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SPECIFICATION FOR

POLYVINYL CHLORIDE (PVC) BOTTLES FOR PACKAGING OF EDIBLE PRODUCTS

SRI LANKA STANDARDS INSTITUTION

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SLS 714:1985

(Attached AMD 119)

Gr. 6

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SRI LANKA STANDARD

SPECIFICATION FOR POLYVINYL CHLORIDE (PVC) BOTTLES FOR PACKAGING OF EDIBLE PRODUCTS

FOREWORD

This Sri Lanka Standard specification was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 1985-11-20, after the draft, finalized by the Drafting Committee on Plastics had been approved by the Chemicals Divisional Committee.

The polyvinyl chloride (PVC) bottles specified in this specification are suitable for packaging edible products such as cordials, squashes, fruit syrup, edible oil and vinegar. They could also be used for packaging of potable water.

The PVC material used for manufacture of bottles shall be of food grade and shall not contain substances injurious to health or which might otherwise lead to the infringement of the Sri Lanka Food Act No. 26 of 1980 and the regulations framed thereunder.

For the purpose of deciding whether a particular requirement of this specification is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with CS 102. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this specification.

All standard values in this specification are given in SI units.

In the preparation of this specification, the assistance obtained from the publications of the Standards Association of Australia, the Indian Standards Institution and the Japanese Standards Association is gratefully acknowledged.

1 SCOPE

This specification prescribes requirements and methods of sampling and test for PVC bottles used for packaging of edible products.

2 REFERENCES

ISO 6401 Plastics - Homopolymer and copolymer resins of vinyl chloride determination of residual vinyl chloride monomer - Gas chromatographic method.

IS 9833 List of pigments and colourants for use in contact with foodstuffs, pharmaceuticals and drinking water

IS 9845 Method of analysis for the determination of specific and/or overall migration of constituents of plastics material and articles intended to come into contact with foodstuffs

IS 10148 Positive list of constituents of PVC in contact with foodstuffs, pharmaceuticals and drinking water

CS 102 Presentation of numerical values

SLS 428 Random sampling methods

SLS 616 Glossary of terms for plastics

3 TERMINOLOGY

3.1 For the purpose of this specification the definitions given in SLS 616 and the following definitions shall apply:

3.1.1 **brimful capacity** : The volume of water required to fill the container completely at 27 ± 2 °C.

3.1.2 **burnt particles** : Polymer particles which are degraded due to exposure to excess heat and which thereby have turned brown or black. They would appear as *black spots* on the moulded articles.

3.1.3 **cap or closure** : A cover for the open mouth of a container. It may be a threaded type or push in type.

3.1.4 **nominal capacity** : The volume of contents normally expected to be filled in the container at 27 ± 2 °C.

3.1.5 **pilferproof** : A seal that cannot be opened without partially or wholly destroying the cap or otherwise showing evidence of tampering.

NOTE - Pilfer is not synonymous to non-refillable.

4 REQUIREMENTS

4.1 Material

4.1.1 *Composition*

The composition of the material used for manufacture of PVC bottles shall not contain any substances that will migrate into the food product placed therein, at a level likely to be injurious to health. It shall not contain rework material.

NOTES

1 List of constituents of PVC namely the copolymers manufacturing residues and necessary additives which may be regarded as safe for use are given in **IS 10148.**

2 List of permitted pigments and colourants for use with PVC and which may be regarded as safe for use in contact with food are given in **IS 9833.**

4.1.2 *Residual monomer content*

The residual vinyl chloride monomer content (VCM) in the PVC material shall not exceed 1 mg/kg when tested as specified in **ISO 6401.**

4.1.3 *Overall migration*

The overall migration of constituents of PVC material shall not be more than 60 mg/kg of the foodstuffs, when tested in accordance with **IS 9845.**

4.2 Other requirements

4.2.1 *Taint*

When the bottle and the cap are subjected to the test described in Appendix A no taint shall be detectable in the food product.

4.2.2 *Capacity*

Unless otherwise agreed to between the purchaser and supplier, the bottles shall be manufactured in the nominal capacities of 375 ml, 625 ml, 750 ml and one litre and the brimful capacity of the bottle shall exceed the nominal capacity by a minimum of 5 per cent.

4.2.3 *Design*

4.2.3.1 The design of the bottle shall be such that it is stable when kept in vertical position. The shape of the bottle may be as agreed to between the purchaser and the supplier.

4.2.3.2 The tolerance on mass of bottle when determined as specified in 9.1 shall be as follows:

	Mass of bottle g	Tolerance per cent
a)	Up to and including 25	± 10 ; and
b)	Over 25 up to and including 100	± 7.5

4.2.4 *Closures*

The neck shall be designed so as to fit the following type of plastic or metal caps:

a) Roll-on-thread-pilferproof (ROPP); and

b) Press-on-pilferproof.

4.2.5 *Workmanship and finish*

The bottle and closure shall be manufactured in accordance with good manufacturing practice and shall be free from any manufacturing defects such as burnt, oxidized or unhomogenized particles which would affect the performance or appearance of the bottle.

4.2.6 *Closure leakage*

4.2.6.1 When tested as prescribed in 9.1.2 the closure shall not show any leakage of product.

4.2.6.2 The bottle when tested for leakage after shaking as prescribed in 9.1.3 shall not show any leakage of product through the cap.

4.2.7 *Drop test*

The bottle when subjected to the drop test as prescribed in 9.1.4 shall not show any sign of cracking or failure.

5 PACKAGING

The bottle immediately after manufacture shall be packed under hygienic conditions in a suitable protective covering that will preclude the ingress of dust, moisture and other foreign matter.

6 MARKING

6.1 Each bottle shall be marked legibly and indelibly with the following information:

a) Name of the manufacturer; or

Registered trade mark, if any.

6.2 The outer protective cover shall give the following information:

a) Name and address of the manufacturer;

b) Nominal capacity in millilitres; and

c) Date of manufacture.

6.3 The bottom of the bottle may also be marked with the Certification Mark of the Sri Lanka Standards Institution illustrated below on permission being granted for such marking by the Sri Lanka Standards Institution.

NOTE - The use of the Sri Lanka Standards Institution Certification Mark (SLS Mark) is governed by the provisions of the Sri Lanka Standards Institution Act and the regulations framed thereunder. The SLS Mark on products covered by a Sri Lanka Standard is an assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control, which is devised and supervised by the Institution and operated by the producer. SLS marked products are also continuously checked by the Institution for conformity to the relevant standard as a further safeguard. Details of conditions under which a permit for the use of the Certification Mark may be granted to manufacturers or processors may be obtained from the Sri Lanka Standards Institution.

7 SAMPLING

7.1 Lot

In any consignment all the bottles produced in one day under the same conditions of manufacture shall constitute a lot.

7.2 Scale of sampling

7.2.1 Samples shall be tested from each lot for ascertaining the conformity of the lot to the requirements of this specification.

7.2.2 The number of bottles to be selected from a lot shall be in accordance with Column 1 and Column 2 of Table 1.

TABLE 1 - Scale of sampling

Number of bottles in the lot (1)	Number of bottles to be selected (2)	Acceptance number (3)	Sub-sample size (4)
Up to 500	20	03	03
501 to 1 200	32	05	03
1 201 to 3 200	50	07	05
3 201 to 10 000	80	10	08
10 001 and above	125	14	13

7.2.3 The bottles shall be selected at random. In order to ensure randomness of selection random number tables as given in SLS 428 shall be used.

8 NUMBER OF TESTS

8.1 Each bottle selected as in 7.2.2 shall be inspected for marking (6) and packaging requirements (5).

8.2 Each bottle selected as in 7.2.2 shall be tested for requirements specified in 4.2.2 to 4.2.6.

8.3 If the lot has been found satisfactory with respect to requirements specified in 4.2.2 to 4.2.6 as in 8.2 a sub sample of size as given in Column 4 of Table 1 shall be drawn at random and shall be tested for the requirements specified in 4.2.7.

8.4 Two bottles shall be selected at random and shall be subjected to test for taint (4.2.1).

8.5 Two bottles shall be selected at random and shall be subjected to the test for residual monomer content (4.1.2) and overall migration (4.1.3).

9 METHODS OF TEST

9.1 Tests shall be carried out as specified in 9.1.1 to 9.1.4 and Appendix A.

9.1.1 *Measurement of mass of bottle*

The bottle mass shall be ascertained by weighing the bottle on a balance weighing to 0.1 g. The weighing shall be done to the following accuracy:

a) To the nearest 0.1 g for a mass up to 50 g; and

b) To the nearest 0.5 g for masses over 50 g up to and including 100 g.

9.1.2 *Closure leakage test*

The bottle shall be filled to its nominal capacity with the product at 27 ± 2 °C and closed tightly with the cap. The filled bottle shall be kept in vertically inverted position for a period of 2 hours. At the end of the test the closure shall be examined for any leakage of product.

9.1.3 *Leakage by shaking*

The bottle shall be half filled with the product and closed tightly with the cap. The bottles shall be inverted and shaken. Thereafter the bottle shall be brought to the upright position and allowed to stand for 5 minutes before examining for any leakage of product from the cap.

9.1.4 *Drop test*

The bottle shall be filled to its nominal capacity with the product at 27 ± 2 °C and closed tightly with the cap. It shall then be freely dropped from a height of 1.5 m in the following positions :

a) Vertical; and

b) Inverted.

The bottle subjected to the above test shall be examined for any signs of cracking or leakage.

10 CONFORMITY TO STANDARD

10.1 The lot shall be declared as conforming to the requirements of this specification if the following conditions are satisfied:

10.1.1 Each bottle inspected as in 8.1 satisfies the marking and packaging requirements.

10.1.2 The number of bottles not conforming to any one or more requirements when tested as in 8.2 is less than or equal to the corresponding acceptable number given in Column 3 of Table 1.

10.1.3 Each bottle tested as in 8.3 satisfies the relevant requirement for drop test.

10.1.4 The bottles tested as in 8.4 and 8.5 satisfies the requirements for taint (4.2.1) residual monomer content (4.1.2) and overall migration (4.1.3).

APPENDIX A

METHOD OF TEST FOR TAINT

A.1 PROCEDURE

A.1.1 The bottle shall be filled to its nominal capacity with the product, and closed tightly with the cap. It shall then be stored at 27 ± 2 °C for 72 hours in a close, dust free atmosphere.

A control test shall be arranged omitting the plastic bottle as follows:

Approximately 100 g of the product concerned is placed in the bottom of clean, dry glass jar equipped with an odour free screw-on lid.

The glass jar is maintained at a temperature of 27 ± 2 °C for 72 hours.

A.1.2 Taint panel test for the above shall be conducted as follows:

A.1.2.1 The product from the plastic bottle and the control jar are each divided into 12 equal portions. The 24 portions are then arranged into 12 pairs as follows:

a) Three pairs each consisting of two untreated portions;

b) Three pairs each consisting of two treated portions;

c) Three pairs each consisting of one untreated and one treated portion; and

d) Three pairs each consisting of one treated and one untreated portion.

A.1.2.2 The 12 pairs are then coded and arranged in random order. Each member of the panel tests by taste an equal number of pairs, that is a panel of four would each test three pairs. The members of the panel are asked to test each pair in the order presented. Thus, when presenting a pair from (a) or (b), the order of presentation does not matter since both samples are from the one treatment, but an untreated sample will be presented first from (c) and a treated sample first from (d).

A.1.2.3 The members of the panel are asked only if the two specimens in each pair are the same or different in taste. They are not asked to comment on likes or dislikes.

TABLE 2 - Interpretation of results from taste panel

Number of correct answers	Inference	Conclusion
10 to 12	Treatment has produced a statistically significant difference between *control* and *treated* product.	Taint has occurred
7, 8 or 9	The difference is not statistically significant	Repeat the test combining the results (see Table 3)
6 or less	Treatment has produced no significant difference	No detectable taint

TABLE 3 - Interpretation of retesting results

Number of correct answers	Inference	Conclusion
Greater than 17	Treatment has produced a statistically significant difference between *control* and *treated* products.	Taint has occurred
17 or less	No significant difference	No detectable taint

A.2 REPORT

The report shall state whether taint has occurred or not.

AMENDMENT NO. 01 APPROVED ON 1989-07-25

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Clause 4.2.3.2

Amend the tolerance given for mass as follows :

	Mass of bottle g	Tolerance per cent
a)	Up to and including 25	± 6 ; and
b)	Over 25 up to and including 100	± 4

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Clause 9.1.4 Drop test

Amend the second sentence to read as follows:

"It shall then be freely dropped from a height of 1 m on to a flat concrete surface in the following positions".

SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI *which includes surveillance inspection of the factory, testing of both factory and market samples.*

Further particulars of the terms and conditions of the permit may be obtained from the Sri *Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.*

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SRI LANKA STANDARDS INSTITUTION

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The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

The development and formulation of National Standards is carried out by Technical Experts and representatives of other interest groups, assisted by the permanent officers of the Institution. These Technical Committees are appointed under the purview of the Sectoral Committees which in turn are appointed by the Council. The Sectoral Committees give the final Technical approval for the Draft National Standards prior to the approval by the Council of the SLSI.

All members of the Technical and Sectoral Committees render their services in an honorary capacity. In this process the Institution endeavours to ensure adequate representation of all view points.

In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.

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