



DRAFT TANZANIA STANDARD

Popcorn — Specification

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0. Foreword

Popcorn is a type of corn kernel that, when heated it pops to become light and fluffy. Unlike refined grains that manufacturers have processed to remove the bran and germ, whole grains include the entire grain seed, also called the kernel. Popcorn has high in fiber content, contains protein, vitamins and minerals, low in fat and sugar.

Development of this Tanzania standard was necessitated by the need to ensure the safety and quality of popcorn being produced and or marketed in Tanzania as well as for import and export markets.

In preparation of this Tanzania standard assistance was drawn from TZO 328-1 *Milled corn Products—Specification*

In reporting the result of a test or analysis made in accordance with the Tanzania standard, if the final value observed or calculated is to be rounded off, it shall be done in accordance with TZO 4: (see clause 2)

1.0 Scope

This Tanzania Standard specifies the requirements, sampling and test methods for popcorn intended for human consumption.

2.0 Normative references

The following documents are 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.

AOAC 952.13, *Arsenic in food. Silver diethyldithiocarbamate*

AOAC 972.25, *Official Method, Lead in Food Atomic Absorption Spectrophotometric Method*

AOAC 2001.04, *Determination of Fumonisin in Corn and Corn Flakes*

CODEX STAN 192, *General standard for food additives*

CODEX STAN 193, *General standard for contaminants and toxins in food and feed*

TZS 109, *Food processing units – Code of hygiene*

TZS 118, *Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of microorganisms – Colony-count technique at 30°C*

TZS 122, *Microbiology of food and feeding stuffs – Horizontal method for the detection of salmonella spp*

TZS 125, *Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) – Part 1: Technique using Baird-Parker agar medium – Amendment 1: Inclusion of precision data*

TZS 131, *Microbiology of food and animal feeding stuffs: General guidance for enumeration of yeasts and moulds – Colony Count technique at 25°C*

TZS 268, *General atomic absorption spectrophotometric method for determination of lead in food and food stuffs*

TZS 330, *Cereals and pulses — sampling*

TZS 331, *Cereals and pulses — Test methods*

TZS 438, *Maize grains — Specification*

TZS 538, Labelling of pre-packaged foods — General requirements

TZS 730, Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of *β*-glucuronidase-positive *Escheria coli* – Part 2 – Colony-count technique at 44 °C using 5-bromo-4-chloro-3-indolyl-*D*-glucuronide

TZS1317

TZS1331

TZS 1502, Fruits, vegetables and derived products – Sampling and methods of test Part 14: Determination of arsenic content – Silver diethyldithiocarbamate spectrophotometric method
TZS 1495 Fruits, vegetables and derived products — Determination of copper content — Method using flame atomic absorption spectrometry.

3.0 Terms and definitions

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

3.1

maize(corn) grain

shelled grain or kernel of the species *Zea mays indentata* L. (dent maize) and/or *Zea mays indurata* (flint maize) or their hybrids.

3.2

popcorn

snack made from grains of maize(corn) that have been heated until they have burst and become large and light.

3.3

popcorn kernel

form of corn whose mature kernels have the ability to pop during rapid cooking because of the build-up of internal pressure during rapid heating

3.4

food grade packaging material

packaging material, made of substances which are safe and suitable for their intended use and which will not impart any toxic substance or undesirable odour or flavour to the product.

4.0 Requirements

4.1 Raw materials

Popcorn shall be made from maize (corn) grains complying with the requirements of TZS 438.

4.2 Optional ingredients

Optional ingredients which may be used shall comply with relevant standards. They include but are not limited to the following:

- a) salt
- b) sugars
- c) edible oils
- d) honey
- e) vinegar
- f) spices flavouring cheese
- g) flavouring butter

4.3 General requirements

Popcorn shall:

- a) not be musty,
- b) be free from off flavours and other undesirable odours;
- c) be free from insects, larvae, and/or their eggs;
- d) be free from glass, metal, coal or dung and other foreign matter; and
- e) be free from sourness and rancidity.

4.4 Specific requirements

Popcorn shall comply with the specific requirements stipulated in Table 1.

Table 1—Specific requirements for Popcorn

S/N	Parameter	Limits (max)	Test method
i.	Moisture content, %, max	7.0	TZS 331 Clause 5
ii.	pH	4.5-6.0	Annex A
iii.	Fat acidity, mg KOH per 100g of product on dry mass basis, max	80	TZS1331
iv.	Salt content (as sodium chloride) ,%, m/m, max	2	Annex B
v.	Acid insoluble ash ,% m/m, max.	0.4	TZS1317

5.0 Food additives

Food additives which may be used in the manufacture of popcorn shall be in accordance with CODEX STAN 192.

6.0 Hygiene

6.1 Popcorn shall be processed, handled, packaged, stored and distributed under hygienic conditions prescribed in TZS 109.

6.2 Popcorn shall comply with the microbiological requirements specified in Table 2.

Table 2—Microbiological requirements for Popcorn

S/N	Microorganism	limit (Max)	Test method
i.	Total Plate Count, cfu/g	10 ²	TZS 118
ii.	<i>E-coli</i> , cfu/g	Absent	TZS 730
iii.	<i>Salmonella spp</i> , per 25g	Absent	TZS 122

iv.	<i>Yeasts and moulds, cfu/g</i>	10	TZS 131
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7.0 Contaminants

7.1 Pesticides residues and other contaminants

Popcorn shall comply with the maximum pesticides residue limits established by the Codex Alimentarius Commission for this commodity, and shall comply with maximum contaminants and toxins in food and feed established in CODEX STAN 193.

7.2 Mycotoxin

Popcorn shall comply with the mycotoxin levels specified in Table 3.

Table 3—Mycotoxin limits for Popcorn

S/N	Mycotoxin	limit (Max)	Test method
i.	Total aflatoxins ($\mu\text{g}/\text{kg}$)	10	TZS 799
ii.	Aflatoxin B1 ($\mu\text{g}/\text{kg}$)	5	
iii.	Fumonisin (mg/kg)	2	

7.3 Heavy metals

Popcorn shall comply with the heavy metal limits in Table 4 when tested in accordance with test methods specified therein.

Table 4—Heavy metal limits in Popcorn

S/N	Heavy metals	Maximum limit (mg/kg)	Test method
i.	Arsenic	0.1	TZS 1502
ii.	Lead	0.2	TZS 268

8.0 Packing, marking and labelling

Popcorn shall be packaged in suitable food grade packaging materials that shall not affect the quality of the product.

9.0 Marking and Labelling

9.1 In addition to the requirements specified in TZS538/EAS 38, each pack of Popcorn shall be clearly legibly and indelibly marked with the following:

- a) name of the product: "Popcorn";
- b) name and address of the manufacturer;
- c) list of ingredients;
- d) lot number;
- e) date of manufacture;
- f) expiry date;
- g) list of any additives used;
- h) instructions for use;
- i) net contents in metric units;
- j) storage instructions; and
- k) country of origin.

9.3 The use of pictorials or any other misrepresentation of the product on the label is prohibited.

9.4 Each container may be marked with the TBS standards mark of quality.

NOTE – The TBS Standards Mark of Quality may be used by the manufacturers only under licence from TBS. Particulars of conditions under which the licences are granted, may be obtained from TBS.

10 Sampling

Sampling of popcorn shall be done in accordance with TZS 330

Annex A
(normative)

Determination of pH

A.1 Apparatus

A.1.1 pH meter equipped with glass electrode

A.1.2 Beaker of 100 ml capacity

A.2 Reagent

A.2.1 PH 7.0 buffer solution

A.2.2 PH 4.0 and PH 9.0 buffer solutions

A.2.3 Deionised water

A.3 Procedures

A.3.1 Dip the pH meter into about 50 mL of pH 7.0 buffer solution. Ensure that the reading is 7.0

A.3.2 Rinse the meter with deionised water, and dip it into about 50 mL of pH 4.0 buffer solution. Ensure that the reading is 4.0. Repeat using pH 9.0 buffer solution

A.3.3 Determine the pH of the sample solution using the pH meter

Annex B
(normative)

Determination of salt

B.1 Reagent

- B.1.1** Acetone
- B.1.2** 10 % calcium acetate solution
- B.1.3** HNO₃
- B.1.4** 0.1 N AgNO₃
- B.1.5** Ferric indicato
- B.1.6** 0.1 N NH₄SCN₃

B.2 Procedure

B.2.1 Weigh 2 g of a thoroughly mixed sample into a platinum or silica

dish

B.2.2 Disperse the sample with 10 mL of acetone

B.2.3 Remove acetone, at room temperature, with an air current

B.2.4 Add, and thoroughly mix, 10 mL of 10 % calcium acetate

solution

B.2.5 Carefully dry on a steam bath

B.2.6 Ash in a muffle furnace at 500 °C (1 022 °F). Complete ashing not

necessary **B.2.7** Place the ash in a beaker and dissolve the ash in 25 mL HNO₃

(1+3).

B.2.8 Add at least 2 mL - 4 mL of 0.1 N AgNO₃ that is just enough to precipitate all chloride

present

B.2.9 Add at least 5 mL of 0.1 N AgNO₃ in excess, to A.2.8.

B.2.10 heat to boil, cool, then add 5 mL ferric indicator.

B.2.11 Titrate excess Ag with 0.1 N NH₄SCN (which has been standardized to equalize normalities) to a permanent light brown end point.

B.2.12 Subtract the amount of NH₄SCN used in A.2.11 from the total AgNO₃ used in A.2.8 and

A.2.9. The resulting difference is the ml of 0.1 N AgNO₃ used in the calculation of salt

B.3 Calculation

The salt content shall be calculated as follows:insert fomular

$$\%NaCl = \frac{(\text{ml of } 0.1N \text{ AgNO}_3) (0.05845) (100)}{\text{gram of sample}}$$