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# PROJET DE NORME CAMEROUNAISE PNC 3141 : 2026 - CT 48

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## SWEET POTATO CRISPS – SPECIFICATION

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**Sweet potato crisps — Specification**



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## Sweet potato crisps — Specification

### 1 Scope

This African Standard specifies the requirements and methods of sampling and test for crisps made from storage roots of sweet potato [*Ipomoea batatas* (L.) Lam.] intended for human consumption.

### 2 Normative references

The following referenced documents are indispensable for the application 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.

ARS 53, *General principles of food hygiene — Code of practice*

ARS 56, *Prepackaged foods — Labelling*

ARS 471, *Food grade salt — Specification*

ARS 826, *Fresh sweet potatoes — Specification*

ARS 827, *Sweet potato flour — Specification*

CODEX Stan 192, *General standard for food additives*

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

ISO 712, *Cereals and cereal products — Determination of moisture content — Reference method*

ISO 2171, *Cereals, pulses and by-products — Determination of ash yield by incineration*

ISO 3960, *Animal and vegetable fats and oils — Determination of peroxide value — Iodometric (visual) endpoint determination*

ISO 5498, *Agricultural food products — Determination of crude fibre content — General method*

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

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

ISO 21527-2, *Microbiology of food and animal feedstuffs — 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*

ISO 24333, *Cereals and cereal products — Sampling*

### 3 Definitions

For the purpose of this standard the following definitions apply.

#### 3.1

##### **sweet potato crisps**

thin slices of peeled and washed sweet potato storage roots, deep-fried until crunchy

**3.2**

**food grade material**

material that is free from substances that are hazardous to human health and may be permitted to come in contact with food.

**3.3**

**foreign matter**

organic and inorganic materials (such as sand, soil, glass) other than extraneous matter in the crisps

**3.4**

**extraneous matter**

organic matter of sweet potato origin other than sweet potato crisps

**4 Essential quality and compositional requirements**

**4.1 Raw materials**

The following materials shall be used in the processing of sweet potato crisps:

- a) Sweet potato storage roots conforming to ARS 826;
- b) Sweet potato flour conforming to ARS 827
- c) edible oil or fat conforming to relevant African Standards.

**4.2 Optional ingredients**

The following optional ingredients may be used:

- a) spices and condiments conforming to relevant African Standards; and
- b) edible salt conforming to ARS 471.

**4.3 Finished product**

**4.3.1 Physical and sensory factors**

Sweet potato crisps shall:

- a) have a colour that is characteristic of the variety. Where spices or other additives are used, the colour shall be characteristic of that ingredient;
- b) be free from off-flavour, rancidity, bitter taste and any other blemish;
- c) be free from extraneous and foreign matter;
- d) be uniform in size and have a thickness of 1.0 mm - 2.0 mm; and
- e) be crunchy or crispy and free from sogginess and excessive oil.

**4.3.2 Defects**

Sweet potato crisps shall not contain more than 10 % by mass of small pieces, slivers and irregular pieces.

Packaged sweet potato crisps shall have not more than 1 % by mass of the crisps with the following defects:

- a) surface or internal pigmentation;

- b) blisters;
- c) callous area; and
- d) black specks and spots.

#### 4.4 Composition requirements for sweet potato crisps

Sweet potato crisps shall conform to the specified composition in Table 1.

**Table 1 — Compositional requirements for sweet potato crisps**

| S/N | Parameter                                          | Requirements | Method of test |
|-----|----------------------------------------------------|--------------|----------------|
| 1   | Moisture content, %, by mass, max.                 | 5.0          | ISO 712        |
| 2   | Fat content on dry weight basis, %, max.           | 35.0         | Annex A        |
| 3   | Free fatty acids on dry weight basis, %, max.      | 0.5          | Annex B        |
| 4   | Sodium chloride (NaCl) on dry weight basis, %, max | 2.0          | Annex C        |
| 5   | Acid insoluble ash, %, by mass, max                | 0.05         | Annex D        |
| 6   | Peroxide value, meq oxygen per gram                | 0.5          | ISO 3960       |

## 5 Food additives

Food additives may be used in the preparation of sweet potato crisps in accordance with CODEX Stan 192.

## 6 Contaminants

### 6.1 Pesticide residues

Sweet potato crisps shall conform to maximum residue limits for pesticide residues established by the Codex Alimentarius Commission for this commodity.

### 6.2 Other contaminants

Sweet potato crisps shall comply with the maximum levels of the Codex General Standard for Contaminants and Toxins in Food and Feed (CODEX STAN 193).

## 7 Hygiene

Sweet potato crisps shall be prepared and handled in a hygienic manner in accordance with CODEX RCP 1 and shall conform to microbiological limits specified in Table 2.

**Table 2 — Microbiological limits for sweet potato crisps**

| S/N | Micro-organism(s)                     | Requirements    | Method of test |
|-----|---------------------------------------|-----------------|----------------|
| 1   | <i>Escherichia coli</i> , cfu/g, max. | <1              | ISO 7251       |
| 2   | <i>Salmonella</i> , 25g, max.         | absent          | ISO 6579       |
| 3   | Yeasts and moulds, cfu/g, max.        | 10 <sup>3</sup> | ISO 21527-1    |

## **8 Packaging**

**8.1** Sweet potato crisps shall be packaged in food grade material which will safeguard the hygienic, nutritional and organoleptic qualities of the product.

**8.2** The net weight of the packages for sweet potato crisps may be required to meet the relevant regulations of the destination country.

## **9 Labelling**

**9.1** In addition to the requirements of CODEX Stan 1, the following specific labelling requirements shall apply and shall be **legibly** and **indelibly** marked:

- a) common name of the product 'sweet potato crisps';
- b) name, and physical address of the manufacturer/ distributor and /or trade name/ brand name;
- c) if spiced they shall be labelled 'Spiced sweet potato crisps';
- d) date of manufacture;
- e) list of ingredients;
- f) lot identification;
- g) expiry date;
- h) country of origin;
- i) the net weight in metric units;
- j) storage instructions;
- k) declaration stating "salted" or "unsalted";
- l) declaration of flavouring agent or spice used; and
- m) 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 sweet potato crisps shall be done in accordance with ISO 24333.

## **11 Criteria for conformity**

A lot shall be declared as conforming to this standard if samples inspected or analysed for quality requirements conform to the provisions of this standard.

## **Annex A** (normative)

### **Determination of fat content**

#### **A.1 Principle of the method**

This is achieved by the Soxhlet method with ether or petroleum ether. When reporting the results, the method and solvents used for extraction shall be stated. All substances which can be extracted from the materials to be tested by the above-mentioned solvents, and which are not volatile when dried for one hour at 105 °C, are reported.

#### **A.2 Soxhlet method**

The fatty substance is extracted completely with dry peroxide, free diethyl ether or with dry petroleum ether (boiling point below 60 °C) in a Soxhlet apparatus.

The material to be tested has previously been dried, possibly with addition of Na<sub>2</sub>SO<sub>4</sub>.

#### **A.3 Reagents**

**A.3.1 Dry peroxide**, free ethyl ether or petroleum ether (B.p. below 60 °C).

**A.3.2 Na<sub>2</sub>SO<sub>4</sub>**

#### **A.4 Apparatus**

**A.4.1 Extraction thimble**

**A.4.2 Fat-free cotton pad**

**A.4.3 Soxhlet apparatus**

**A.4.4 Metal spiral or glass bulb**

**A.4.5 Oven**, 103 °C – 105 °C

**A.4.6 Desiccator**

#### **A.5 Procedure**

About 5 g – 10 g of the finely ground substance is placed in the extraction thimble and latter closed with a fat-free cotton pad. If the material is very rich in fat, it is recommended to mix it intimately with an equal amount of dried sand.

If necessary, the thimble with contents is dried at 100 °C. The extraction is performed in the Soxhlet apparatus.

In order to drain off the solvent from the extraction thimble as completely as possible at the end of each siphonage, a metal spiral of a glass bulb is placed under it.

The extraction shall be continued for at least 4 h, during which time the thimble will have been emptied about 30 times. The apparatus is then taken apart and the petroleum ether distilled off. The last traces of ether and moisture are removed by drying for one hour either in vacuum at 70 °C, or in a drying oven at 103 °C – 105 °C.

## ARS 829:2017(E)

By passing an air current through the flask before and after drying, all traces of petroleum ether vapour are removed.

Allow to cool for 20 min in a desiccator and weigh. As a control, the drying shall be repeated for 30 min, followed by blowing through, cooling and weighing.

The difference between two weighings shall not exceed 0.05 % of the fat values obtained, otherwise the drying has to be repeated.

## Annex B (normative)

### Determination of free fatty acids

**B.1 Apparatus** — Soxhlet fat extraction apparatus

**B.2 Reagents**

**B.2.1 Petroleum ether**, distilling below 65 °C, or ethyl ether.

**B.2.2 Alcohol potassium hydroxide**, 0.1 N (use absolute or alcohol denatured with methanol)

**B.2.3 Alcohol-ether mixture**, equal volumes of 96 % alcohol and ethyl ether

**B.2.4 Phenolphthalein solution**, 1 % in alcohol or alcohol denatured with methanol. Add 0.3 ml per 100 ml mixture of alcohol-ether and add alcoholic KOH solution to a faint pink.

**B.3 Procedure**

**B.3.1** 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. Dissolve the residue in the extraction flask with the 50 ml of the alcohol-ether phenolphthalein solution. Titrate the dissolved extract, with standard potassium hydroxide solution, to a faint pink colour, which persists for 10 s. If emulsion is formed during titration, dispel by adding a second 50 mL portion of the alcohol-ether phenolphthalein solution.

**B.3.2** Make a blank titration on 50 mL of the alcohol-ether phenolphthalein solution and subtract this value from the titration value of the sample. If the additional 50 mL portion of the alcohol-ether phenolphthalein solution is added, double the blank titration.

**B.4 Calculation**

Calculate the acid value from the following formula:

$$\text{Acid value (as oleic acid)} = \frac{56.1V/N}{M}$$

where,

$V$  is the volume, in mL, of standard potassium hydroxide solution used;

$N$  is the normality of standard potassium hydroxide solution; and

$M$  is the mass, in g, of the material taken for the test.

**Annex C**  
(normative)

**Determination of the sodium chloride content**

**C.1 Scope**

This method determines the content of chlorides.

**C.2 Definition**

The chloride content corresponds to the sum of all anions (halides) calculated as sodium chloride precipitable with silver ions in a nitric acid solution.

**C.3 Principle**

Quantitative precipitation of the halides extracted from the ash in a nitric acid solution with  $\text{AgNO}_3$  in excess.

Back titration of the surplus  $\text{AgNO}_3$  with ammonium thiocyanate, using ferric alum (ferric ammonium sulphate) as the indicator.

**C.4 Reagents**

**C.4.1 Distilled or demineralized water**

**C.4.2  $\text{AgNO}_3$  solution, 0.1 N (16.9888 g  $\text{AgNO}_3$ )**

**C.4.3  $\text{NH}_4\text{SCN}$  solution, 0.1 N (7.6113 g  $\text{NH}_4\text{SCN}$ ).** In practice a slightly higher weight is taken and the solution is adjusted by dilution against a 0.1 N  $\text{AgNO}_3$  solution.

**C.4.4 Cold saturated  $\text{NH}_4\text{Fe}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$  solution** (approximately 40 %). The ensuing brown colouring is eliminated by adding pure nitric acid dropwise.

**C.4.5  $\text{HNO}_3$  (approximately 30 %)**

**C.4.6 Diethyl ether of nitrobenzene**

**C.5 Apparatus**

**C.5.1 Measuring flask, 100 mL**

**C.5.2 Burette, 50 mL**

**C.5.3 Erlenmeyer flask, 200 mL**

**C.5.4 Pipettes**

**C.5.5 Funnel, filtering paper**

**C.6 Procedure**

The ash (residue after carbonisation and incineration of the potato crisp at a maximum temperature of  $550^\circ\text{C}$  in a muffle furnace) obtained from 1 g – 2 g dry matter is extracted by means of 80 mL – 90 mL hot distilled water acidified with a few drops of nitric acid. The washings are filtered off into a 100 mL measuring flask; after cooling distilled water is added until the mark is reached (stock solution).

In proportion to the expected chloride content aliquot part of this solution, which should preferably contain 50 mg – 100 mg NaCl, taken off, distilled water being added to obtain a quantity of approximately 100 mL.

Subsequently 5 mL ferric alum solution (see C.4.4), 20 mL 0.1 N AgNO<sub>3</sub> solution (see C.4.2) and 5 mL – 10 mL ether or 1 mL nitrobenzene are added; titration is carried out by means of an ammonium thiocyanate solution 0.1 N (see C.4.3), until the red colouring remains after stirring.

### C.7 Expression of results

Report in percentage by weight to one decimal place.

$$\text{Chloride content} = \frac{5.65 (V_2 - V_3) \times V \times 100}{V_1 \times P}$$

where,

$P$  is the test portion, in mg, incinerated;

$V$  is the mL of the stock solution derived from the ash;

$V_1$  is the volume, in mL, stock solution used from titration;

$V_2$  is the volume, in mL, AgNO<sub>3</sub> added;

$V_3$  is the volume, in mL, NH<sub>4</sub>SCN necessary for back titration.

## Annex D (normative)

### Determination of acid insoluble ash

#### D.1 Reagent

**D.1.1 Dilute Hydrochloric Acid** — 1:1, prepared from concentrated hydrochloric acid.

#### D.2 Procedure

**D.2.1** Weigh accurately about 2 g of the dried material in a tared porcelain, silica or platinum dish. Ignite with a meker burner for about 1 hour. Complete the Ignition by keeping in a muffle furnace at 500 °C to 570 °C until grey ash results.

Cool and filter through whatman filter paper No. 42 or its equivalent. Wash the residue with hot water until the washings are free from chlorides as tested with silver nitrate solution and return the filter paper and residue to the dish. Keep it in an electric air oven maintained at  $135 \pm 2$  °C for about 3 hrs. Ignite the dish again for about 30 minutes, cool and weigh. Repeat this process till the difference between two successive weighings is less than 1 mg. Note the lowest weight.

#### D.3 Calculation

**D.3.1** Acid insoluble ash, per cent by weight

$$= \frac{100(M_2 - M)}{M_1 - M}$$

where,

$M_2$  = the lowest weight, in g, of the dish with the acid insoluble ash;

$M$  = weight, in g, of the empty dish; and

$M_1$  = weight, in g, of the dish with the dried product taken for the test.

## Bibliography

EAS 774:2012, *Sweetpotato crisps — Specification*

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