



DRAFT TANZANIA STANDARD

**Specification for plastic materials for food contact applications part
6: Polyalkylene Terephthalate (PET and PBT)**

Draft for stakeholders' comments only

TANZANIA BUREAU OF STANDARDS

0. Foreword

Polyalkylene terephthalates (saturated polyesters) are amongst the thermoplastic materials used extensively for packaging of foodstuffs. Polyethylene terephthalate (PET) Polyethylene terephthalate is the most common polyester used in food packaging applications. PET is a good gas and water vapour barrier, is strong, offers good clarity and is temperature resistant. Crystalline PET (CPET) has poorer optical properties but improved heat resistance melting at temperatures in excess of 270°C. Flexible PET film is used for barrier pouches and top webs as a lidding material for tray packs. CPET is used for dual ovenable pre-formed base trays where its high temperature resistance makes it an ideal container for microwave and convection oven cooking of food.

The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

In the preparation of this standard assistance has been derived from: IS 12252:1987 Specification for, polyalkylene terephthalates (PET and PBT) for their safe use in contact with foodstuffs pharmaceuticals and drinking water published by Bureau of Indian Standards (BIS)

In reporting the results of a test or analysis made in accordance with this Tanzania Standard, if the final value observed or calculated is to be rounded off, it shall be done in accordance with TZS 4.

1.0 Scope

This standard specifies the requirements, and methods of sampling and test for polyalkylene terephthalates (PET and PBT) also known as thermoplastic saturated polyesters polymer materials for the manufacture of plastic items used in contact with foodstuffs

This standard does not purport to establish the suitability of the packaging media with particular foodstuffs from 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 standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

TZS 4: Rounding off numerical values

AFDC 2(229) CD1: Determination of overall migration of constituents of plastics materials and articles intended to come in contact with foodstuffs - Method of analysis

FTZS 2927-2:2021 Specification for plastic materials for food contact applications part 2: Polyethylene (PE)

AFDC 2(231) CD1: Specification for plastic materials for food contact applications part 3: colorants

3. Terms and definitions

3.1 Polyethylene Terephthalate (PET)

the basic material produced by the catalytic condensation at high temperature and reduced pressure of dimethyl terephthalate (DMT) terephthalic acid (PTA) and if required, relatively small amounts of dimethyl isophthalate (DMI) isophthalic acid (IPA) with mono-ethylene glycol.

3.2 Polybutylene Terephthalate (PBT)

the basic material produced by the catalytic condensation at high temperature and reduced pressure of DMT/PTA (and, if required, relatively small amounts of DMI/IPA) with 1,4 butanediol

4. Requirements

4.1 Basic Material

To comply with this standard, the thermoplastic (saturated) polyester defined in 3.1 and 3.2 shall be made in such a way that they contain no ingredients or residues of ingredients other than those laid down in clause 4.1.1 to 4.1.5

4.1.1 Basic Raw Materials

the following basic raw materials may be used

- i) Mono ethylene glycol (MEG)
- ii) 1, 4 Butanediol
- iii) Dimethyl terephthalate (DMT)
- iv) Dimethyl isophthalate (DMI)
- v) Terephthalic acid (TPA)
- vi) Isophthalic acid (IPA)

4.1.1.1 the polymer shall exist at least 50 percent of units derived from TPA.

4.1.1.2 to the thermoplastic polyesters made from the above raw materials polyethylene up to 5 per- cent used conforming to FTZS 2927-2:2021 may also be added.

4.1.2 residual catalyst

Table 1: maximum limits for the residual catalysts

Residual catalyst	Maximum limits (mg/kg or ppm)	Test methods
Antimony	350	AFDC 2 (229) CD1
Gallium	20	
Germanium	100	
Cobalt	125	
Lithium	130	
Manganese	80	

Zinc	80	
Titanium	120	

4.1.3 Crystallization accelerators

Table 2: maximum limits for the crystallization accelerators

Crystallization Accelerators	Maximum limits (percent)	Test methods
Talc, free of asbestos	0.25	AFDC2(229) CD1
Sodium benzoate	0.25	

4.1.4 Auxiliary items for Working

the following auxiliary items may be present with limits prescribed against each:

Table 3: maximum limits for the auxiliary items in percentage

Auxiliary items	Maximum limits (percent)	Test methods
Calcium stearate and zinc stearate together	0.5	AFDC2(229) CD1
Synthetic paraffin	0.25	
Iso-butyl stearate	0.2	
Even numbered, saturated, aliphatic primary alcohols of the chain length C ₁₂ to C ₂₀	0.5	
Low molecular polyolefins	0.5	
silicon oil	0.3	
Penta-erythrite-ester of saturated even numbered aliphatic mono-carbonic acids of the chain length C ₁₄ to C ₃₂	1.0	

4.1.5 Pigments and Colourants

In case the coloured material is used for food packaging applications, it shall comply with the list and limits of pigments and colourants prescribed in AFDC 2(231) CD1.

4.2 Overall Migration

The material shall comply with the overall migration limits of 60mg/L, max of simulat and 10 mg/dm², max of the surface of the material or article when tested by the method prescribed in AFDC 2(229) CD1

4.3 Storage and Control

4.3.1 Storage

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

4.3.3 Adequate standards of hygiene shall be maintained at all times and plant operators and store men shall be trained in proper hygiene practices.

5. Packing and Marking

5.1 Packing

The material shall be packed in gunny/paper bags with suitable 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. It shall be securely sealed to prevent any ingress of moisture.

5.2 Marking

Each package shall be clearly marked with the following information

- a. Manufacturer's name and/or trade-mark, if any;
- b. Name and type of material;
- c. Month and year of manufacture;
- d. Net mass of the material; and
- e. Lot and batch number.

5.2.1 The packages may also be marked with the Standard Mark.

6. Sampling

6.1 Preparation of Test Samples - The method of drawing representative sample of the material and the criteria for conformity shall be as prescribed in annex A.

Annex A

Sampling of Polyalkylene Terephthalates (PET and PBT)

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, where applicable shall be made of stainless steel or any other suitable material on which the material shall have no action with plastics. 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 airtight 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 room 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 of 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.

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 clause 3.

B-3.1.1 The packages may consist of container of polyalkylene terephthalate (PET/PBT) chips and its rolls, films or vials.

B-3.2 For. ascertaining the conformity of the material to the requirements of this specification, sample 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 col. 1 and 2 of Table 1.

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 clause 3, shall be one.

B-4. Number of Tests

B-4.1 Test for determining all the requirements given in 3 shall be carried out on the individual test samples.

Table 1 Scale of Sampling

Number of packages in the lot	Sample size
Up to 50	3
51 to 150	4
151 to 300	5
301 to 300	7
501 and above	10

B-5. Criteria for conformity

B-5.1 From the individual test results, the average \bar{X} and the range (R) shall be calculated as follows:

$$\bar{X} = \frac{\text{Sum of the test results}}{\text{Number of tests}}$$

Where:

R = difference between the maximum and the minimum values of the test results.

The lot shall be declared as conforming to the requirement of various characteristics if: $\bar{x} + KR \leq$ the maximum value specified; and where the value of K shall be chosen from' as given below:

AQL \ Sample size	0.65	1.00	1.50	2.50	4.00
3	-	-	-	0.587	0.502
4	-	0.651	0.598	0.525	0.450
5	0.663	0.614	0.565	0.498	0.431
7	0.613	0.596	0.525	0.465	0.405
10	0.755	0.703	0.650	0.579	0.507