TBS/AFDC 2(65) P3
ICS 67:250

DRAFT TANZANIA STANDARD

Specification for plastic materials for food contacts applications Part 5: Polystyrene

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TANZANIA BUREAU OF STANDARDS

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0. Forewords

This standard provides a basic guide on the constitution of polystyrene plastics which is considered toxicologically safe and not on the manner of its actual processing or use. In reporting the result of a test or analysis made in accordance with this standard, if the final values observed or calculated, is to be rounded off it shall be done in accordance with TZS 4 *Rounding off numerical values*.

In the preparation of this standard assistance has been derived from: US 1666:2017 Polystyrene for its safe use in contact with foodstuffs, pharmaceuticals and drinking water-Specification published by Uganda National Bureau of Standards (UNBS)

1. Scope

1.1 This Tanzania 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

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

2. Normative references

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

AFDC2 (66) P2: Packaging materials for food contact use – General requirements

AFDC 2 (231) P1: Specification for plastic materials for food contact applications part 3: colorants

TZS 2247 Prerequisite Programme on Food Safety-Part 4: Food Packaging Manufacturing

TZS 4: Rounding off numerical values

AFDC 2(229) P1: Determination of overall migration of constituents of plastics materials and articles intended to come in contact with foodstuffs - Method of analysis

3. Terms and definitions

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

3.1 polystyrene

a) homo polymers of styrene produced by the polymerization 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 polymerization of the polystyrene such that the finished basic polymers contain a minimum of 75 percent by mass of total polymer units derived from styrene monomer

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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 to 4.1.3.

4.1.1 Residual monomer

the maximum of total residual styrene monomer, when present shall be 0.1 percent by mass of the polymer when tested according to the method prescribed in Annex A.

4.1.2 Materials

the material shall comply with the threshold limits of the catalyst, emulsifying agents, suspension agents, miscellaneous polymerization additives and other additives as prescribed in AFDC 2(231) P1

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 AFDC 2 (231) P1

4.2 Overall migration

the overall migration limits of the materials shall be 60mg/L, Max of the simulant and 10mg/dm^2, Max of the surface of the material or article, when tested by the method prescribed in AFDC 2(229) P1

NOTE: The requirements of this 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 authorized person should supervise and control the issue of plastics materials to the process or manufacturing area and should maintain appropriate written records of the issue of such materials.

Good manufacturing practices (GMP) shall be maintained at all times and plant operators and store men shall adhere to good hygienic practice as detailed in TZS 2247

5. Packing, marking and labeling

5.1 Packing

The material should be suitably packed with suitable liner (food grade) in a container as agreed between the purchaser and the supplier, in a manner so as to ensure that the items do not become contaminated during transport and storage.

5.2 Marking and labeling

Each package shall be marked legibly and indelibly with the following

a) Name and type of the material

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b) Manufacturing date of the material

c) Expiry

d) Country of origin

e) Name of the manufacturer and/or trade mark, if any.

f) The packages shall carry the symbol for food grade (Fig. 1) or the word “for food grade” on it

Fig. 1

6. Sampling

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

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Annex A

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 chromatography. The amount of styrene monomer present is determined from the area of the resulting peak.

A.3 Apparatus

A.3.1 Gas chromatograph.

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

A.3.2 Chromatography column

6.35mm outside diameter, stainless steel tubing (0.71mm wall thickness), 1.2m in length, packed with 20 percent polyethylene glycol (20000 molecular weight) on alkaline treated 60-80 mesh firebrick.

A.3.3 Recorder

Millivolt range of 0 to 1, chart speed of 12.7mm/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 82mm/min.

A.5.2 The hydrogen burner is operated with 1.1kg/cm^2 of air pressure and 0.5kg/cm^2 of hydrogen pressure.

A.5.3 The attenuation of the hydrogen flame detector is set at 2 x102

A.6 Standardization

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 mm of methylene chloride. Cap the bottle tightly and shake to thoroughly mix the solution.

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

A.7 Procedure

A.7.1 Transfer 1g of sample (accurately weighed to the nearest 0.001g) to a 0.06kg bottle and add several glass beads. Pipette 25.0mL 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

Percentage residual styrene monomer $= \frac{\frac{mass\ of\ standard\ monomers\ in\ mg\ x\ peak\ area\ of\ the\ sample}{peak\ area\ of\ standard\ monomer}}{x\ sample\ weight\ in\ g} x\ 30$

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Annex B
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

Lot size	**For visual examination (See 8.1)**		**For closure leakage test (see 9.1 and 9.3)**		**For dimensional examination (See 7.2 and 7.3)**
	Sample size	Acceptance Number	Sample size	Acceptance Number	No. of Samples
Up to 500	13	1	5	0	2
501-1000	20	2	8	0	2
1001-3000	32	3	13	0	2

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3001-5000	50	5	20	1	3
5001 and above	80	7	32	2	5

B.2.2.1 These packages shall be selected at random from the lot in accordance to the relevant Tanzania standards for sampling

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

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