless specified otherwise, chemicals of analytical grade and distilled water shall be employed in tests.
- 6.2.2.2 The following reagents are required:—
 - (i) Standard Hydrochloric Acid Solution-0.01 N.
 - (ii) Ethyl Alcohol or Rectified Spirit-
 - (a) ethyl alcohol, 95 percent by volume or
 - (b) rectified spirit, containing 95 percent ethyl alcohol by volume.
 - (iii) Standard Sodium Hydroxide Solution-0.05 N.
 - (iv) Methyl Red Indicator—Dissolve 0.04 g of methyl red in 75 ml of ethyl alcohol or rectified spirit. Add 1.5 ml of standard sodium hydroxide solution or a quantity sufficient to ensure that the colour of the solution corresponds to pH 5.2 and then dilute to 100 ml with water.
 - (v) Test Solution—Take 1.0 ml of standard hydrochloric acid and 1.0 ml of methyl red indicator in a previously tested Erlenmeyer flask (See 6.2.3.1) and 240 ml of water. Boil for five minutes, cool quickly under running water and make up to 250 ml in the graduated flask.

6.2.3 Testing of Erlenmeyer Flask Assembly

6.2.3.1 Transfer 100 ml of test solution to the Erlenmeyer flask to be tested. Place the flask quickly in a bath of boiling water so that the level of the solution in the flask is below the level of the water in the bath and attach a small reflux condenser. Continue boiling for one hour and at the end of this period observe the colour of the solution. Reject the flask if any change of the colour of the test solution has taken place.

Erlenmeyer flask assemblies which have once passed the test for suitability may fail to do so after prolonged storage. In such a case, they may be reviewed by washing with 5 percent (m/v) solution of glacial acetic acid followed by washing with water until free from acid before use.

6.2.4 Procedure

6.2.4.1 Use Erlenmeyer flasks as tested under 6.2.3.1. Rinse the glass bottles selected for this test with distilled water, dry in a stream of dry air and crush them in the mortar such that the glass particles pass through the sieve of aperture size 600 \(\mu \) m but fail to pass through the sieve of aperture size 425 μ m. The crushing and sieving should be done in three to four stages to avoid too much fines. Spread the sieved particles, weighing more than 5 g, on a glazed paper and pass a magnet over them to remove any particles of iron which may have been introduced during crushing. Wash the sieved glass free from dust in Erlenmeyer flask with four successive 30 ml portions of ethyl alcohol or rectified spirit and dry the flask and contents at 98°C to 100°C. Take two more Erlenmeyer flasks and transfer exactly 5 g of the sieved, clean, dry glass to one of the two flasks. Transfer a 100 ml portion of the freshly prepared test solution (see 6.3.2.2 v) to both flasks. Place the flasks quickly in a bath of boiling water so that the levels of the contained solutions are below the level of the water in the bath and attach the previously tested reflux condensers. Keep the flasks in the boiling water bath for 30 minutes and then take them out and cool quickly under running water. From the first flask containing powdered glass sample, decant out test solution into a third Erlenmeyer flask. 4 ml of water to the powdered glass residue in the first flask, shake a little and decant out into the third flask, taking care to see that transference of the powdered glass is avoided as far as possible. Also add 4 ml of water to the second flask containing only the test solution (blank), titrate the solution in the third flask immediately with standard hydrochloric acid to the pink colour of the blank test solution in the second flask.

6.2.5 Result

The glass containers shall be taken to have passed the test if not more than 3 ml of 0.01 N hydrochloric acid is required for the titration.

6.3 Shapes and Dimensions

Bottles shall be examined for compliance with Clause 4.3. Acceptable limit gauges or measuring instruments of accuracy sufficient to carry out measurements to that precision indicated by the specified dimensions, shall be used.

6.4 Capacity of a Single Bottle

- **6.4.1** Apparatus—A balance having a limit of error of 0.1 g and a thermometer.
- bottle to the nearest 0.1 g. Fill the bottle with distilled water at a temperature between 20°C and 30°C to approximately 25 mm (1.0 in) below the top, keeping the outside of the bottle dry. After half an hour, measure the temperature of the water in the bottle. Using a depth gauge to the centre of the surface of the liquid, adjust the water level in the bottle exactly to the brim. Weigh the bottle and the contents to the nearest 0.1 g. Calculate the capacity of the bottle as follows:—

Capacity of bottle in millilitres at T₁ °C

 $= (m_2-m_1) \times V \times [1-0.0002 (T_1-29)]$

Where $m_1 = mass of empty bottle in g,$

m₂ = mass of bottle filled to the brim with distilled water in g,

T₁ = temperature of the water in degree Celsius,
 V = the volume, in millilitres, per gramme water at 29°C, and

0.0002 = the coefficient of expansion of water per degree Celsius in the range 10°C to 30°C.

6.5 Mass—Mass of the bottle shall be determined to an accuracy of ± 0.5 g.

6.6 Thermal Shock Test-

6.6.1 Apparatus—The apparatus shall consist essentially of a basket for holding the glassware upright, two tanks, one containing hot water and one containing cold water and an automatically timed means for immersing and transferring the basket of bottles from the hot to the cold bath.

A device shall be provided to maintain the temperature of the baths within $\pm 1^{\circ}$ C of the specified temperatures. Indicating controllers which control the heating of the hot water and cooling of the cold water are recommended. A suitable set up is given in Fig. 4. The capacity of each tank shall be at least 10 litres per kilogramme of glass tested.

6.6.2 Procedure—The temperature of the baths shall be adjusted so that the cold bath is at 27°C and the hot bath is at 75°C. The basket shall be filled or partially filled with empty bottles, and when the temperatures of the baths are within±1°C of those specified, the basket shall be immersed in the hot bath in such a manner that the bottles become completely

filled with hot water, allowed to soak for 5 minutes, transferred to the cold bath and immersed for 30 secs, and then removed from the cold bath. The 5 minute immersion in the hot bath shall be controlled within 10 secs. During the test the apparatus shall be protected from draughts. The number of containers failing in the test shall be observed by individual inspection of each.

- 6.7 Impact Test—The bottles shall be struck with a hardened spherical steel ball 4 times at four different points in the same plane at the belly. i.e. 40 to 100 mm from the base and at the following points with a mass of 400 g falling through a distance of 300 mm:
 - (a) on both seams, and
 - (b) at the extremities of a diameter, at right angles to the joining seams.

A bottle shall be deemed to have failed to pass the test if a crack appears or if the bottle chips.

6.8 Bursting Strength Test

- **6.8.1** Apparatus—The apparatus shall embody the following principles:
 - 6.8.1.1 The bottles to be tested shall be held in such manner that the bottle is not clamped but is suspended from the bead of the finish.
 - 6.8.1.2 There shall be a resilient sealing member which shall act with the sealing surface of the container to retain the pressurizing medium during the period of the test.
 - 6.8.1.3 There shall be a means of applying fluid pressure to a predetermined level at a minimum rate of 7 kPa* per minute (1.0 psi per minute) and of maintaining that pressure constant during the period of test.

^{*} $1 \text{ kPa} = 1 \text{ kN/m}^2$

6.8.1.4 There shall be an automatically controlled timing mechanism in the apparatus so that the container will be subjected to uniform internal pressure for a pre-determined period which shall be not less than 3 seconds and not more than 1 minute. The period of test shall be reproducible within ± 2 per cent.

6.8.2 Procedure

- 6.8.2.1 The containers may be filled with water or other low density liquid, if such is used as the medium for applying pressure.
- 6.8.2.2 An internal pressure of 1.03 MPa (150 psi) shall be applied and held constant for 60 seconds.

6.9 Parallelism between the Base and the Top Sealing Surface

- 6.9.1 Apparatus—Any acceptable apparatus suitable for determining whether the base of the bottle is parallel to the top sealing surface. Two optically flat plates and a spirit level calibrated to the accuracy required for the purpose may be used.
- 6.9.2 Procedure—Test each bottle for compliance with Clause 4.9.

6.10 Test for Verticality

- 6.10.1 Assembly—Assembly for the determination of verticality of the bottles shall be as shown in Figure 1.
- 6.10.2 Place the bottle on its base on a flat plate having a shaft bounded to it at right angles. Adjust the 'V' block mould on the shaft in such a manner that it is in contact with the outer diameter of the bottle at about the middle. Adjust the dial indicator fitted to the shaft so that its measuring point comes in contact with the outer edge of the neck of

the bottle. Rotate the bottle such that the body is always in contact with the 'V' block and keeping the bottle always firmly on its base. The total deflection shown by the indicator shall be the difference in the verticality.

- 6.10.3 The bottles shall be deemed to have passed the test if the total deflection indicated is less than 1.5 mm.
- **6.11 Colour**—Colour shall be determined by visual inspection unless otherwise agreed between the manufacturer and the purchaser.

7. SAMPLING

- 7.1 Lot—In any consignment bottles of the same type and capacity shall be grouped as a lot.
- 7.2 Scale of Sampling—The scale of sampling shall be as indicated in Table 1. The required number of sample bottles (Column 3 of Table 1) shall be drawn from each lot, by the method described in Clause 7.3.

7.3 Method of Selecting Glass Bottles

- 7.3.1 The bottles to be selected from the lot shall be chosen at random. In order to ensure the randomness of selection, a random number table shall be followed.
- 7.3.2 In case a random number table is not available, the bottles may be selected from the lot in the following manner:—

Starting from any bottle in a lot, the bottles shall be counted as 1,2......r and so on in one order. Every r th bottle thus counted shall be withdrawn to constitute the sample, where r is the integral part of N/n (N and n being the lot size and corresponding sample size respectively). This procedure shall be stopped as soon as the required number of bottles is obtained.

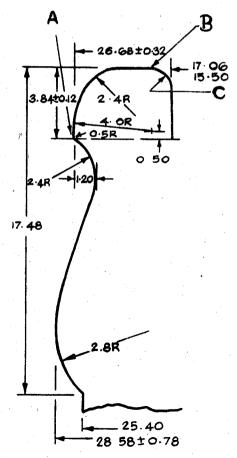
7.4 Criteria for Conformity

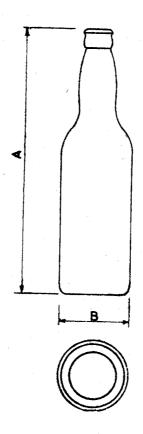
- 7.4.1 Out of the sample bottles selected in accordance with Clause 7.2, five sample bottles shall be subjected to alkalinity test described in Clause 6.3. If these five sample bottles pass the test, then only further testing need be done to examine the conformity of the lot to other requirements. If the five samples fail, the lot shall be rejected without further testing.
- 7.4.2 From the sample selected in accordance with Clause 7.2, ten sample bottles shall be subjected to thermal shock test described in Clause 6.7. Any sample bottle not satisfying the requirements of the test shall be considered as a defective.
- 7.4.3 If the number of defectives among the ten sample bottles tested for thermal shock is more than one, the lot shall be rejected without further tests. Otherwise the non defective bottles subjected to the thermal shock test shall be mixed with the remaining sample bottles selected in accordance with Clause 7.2 for further testing.
- The directions given below shall determine the conformity or otherwise of the lot to the requirements other than the limit of alkalinity and the resistance to thermal shock. If in the first sample the number of defective bottles is less than or equal to the first acceptance number (Column 5 of Table 1), the lot shall be declared as conforming to the requirements. If the number of defectives is greater than or equal to the first rejection number (Column 6 of Table 1), the lot shall be rejected. If the number of deg defectives is greater than the first acceptance number but less than the first rejection number, a second sample of the size equal to that of the first shall be taken to determine the conformity or otherwise of the lot. The number of defectives found in the first and second samples shall be combined and, if the combined number of defectives is less than or equal to the second acceptance number, the lot shall be declared as conforming to the requirements, otherwise not.

TABLE 1. SCALE OF SAMPLING

No. of	bottle	s in the lot	Sample	Sample size	Cumulative sample size	Acceptance No.	Rejection No.
Up	to	1 200	1st	50	50	0	3
			2nd	50	100	3	4
1 201	to	3 200	1st	80	80	1	4
		A	2nd	80	160	4	5
3 201	to	10 000	1st	125	125	2	5
10.001		2	2nd	125	250	6	7
10 001	to	35 000	1st	200	200	3	7
	,		2nd	200	400	8	9
above		35 000	lst	315	315	5	9
			2nd	315	630	12	13

APPENDIX A Dimensions of the crown finish
All Dimensions are in Millimeters



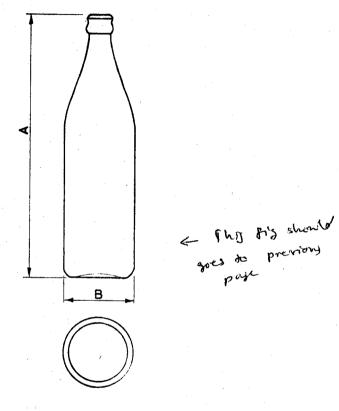


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	Nominal	Bottle Height		Diameter	
	Capacity	A		B	
	ml	mm (in)		mm (in)	
Replace	650 325	Max. 283.0 (11.14) 228.3 (8.99)	Min. 280.0 (11.02) 225.3 (8.87)	Max. 77.7 (3.06) 65.0 (2.56)	Min. 76.1 (3.00) 62.0 (2.44)

Fig. 1—Shape and Dimensions of Type I—Bottle



Nominal	Bottle Height		Body Diameter		
Capacity	A		B		
ml	mm (in)		mm (in)		
650 325	Max. 285.5 (11.24) 228.4 (8.20)	Min. 282.5 (11.13) 225.6 (8.58)	Max. 78.5 (3.09) 65.5 (25.79)	Min. 75.7 (2.98) 62.5 (24.61)	

Fig. 2—Shape and Dimensions of Type 11— Bottle.

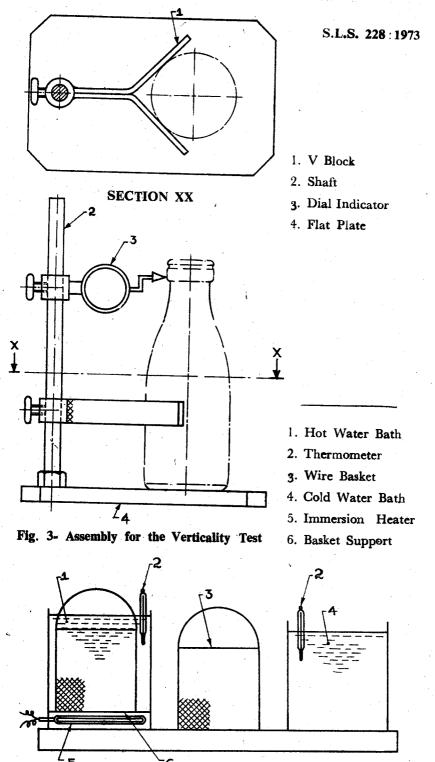


Fig. 4-Apparatus for the Thermal Shock Test

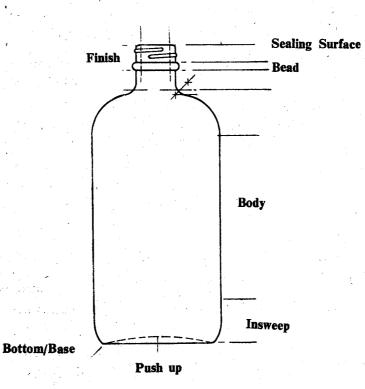


Fig. 5

AMD 75

AMENDMENT NO. 1 APPROVED ON 1986-01-15.

SLS 228: 1973 SPECIFICATION FOR GLASS BOTTLES WITH CROWN FINISH (650 ml AND 325 ml)

Page 1 and Page 5

Title

Amend to read as "Sri Lanka Standard Specification for Glass Bottles with Crown Finish (650 ml, 625 ml and 325 ml)."

Page 6

Clause 1 – Scope

Amend to read as, "This specification prescribes the requirements and methods of sampling and test for glass bottles with crown finish and of nominal capacities 650 ml, 625 ml and 325 ml."

Clause 2.2

Substitute the existing clause with the following:

"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."

Page 7

Clause 4.3

Amend to read as follows:

"Shape and dimensions: The general shape of the Type 1 bottle shall be as in Figure I and that of Type II bottle shall be as in Figure 2. The height and body diameter of the bottles of Types I and II shall be as given in Figure 1 and 2 respectively.

The neck finish of the bottle shall conform to the relevant neck finish specified in **SLS 601 : Part 2 -** Glass container finishes – Crown finishes. The neck finish diameter and bore dimensions shall be measured as prescribed in 8.1.2 and 8.1.3 respectively of **SLS 628 : 1984** – 750 ml Glass bottles with 31.5 –mm standard roll-on-pilfer-proof(ROPP)

Clause 4.4

Substitute the existing clause with the following:

"Capacity at filling level: The bottles when filled to a filling level of 55 mm shall have the following capacities:

Nominal capacity	Capacity at filling level
ml	ml
650	+ 4 650 - 0
625	+ 14 625 - 0
325	+ 10 325 - 0

NOTE - 625 ml bottle shall be of Type I only and shall be used exclusively for packing beer."

Page 8

Clause 4.5

Include also the mass of the 625 ml bottle as follows:

625 ml bottle : 550 g

Page 18

Delete 'Appendix A'

Page 19

Interchange the Figure 1 and Figure 2 (but not the tables).

Replace the table given in Figure 1 by the following:

Nominal capacity	Bottle height A (mm)		Diameter B (mm)	
	Max.	Min.	Max	Min.
650	283.0	280.0	77.7	76.1
625	285.5	282.5	76.4	73.6
325	228.3	225.3	65.0	62.0

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