

DRAFT UGANDA STANDARD

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**Polystyrene for its safe use in contact with foodstuffs,
pharmaceuticals and drinking water — Specification**



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Requests for permission to reproduce this document should be addressed to

The Executive Director
Uganda National Bureau of Standards
P.O. Box 6329
Kampala
Uganda
Tel: +256 414 333 250/1/2/3
Fax: +256 414 286 123
E-mail: info@unbs.go.ug
Web: www.unbs.go.ug

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Foreword

Uganda National Bureau of Standards (UNBS) is a parastatal under the Ministry of Trade, Industry and Cooperatives established under Cap 327, of the Laws of Uganda, as amended. UNBS is mandated to co-ordinate the elaboration of standards and is

- (a) a member of International Organisation for Standardisation (ISO) and
- (b) a contact point for the WHO/FAO Codex Alimentarius Commission on Food Standards, and
- (c) the National Enquiry Point on TBT Agreement of the World Trade Organisation (WTO).

The work of preparing Uganda Standards is carried out through Technical Committees. A Technical Committee is established to deliberate on standards in a given field or area and consists of key stakeholders including government, academia, consumer groups, private sector and other interested parties.

Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

The committee responsible for this document is Technical Committee UNBS/TC 19, Packaging and Packaging products

Polystyrene for its safe use in contact with foodstuffs, pharmaceuticals and drinking water — Specification

1 Scope

This Draft Uganda Standard specifies requirements, sampling and test methods for polystyrene (crystal and high impact) materials for the manufacture of plastic items used in contact with foodstuffs, pharmaceuticals and drinking water.

This standard does not cover requirements of a packaging media for a particular foodstuff and drinking water other than toxicological considerations

2 Normative references

The following referenced documents referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 24153, *Random sampling and randomisation*

US 1659, *Packaging materials for food contact use – General requirements*

US 1675, *Determination of overall migration of constituents of plastics materials and articles intended to come in contact with foodstuffs – Method of analysis*

DUS 1667 *Positive list of constituents of polyvinyl chloride (PVC) and its copolymers in contact with food stuffs, pharmaceuticals and drinking water.*

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply

3.1

polystyrene

shall mean:

- a) homo polymers of styrene produced by the polymerisation of styrene, and
- b) rubber modified polystyrene consisting of basic polymers produced by combining styrene butadiene copolymers and/or polybutadiene with polystyrene either during or after polymerisation of the polystyrene such that the finished basic polymers contain not less than 75 percent by mass of total polymer units derived from styrene monomer

4 Requirements

4.1 Basic resin

To comply with this standard, the styrene polymers defined in 3 shall be made in such a way that they contain no ingredients or residuals of ingredients other than those listed in 4.1.1, 4.1.2 and 4.1.3.

4.1.1 Residual monomer

The total -residual styrene monomer, when present, shall not exceed 0.1 percent by mass of the polymer when tested according to the method prescribed in Annex A.

4.1.2 Material

The material shall comply with the threshold limits of the catalyst, emulsifying agents, suspension agents, miscellaneous polymerisation additives and other additives as prescribed in US 1667.

4.1.3 Pigments and colorants

In case the coloured material is used for food packaging applications, it shall comply with the list and limits of the pigments and colorants prescribed in US 1659.

4.2 Overall migration

The material shall also comply with the overall migration limits of 60 mg/l, Max of the simulant and 10 mg/dm², Max of the surface of the material or article, when tested by the method prescribed in US 1675.

NOTE The requirements of this draft standard are considered fully met when the two requirements mentioned in 4 are met, that is, basic resin characteristics at 4.1 and overall migration at 4.2.

4.3 Storage and control

4.3.1 Storage

Plastics materials intended for food contact use shall be stored separately from other materials in closed, properly identified containers.

4.3.2 Control

An authorised person shall supervise and control the issue of plastics materials to the process or manufacturing area and shall maintain appropriate written records of the issue of such materials.

GMP shall be maintained at all times and plant operators and storemen shall be trained in proper hygiene practices.

5 Packing and marking

5.1 Packing

The material shall be suitably packed in Paper/Polythene/Plastic bags (with or without liner), as agreed between the purchaser and the supplier, in a manner so as to ensure that the items do not become contaminated during storage.

5.2 Marking

5.2.1 Each package shall be clearly marked with the name and type of the material, month and year of manufacture of the material, name of the manufacturer and manufacturer's trade mark, if any.

5.2.2 The packages shall also carry the symbol (Fig. 1) clearly embossed/printed on it



Figure 1 — Symbol

6 Sampling

6.1 Preparation of test samples

The method of drawing representative samples of the material and the criteria for conformity shall be as prescribed in Annex B.

Annex A (normative)

Analytical method for determination of total residual styrene monomer content

A.1 General

This method is suitable for the determination of residual styrene monomer in all types of styrene polymers.

A.2 Principle

The sample is dissolved in methylene chloride. An aliquot of the solution is injected into a gas chromatograph. The amount of styrene monomer present is determined from the area of the resulting peak.

A.3 Apparatus

A.3.1 Gas chromatograph

Gas chromatograph with hydrogen flame detector or apparatus of equivalent sensitivity.

A.3.2 Chromatograph column

6.35 mm outside diameter, stainless steel tubing (0.71 mm wall thickness), 1.2 m in length, packed with 20 percent polyethylene glycol (20 000 molecular weight) on alkaline treated 60-80 mesh firebrick.

A.3.3 Recorder

Millivolt range of 0 to 1, chart speed of 12.7 mm/min.

A.4 Reagents

Compressed air, purified; helium gas; hydrogen gas; methylene chloride, redistilled; and styrene monomer, redistilled

A.5 Operating conditions for the gas chromatograph

A.5.1 The column is operated at a temperature of 100°C with a helium flow rate of 82 mm/min.

A.5.2 The hydrogen burner is operated with 1.1 kg/cm² of air pressure and 0.5 kg/cm² of hydrogen pressure.

A.5.3 The attenuation of the hydrogen flame detector is set at 2×10^2

A.6 Standardisation

A.6.1 Prepare a standard solution by weighing accurately 15 mg to 20 mg of styrene monomer into a 0.06 kg bottle containing 25.0 ml of methylene chloride. Cap the bottle tightly and shake to thoroughly mix the solution.

A.6.2 By means of a microliter syringe, inject 1 µl of the standard solution into the gas chromatograph. Measure the area of the styrene monomer peak which emerges after approximately 12 min

A.7 Procedure

A.7.1 Transfer 1 g of sample (accurately weighed to the nearest 0.001 g) to a 0.06 kg bottle and add several glass beads. Pipette 25.0 ml of methylene chloride into the bottle. Cap the bottle tightly and place on a mechanical shaker. Shake until the polymer is completely dissolved. If any insoluble residue remains, allow the bottle to stand (or centrifuge at a low speed) until a clear supernatant layer appears.

A.7.2 By means of a microliter syringe, inject 3 microliters of the clear supernatant liquid into the gas chromatograph.

A.7.3 Measure the area of the resulting styrene monomer peak. Compare the sample peak area with the area produced by the standard styrene monomer solution.

A.8 Calculation

$$\text{percentage residual styrene monomer} = \frac{\text{mass of standard monomer in mg} \times \text{peak area of sample}}{\text{peak area of standard monomer} \times \text{sample weight in g}} \times 30$$

Annex B (normative) Sampling of Polystyrene

B.1 General

B.1.1 In drawing, preparing, storing and handling samples, the following precautions and directions shall be observed.

B.1.2 Samples shall not be taken in an exposed place.

B.1.3 The sampling instrument, wherever applicable, shall be made of stainless steel or any other suitable material on which the material shall have no action. The instrument shall be clean and dry.

B.1.4 Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from adventitious contamination.

B.1.5 The samples shall be placed in a suitable, clean, dry, air-tight metal or glass containers on which the material has no action. The sample containers shall be of such a size that they are almost completely filled by the sample.

B.1.6 Each sample container shall be sealed air-tight with a stopper after filling and marked with full details of sampling, such as the date of sampling, the month and year of manufacture of the material, etc.

B.1.7 Samples shall be stored in such a manner that the temperature of the material does not vary unduly from the normal temperature.

B.2 Scale of sampling

B.2.1 Lot

In a single consignment all the packages of the same class, same type, same form and belonging to the same batch of manufacture shall be grouped together to constitute a lot. If a consignment is known to consist of packages belonging to different batches of manufacture or different forms, the packages belonging to the same batch of manufacture and same form shall be grouped together and each such group shall constitute a lot.

The packages may consist of containers of polystyrene materials, rolls, films, vials, etc.

B.2.2 Sample size

For ascertaining the conformity of the material to the requirements of this specification, samples shall be tested from each lot separately. The number of packages to be sampled shall depend on the size of the lot and shall be in accordance with Table B 1.

Table B1 — scale of sampling

Number of packages in the lot	Sample size
Up to 15	2
16 to 50	3
51 to 100	4
101 to 300	5
301 to 500	6
501 to 1000	8
1001 and above	10

NOTE When the number of packages in the lot is less than three, all the packages shall be sampled.

B.2.2.1 These packages shall be selected at random from the lot and in order to ensure the randomness of selection, procedures given in ISO 24153 may be followed.

B.3 Preparation of test samples

B.3.1 From each of the packages of material selected, small portions of material shall be drawn with the help of a suitable sampling instrument. The total quantity of material collected from each package shall be sufficient to test all the requirements given in 4.

B.3.2 In the case of packages consisting of containers, vials, rolls or films, the number of items to be selected from a package, for testing each of the requirements given in 4, shall be one.

B.4 Number of tests

Tests for determining all the requirements given in 4 shall be carried out on the individual test samples.

B.5 Criteria for conformity

The lot shall be declared as conforming to the requirements of this specification if all the test results on individual samples meet the relevant specification requirements

Certification marking

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