

# DRAFT UGANDA STANDARD

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## Fruit chips and crisps — Specification

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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 coordinate 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 2, *Food and Agriculture*, Subcommittee SC 4, *Fruits, vegetables, spices and related products and processes*.

This second edition cancels and replaces the first edition (US 882:2011), which has been technically revised.



# Fruit chips and crisps — Specification

## 1 Scope

This Uganda Standard specifies requirements, sampling and test methods for fruits chips and crisps prepared by either deep frying or baking offered for direct consumption or for further processing, including for catering purposes or for repackaging if required

It does not apply to dried fruits or crisps which have been produced by drying processes for which other standards apply.

## 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.

US 45, *General standard for food additives*

US 738, *General standard for contaminants and toxins in food and feed*

US EAS 38, *Labelling of pre-packaged foods — General requirements*

US EAS 39, *Code of practice for hygiene in the food and drink manufacturing industry*

US EAS 321, *Edible fats and oils – Specification*

US EAS 803, *Nutrition labelling — Requirements*

US EAS 804, *Claims on food — Requirements*

US EAS 805, *Use of nutrition and health claims — Requirements*

ISO 4833-1, *Microbiology of the food chain - Horizontal method for the enumeration of microorganisms – Part 1: Colony count at 30 C by the pour plate technique*

ISO 4833-2, *Microbiology of the food chain - Horizontal method for the enumeration of microorganisms – Part 2: Colony count at 30 C by the surface plating technique*

US ISO 763, *Fruit and Vegetable Products - Determination of ash insoluble in hydrochloric acid*

US ISO 4125, *Dry fruits and dried fruits — Definitions and nomenclature*

US ISO 6561-1, *Fruits, vegetables and derived products — Determination of cadmium content — Part 1: Method using graphite furnace atomic absorption spectrometry*

US ISO 6561-2, *Fruits, vegetables and derived products — Determination of cadmium content — Part 2: Method using flame atomic absorption spectrometry*

US ISO 7251, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of presumptive Escherichia coli — Most probable number technique*

US 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*

### **3 Terms and definitions**

For the purposes of this document, the terms and definitions given in US ISO 4125 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <http://www.iso.org/obp>

### **4 Product Description**

#### **4.1 Fruit chips**

Fruit chips are the products:

- a) prepared from sound ripe fruit of varieties characteristic of the named fruit; and
- b) processed by deep frying, with or without added sweetening agent and food additives, into a form of marketable fried product.

#### **4.2 Fruit crisps**

These are thin slices of peeled fruits, deep-fried or baked until crispy or crunchy.

### **5 Requirements**

#### **5.1 Basic ingredients**

Fruit to be used shall be fresh, sound, clean and at an appropriate level of maturity from any cultivated variety conforming to the characteristics of the fruits and of a quality suitable for human consumption.

Edible oil or fat used for deep frying shall conform to US **EAS 321**

#### **5.2 Optional ingredients**

These consist of other edible material as may be appropriate to stuffing the product provided it is suitable for human consumption.

#### **5.3 General requirements**

##### **5.3.1 Colour, odour and flavour**

Fruit chips and crisps shall have the colour, odour and flavour characteristics of the fruit. They shall be free from off-odour, off-flavour and foreign taste including rancidity and mustiness.

### 5.3.2 Moulds and insects

Fruit chips and crisps shall be free from moulds and insect infestation when inspected visually.

### 5.3.3 Extraneous matter

Fruit chips and crisps shall be practically free from all organic and inorganic materials

## 5.4 Specific requirements

Fruit chips and crisps shall comply with the specific requirements in Table 1 when tested in accordance with the methods specified therein

**Table 1 — Specific requirement for fruit chips and crisps**

Characteristic	Requirement		Method of test
	Chips	Crisps	
Moisture, % (m/m), max	-	5	Annex B
Acid insoluble ash, % (m/m), (on dry basis), max.	0.1	0.1	US ISO 763
Free fatty acids, %, by mass on dry weight basis, max.	0.5	0.5	Annex C
Peroxide value, meq/oxygen per gram	0.5	0.5	Annex D

## 6 Food additives

Food additives may be used in fruit chips and crisps in accordance with US 45.

## 7 Contaminants

### 7.1 Heavy metals

In addition to complying with those maximum levels for contaminants and toxins given in US 738, fruit crisps and chips shall comply with the limits for heavy metals given in Table 3 when tested in accordance with the test methods specified therein.

**Table 3 — Heavy metal limits for fruit crisps and chips**

S/No	Characteristic	Maximum limit mg/kg	Test method
i.	Lead	0.1	US ISO 6561-1 US ISO 6561-2
ii.	Cadmium	0.1	

## 7.2 Pesticide residue

Fruit chips and crisps shall comply with those maximum residue limits established by the Codex Alimentarius Commission

## 7.3 Mycotoxins

When determined in accordance with US ISO 16050, the maximum content of aflatoxins in dried fruits shall not exceed 10 µg/kg for total aflatoxins

## 8 Hygiene

Fruit chips and crisps shall be produced and handled in accordance with US EAS 39. The products shall conform to the requirements for microbiological limits in Table 2.

**Table 2 — Microbiological limits in fruit chips and crisps**

Characteristics	Limit	Test method
Total plate, cfu/g, max.	10 000	US ISO 4833-1
E-coli, cfu/g, max.	Absent	,ISO 16649 -2
Yeast and moulds, cfu/g, max	1000	US ISO 21527-2

## 9 Packaging

Fruit chips and crisps shall be packaged in a food grade packaging material that will safeguard the hygienic, safety, nutritional, technological and organoleptic qualities of the product which comply with US 1659

## 10 Weights and measures

Containers shall be as full as practicable without impairment of quality and shall be consistent with a proper declaration of contents for the product.

## 11 Labelling

### 11.1 General

In addition to the requirements of US EAS 38 the following specific labelling requirements shall apply and shall be legibly and indelibly marked

- a) name of product as "X chips or X crisps", where "X" is the name of the fruit
- b) declaration of allergens, if any

### 11.2 Nutritional declaration

Nutritional labelling, nutrition and health claims may be made in accordance with US EAS 803, US EAS 804 and US EAS 805.

## 12 Sampling

Representative samples of the material shall be drawn and tested for conformity to this specification as prescribed in Annex A.

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## **Annex A** (normative)

### **Sampling of fruit chips and crisps**

#### **A.1 Definitions**

##### **A.1.1 Package**

Individually packaged part of a lot, including contents so as to facilitate handling and transport of a number of sales units or of products loose or arranged, in order to prevent damage by physical handling and transport. Road, rail, ship and air containers are not considered as packages.

##### **A.1.2 Sales package**

Individually packaged part of a lot, including contents, which is so as to constitute a sales unit to the final user or consumer at the point of purchase

##### **A.1.3 Pre-packages**

Pre-packages are sales packages such as the packaging which encloses the foodstuff completely or only partially, but in such a way that the contents cannot be altered without opening or changing the packaging. Protective films covering single product are not considered as a pre-package.

##### **A.1.4 Consignment**

Quantity of product to be sold by a given trader found at the time of inspection and defined by a document. A consignment may consist of one or several types of product; it may contain one or several lots of dried fruit.

##### **A.1.5 Lot**

Quantity of product which, at the time of inspection at one place, has similar characteristics with regard to:

- a) packer and/or dispatcher;
- b) country of origin;
- c) nature of product;
- d) class of product;
- e) size (if the product is graded according to size);
- f) variety or commercial type (according to the relevant provisions of the standard); and
- g) type of packaging and presentation.

If it is difficult to distinguish between different lots and/or presentation of individual lots is not possible, all lots of a specific consignment may be treated as one lot if they are similar in regard to type of product, dispatcher, country of origin, class and variety or commercial type, if this is provided for in the relevant marketing standard.

## **A.1.6 Sampling**

Collective samples taken temporarily from a lot during conformity check

### **A.1.6.1 Primary sample**

Package taken at random from the lot, in case of packed product or, in case of bulk product (direct loading into a transport vehicle or compartment thereof), a quantity taken at random from a point in the lot

### **A.1.6.2 Bulk sample**

Several primary samples supposed to be representative for the lot so that the total quantity is sufficient to allow the assessment of the lot with regard to all criteria

### **A.1.6.3 Secondary sample**

An equal quantity of product taken at random from the primary sample. The secondary sample shall comprise 30 units, in case the net weight of the package is 25 kg or less and the package does not contain any sales packages. In certain cases this means that the whole content of the package has to be checked, if the primary sample contains not more than 30 units.

### **A.1.6.4 Composite sample**

A composite sample is a mix, weighing at least 3 kg, of all the secondary samples taken from the bulk sample. Product in the composite sample shall be evenly mixed.

### **A.1.6.5 Reduced sample**

Quantity of product taken at random from the bulk or composite sample whose size is restricted to the minimum quantity necessary but sufficient to allow the assessment of certain individual criteria. If the inspection method would destroy the product, the size of the reduced sample shall not exceed 10 % of the bulk sample. In the case of small dry or dried products (that is, 100 g include more than 100 units) the reduced sample shall not exceed 300 g. Several reduced samples may be taken from a bulk or composite sample in order to check the conformity of the lot against different criteria

## **A.2 Sampling method**

### **A.2.1 Identification of lots and/or getting a general impression of the consignment**

The identification of lots shall be carried out on the basis of their marking or other criteria. In the case of consignments which are made up of several lots it is necessary for the inspector to get a general impression of the consignment with the aid of accompanying documents or declarations concerning the consignments. The inspector shall then determine how far the lots presented comply with the information in these documents. If the product is to be or has been loaded onto a means of transport, the registration number of the latter shall be used for identification of the consignment.

### **A.2.2 Presentation of product**

The inspector shall decide which packages are to be checked. The presentation shall be made by the operator and shall include the presentation of the bulk sample as well as the supply of all information necessary for the identification consignment or lot.

If reduced or secondary samples are required, these shall be identified by the inspector from the bulk sample. The inspector shall determine the size of the bulk sample in such way as to be able to assess the lot.

The inspector selects at random the packages to be inspected or in the case of bulk product the points of the lot from which individual samples shall be taken.

Care shall be taken to ensure that the removal of samples does not adversely affect the quality of the product. Damaged packages shall not be used as part of the bulk sample. They shall be set aside and may, if necessary, be subject to a separate examination and report.

The bulk sample shall comprise the following minimum quantities whenever a lot is declared unsatisfactory or the risk of a product not conforming to the standard has to be examined:

Number of packages in the lot	Number of packages to be taken (primary samples)
Packaged products	
Up to 100	5
From 101 to 300	7
From 301 to 500	9
From 501 to 1 000	10
More than 1 000	15 (minimum)
Product in bulk	
Quantity of lot in kg or number of bundles in the lot	Quantity of primary samples in kg or number of bundles
Up to 200	10
From 201 to 500	20
From 501 to 1 000	30
From 1 001 to 5 000	60
More than 5 000	100 (minimum)

In the case of bulky dried fruit and vegetables (over 2 kg per unit), the primary samples shall be made up of at least five units. In the case of lots comprising fewer than five packages or weighing less than 10 kg, the check shall cover the entire lot.

If the inspector discovers, after an inspection, that a decision cannot be reached, another physical check shall be undertaken and the overall result reported as an average of the two checks.

### A.2.3 Control of product

In case of packed product, the primary samples shall be used to check the general appearance of the product, the presentation, the cleanliness of the packages and the labelling. In all other cases, these checks shall be done on basis of the lot or transport vehicle.

The product shall be removed entirely from its packaging for the conformity check. The inspector may only dispense with this where the sampling is based on composite samples.

The inspection of uniformity, minimum requirements, quality classes and size shall be carried out on the basis of the bulk sample, or on the basis of the composite sample.

## Annex B (normative)

### Determination of moisture content

#### B.1 Procedure

Weigh accurately 10 g of the material in a suitable moisture dish previously dried in an electric oven and weighed. Place the dish in an electric oven maintained at  $105\text{ °C} \pm 1\text{ °C}$  for 5 h. Cool the dish in a desiccator and weigh with the lid on. Repeat the process of heating, cooling and weighing at half-hour intervals until the loss in weight between two successive weighing is less than 1 mg.

Record the lowest weight obtained.

#### B.2 Calculation and expression of results

The moisture, expressed as percent by mass, shall be calculated as follows:

$$\frac{(M_1 - M_2) \times 100}{M_1 - M_3}$$

where,

$M_1$  is the mass, in grams, of the dish and sample before drying;

$M_2$  is the mass, in grams, of the dish and sample after drying;

$M_3$  is the mass, in grams, of the dish only.

## Annex C (normative)

### Determination of acidity of extracted fat

#### C.1 Reagents

##### C.1 Apparatus

Soxhlet apparatus, with a 250 mL flat bottom flask

##### C.2 Reagents

**C.2.1** Petroleum ether, boiling point 40 °C – 80 °C

**C.2.2** Benzene-alcohol-phenolphthalein stock solution — To 1 L of distilled benzene add 1 L of alcohol or rectified spirit and 0.4 g of phenolphthalein. Mix the contents well.

**C.2.3** Standard potassium hydroxide solution, 0.05 mol/L

##### C.3 Procedure

Weigh accurately about 10 g of biscuit powder (D.3.3.2) and transfer it to a thimble and plug it from the top with extracted cotton and filter paper. Dry the thimble with contents for 15 min to 30 min at 100 °C in an oven. Take the mass of empty Soxhlet flask. Extract the fat in the Soxhlet apparatus for 3 h to 4 h and evaporate off the solvent in the flask on a water bath. Remove the traces of the residual solvent by keeping the flask in a hot air oven for about half an hour and weigh. Cool the flask and add 50 mL of mixed benzene-alcohol-phenolphthalein reagent and titrate hydroxide solution taken in a 10 mL microburette.

If the contents of the flask become cloudy, during titration, add another 50 mL of benzene-alcohol-phenolphthalein reagent and continue titration. Make a blank titration of the 50 mL reagent. Subtract from the titre of the fat, the blank titre.

##### C.4 Calculation

Acidity of extracted fat, (as oleic acid) percent by mass =  $\frac{mv}{m} \times 411$ .

where

$v$  is the volume of potassium hydroxide solution used in titration after subtracting the blank;

$m$  is the mass in grams of Soxhlet flask containing fat; and

$m$  is the mass in grams of empty Soxhlet flask.

## Annex D (normative)

### Determination of peroxide value (Titration Method-Reference AOAC 965.33)

(NOTE Conduct analysis in diffuse day light or in artificial light shielded from direct light source.)

#### D.1 Reagents

**D.1.1 Acetic acid-chloroform solution.** Mix 3 volumes CH<sub>3</sub>COOH with 2 volumes CHCl<sub>3</sub>, USP

**D.1.2 Potassium iodide solution,** saturated. Dissolve excess KI in freshly boiled H<sub>2</sub>O. Excess solid must remain. Store in dark. Test daily by adding 0.5 mL to 30 mL CH<sub>3</sub>COOH-CHCl<sub>3</sub>. Then add two drops 1 %starch solution, (mix ca 1g soluble starch with enough cold H<sub>2</sub>O to make thin paste, add 100 mL boiling H<sub>2</sub>O, and boil ca 1 min while stirring). If solution turns blue, requiring more than one drop 0.1 M Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> to discharge colour, prepare fresh solution.

**D.1.3 Sodium thiosulfate standard solutions,** 0.1 and 0.01 M, for 0.01M, dilute 0.1M with freshly boiled and cooled H<sub>2</sub>O.

#### D.2 Procedure

##### D.2.1 Extraction of oil

Extract 10.00 g ± 0.01 g of the sample taken in a thimble with petroleum ether for about 4 h in a Soxhlet extraction apparatus. Completely evaporate the solvent from the extraction flask (weighed previously) on a steam bath, cool and weigh the extraction flask with the residue.

##### D.2.2 Determination of peroxide value of the oil

Add 30 mL CH<sub>3</sub>COOH-CHCl<sub>3</sub>.

- a) and swirl to dissolve. Add 0.5 mL saturated KI solution.
- b) from Mohr pipet, let stand with occasional shaking for 1 min, and add 30 mL H<sub>2</sub>O. Slowly titrate with 0.1 M Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> with vigorous shaking until yellow is almost gone. Add ca 0.5 mL 1% starch solution, and continue titration, shaking vigorously to release all I<sub>2</sub> from CHCl<sub>3</sub> layer until blue just disappears, If less than 0.5 mL 0.1 M Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> is used, repeat determination with 0.01 M Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> Conduct blank determination daily (must be mL 0.1 M Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>). Subtract from test portion titration.

#### D.3 Calculation

Calculate the peroxide value from the following expression:

Peroxide value (milliequivalents peroxide per gram of product) =  $S \times M \times 1000/g$

Where,

S is the volume, in millilitres, Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> (blank corrected) and

M is the molarity of  $\text{Na}_2\text{S}_2\text{O}_3$  solution

g is mass in grams, of sample used

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## Bibliography

- [1] US 882:2011, *Fruit chips and crisps — Specification*

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