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**Popcorn— Specification**

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In order to match with technological development and to keep continuous progress in industries, standards are subject to periodic review. Users shall ascertain that they are in possession of the latest edition

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## **Foreword**

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

RS 389 was prepared by Technical Committee RSB/TC 003, *Cereals, pulses, legumes and cereal products*.

This second edition cancels and replaces the first edition (RS 389: 2018), which has been technically revised.

## **Committee membership**

The following organizations were represented on the Technical Committee on *Cereals, pulses, legumes and cereal products* (RSB/TC 003) in the preparation of this standard.

Enterprise URWIBUTSO/SINA GERARD

MANOSALIWA Food Industries Ltd

MINIMEX Ltd

National Agricultural Export Development Board (NAEB)

National Industrial Research and Development Agency (NIRDA)

Nyarutarama Business Incubation Center

One Acre Fund-Tubura

Rwanda Food and Drugs Authority

Zamura Feeds Ltd

Rwanda Standards Board (RSB) – Secretariat

# Popcorn— Specification

## 1 Scope

This Draft Rwanda Standard specifies the requirements, sampling and test methods for popcorn of *Zea mays everta* variety intended for human consumption.

## 2 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 2001.04, *Determination of Fumonisin in Corn and Corn Flakes*

RS CAC/RCP 1, *General principles of food Hygiene*

RS CODEX STAN 192, *General standard for food additives*

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

RS EAS 147-1, *Vinegar — Specification — Part 1: Vinegar from natural sources*

RS EAS 147-2, *Vinegar — Specification — Part 2: Vinegar from artificial sources*

RS EAS 16, *Plantation (mill) white sugar — Specification*

RS EAS 321, *Edible fats and oils — Specification*

RS EAS 35, *Fortified food grade salt — Specification*

RS EAS 36, *Honey—Specification*

RS EAS 38, *Labelling of Pre-Packaged Foods*

RS EAS 5, *Refined white sugar — Specification*

RS EAS 749, *Brown sugars— Specification*

RS ISO 16050, *Foodstuffs — Determination of aflatoxin B1, B2, G1 and G2 in cereals, nuts and derived products — High performance liquid chromatographic method*

RS ISO 16649-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of beta-glucuronidase-positive Escherichia coli — Part 2: Colony-count technique at 44 degrees C using 5-bromo-4-chloro-3-indolyl beta-D-glucuronide*

RS ISO 21527-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds — Part 2: Colony count technique in products with water activity less than or equal to 0,95*

RS ISO 24333, *Cereals and cereal products — Sampling*

RS ISO 4833-1, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of microorganisms — Part 1: Colony count at 30 degrees C by the pour plate technique*

RS ISO 5985, *Animal feeding stuffs — Determination of ash insoluble in hydrochloric acid*

RS ISO 6540, *Maize — Determination of moisture content (on milled grains and on whole grains*

RS ISO 6579-1, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection of Salmonella spp.*

RS ISO 7305, *Milled cereal products — Determination of fat acidity*

### **3 Terms and definitions**

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

#### **3.1**

##### **popcorn**

product made from kernels of *Zea mays* everta variety that have been heated until they forcefully expands and puffs up

#### **3.2**

##### **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 Requirements**

#### **4.1 Ingredients**

##### **4.1.1 Essential ingredients**

The following essential ingredients shall be used in the preparation of popcorn and shall comply with relevant standards:

- a) corn of *Zea mays everta* variety complying with requirements specified in table 1; and
- a) edible oils complying with RS EAS 321.

**Table 1—Requirements for *Zea mays everta***

S/N	Characteristic	Maximum limit			Test method
		Grade 1	Grade 2	Grade 3	
i.	Moisture, %, m/m	13.5	13.5	13.5	RS ISO 712
ii.	Foreign matter, %, m/m	0.5	1.0	1.5	RS ISO 605
iii.	Inorganic matter, %, m/m	0.25	0.5	0.75	
iv.	Pest damaged grains, %, m/m	1.0	3.0	5.0	
v.	Rotten and diseased grains, %, m/m	1	2	3	
vi.	Discoloured grains, %, m/m	1.5	2.0	2.5	
vii.	Immature and shrivelled grains, %, m/m	1.0	2.0	3.0	
viii.	Filth, %, m/m	0.1	0.1	0.1	
ix.	Broken kernels, %, m/m	2.0	4.0	6.0	
x.	Total defective grains, %, m/m	5	9	14	
NOTE 1 The parameter, Total defective grains is not the sum total of the individual defects. It is limited to 70 % of the sum total of individual defects.					
NOTE 2 The parameter, Discoloured grains is limited to at least 25 % discolouration on both sides of the kernel.					

#### 4.1.2 Optional ingredients

The following optional ingredients including but not limited to the following may be used in popcorn and shall comply with relevant standards:

- a) salt complying with RS EAS 35;
- b) sugars complying with RS EAS 5 or RS EAS 16 or RS EAS 749;
- c) honey complying with RS EAS 36;
- d) vinegar complying with RS EAS 147-1 or RS EAS 147-2;
- e) cocoa powder;
- f) spices flavouring cheese; and
- g) flavouring butter.

## 4.2 General requirements

Popcorn shall be free from:

- a) off flavours and odours;
- b) insects, larvae, and/or their eggs;
- c) extraneous matter and other foreign matter such as sand, glass and metal;
- d) sourness and rancidity; and
- e) be practically free from unpuffed kernels.

## 4.3 Specific requirements

Popcorn shall comply with the specific requirements stipulated in Table 2 when tested in accordance with test methods specified therein.

**Table 2— Specific requirements for popcorn**

S/N	Parameter	Requirements	Test method
i.	Moisture content, %, max.	7.0	RS ISO 6540
ii.	Fat acidity, mg KOH per 100 g of product on dry mass basis, max.	80	RS ISO 7305
iii.	Salt content (as sodium chloride), %, m/m, max.	1.2	Annex A
iv.	Acid insoluble ash, %, m/m, max.	0.4	RS ISO 5985

## 4.4 Microbiological limits

Popcorn shall not exceed microbiological limits specified in Table 3 when tested in accordance with test methods specified therein.

**Table 3 — Microbiological limits for popcorn**

S/N	Microorganism	Maximum limit	Test method
i.	Total Viable Count, CFU/g	$10^3$	RS ISO 4833-1
ii.	<i>E.coli</i> , CFU/g	absent	RS ISO 16649-2
iii.	<i>Salmonella spp.</i> in 25g	Absent	RS ISO 6579-1
iv.	<i>Staphylococcus aureus</i> , CFU/g	Absent	RS ISO 6888-1
v.	Yeasts and moulds, CFU/g	$10^2$	RS ISO 21527-2



## 5 Food additives

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

## 6 Hygiene

Popcorn shall be processed and handled in accordance with RS CAC/RCP 1.

## 7 Contaminants

### 7.1 Pesticides residues

Popcorn shall comply with the maximum pesticides residue limits established by the Codex Alimentarius Commission

### 7.2 Mycotoxins

Popcorn shall not exceed mycotoxin limits specified in Table 4 when tested in accordance with test methods specified therein.

**Table 4 — Mycotoxin limits for popcorn**

S/N	Mycotoxin	Maximum limit (µg/kg)	Test method
i.	Total aflatoxins	10	RS ISO 16050
ii.	Aflatoxin B1	5	
iii.	Fumonisin	2000	AOAC 2001.04

### 7.3 Heavy metals

Popcorn shall not exceed heavy metal limits in Table 5 when tested in accordance with test methods specified therein.

**Table 5 — Heavy metal limits in popcorn**

S/N	Heavy metals	Maximum limit mg/kg	Test method
i.	Cadmium	0.1	AOAC 999.11
ii.	Lead	0.1	

## 8 Packaging

Popcorn shall be packaged in food grade packaging material that ensures the integrity and safety of the product

## 9 Labelling

9.1 In addition to the requirements specified in RS EAS 38, each pack of popcorn shall be legibly and indelibly marked with the following:

- a) name of the product, "Popcorn";
- C) name and address of the manufacturer/packer/distributor/ importer/exporter/vendor;
- b) list of ingredients in descending order;
- c) batch number;
- d) date of manufacture;
- e) expiry date;
- f) ;instructions for use;
- g) food additives used;
- h) net contentsshall be declared in the metric system;
- i) storage instructions;
- j) country of origin;
- a) the statement 'Human Food' shall appear on the package;and
- b) instructions on disposal of used package.

9.2 When labelling non-retail packages, information for non-retail packages shall either be given on the packages or in accompanying documents, except that the name of the product, lot identification and the name and address of the manufacturer or packer shall appear on the packages.

## 10 Sampling

Sampling of popcorn shall be done in accordance with RS ISO 24333

## Annex A (normative)

### Determination of salt content in popcorn

#### A.1 Reagent

- A.1.1 Acetone
- A.1.2 calcium acetate solution
- A.1.3 HNO<sub>3</sub>
- A.1.4 0.1 N AgNO<sub>3</sub>
- A.1.5 Ferric indicato
- A.1.6 0.1 N NH<sub>4</sub>SCN<sub>3</sub>

#### A.2 Procedure

- A.2.1 Weigh 2 g of a thoroughly mixed sample into a platinum or silica dish
- A.2.2 Disperse the sample with 10 mL of acetone
- A.2.3 Remove acetone, at room temperature, with an air current
- A.2.4 Add, and thoroughly, mix 10 mL of 10 % calcium acetate solution
- A.2.5 Carefully dry on a steam bath
- A.2.6 Ash in a muffle furnace at 500 °C (1 022 °F). Complete ashing not necessary
- A.2.7 Place the ash in a beaker and dissolve the ash in 25 mL HNO<sub>3</sub> (1+3).
- A.2.8 Add at least 2 mL - 4 mL of 0.1 N AgNO<sub>3</sub> that is just enough to precipitate all chloride present
- A.2.9 Add at least 5 mL of 0.1 N AgNO<sub>3</sub> in excess, to B.2.8.
- A.2.10 Boil, cool, then add 5 mL ferric indicator.

**A.2.11** Titrate excess Ag with 0.1 N NH<sub>4</sub>SCN (which has been standardized to equalize normalities) to a permanent light brown end point.

**A.2.12** Subtract the amount of NH<sub>4</sub>SCN used in B.2.11 from the total AgNO<sub>3</sub> used in B.2.8 and B.2.9. The resulting difference is the ml of 0.1 N AgNO<sub>3</sub> used in the calculation of salt

### **A.3 Calculation**

The salt content shall be calculated as follows:

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

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## Bibliography

[1] RS 389: 2018 Popcorn—Specification, First edition

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