



AGENCE DES NORMES ET DE LA QUALITE®
STANDARDS AND QUALITY AGENCY®

www.anor.cm

PROJET DE NORME CAMEROUNAISE PNC 3143 : 2026 - CT 48

2026

BANANA CRISPS – SPECIFICATION

Toute reproduction ou représentation intégrale ou partielle, par quelque procédé que ce soit, des pages publiées dans le présent document, faite sans l'autorisation de l'éditeur est illicite et constitue une contrefaçon. Seules sont autorisées d'une part, les reproductions strictement réservées à l'usage privé du copiste et non destinées à une utilisation collective et, d'autre part, les analyses et courtes citations justifiées par le caractère scientifique ou d'information de l'œuvre dans laquelle elles sont incorporées.

PROJET DE NORME CAMEROUNAISE

ENQUETE PUBLIQUE N° : 19

Durée de l'enquête Du 21/09/2026 Au 19/10/2026

Edition et diffusion par l'Agence des Normes et de la Qualité

B.P.: 14966 Yaoundé – CAMEROUN – Tél: 6992 257 777 /Fax.: (237) 222 22 64 96

E-mail : enquetepublique@anor.cm – www.anor.cm/enquetes-publiques

ANOR®

DN-R2/PR-01/ENR-02
16/12/2015

Banana crisps — Specification



Table of contents

1	Scope	1
2	Normative references	1
3	Definitions	1
4	Essential quality and compositional requirements	2
4.1	Raw materials	2
4.2	Optional ingredients	2
4.3	Physical requirements of the finished product	2
4.4	Chemical requirements	3
5	Food additives	3
6	Contaminants	3
6.1	Pesticide residues	3
6.2	Other contaminants	3
7	Hygiene	3
8	Packaging	4
9	Labelling	4
10	Sampling	4
11	Criteria for conformity	4
	Annex A (normative) Determination of fat content	5
	Annex B (normative) Determination of free fatty acids	7
	Annex C (normative) Determination of the sodium chloride content	8
	Annex D (normative) Determination of acid insoluble ash	10
	Acknowledgment and appreciation	11

Foreword

The African Organization for Standardization (ARSO) is an African intergovernmental organization established by the United Nations Economic Commission for Africa (UNECA) and the Organization of African Unity (AU) in 1977. One of the fundamental mandates of ARSO is to develop and harmonize African Standards (ARS) for the purpose of enhancing Africa's internal trading capacity, increase Africa's product and service competitiveness globally and uplift the welfare of African communities. The work of preparing African Standards is normally carried out through ARSO technical committees. Each Member State interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, Regional Economic Communities (RECs), governmental and non-governmental organizations, in liaison with ARSO, also take part in the work.

ARSO Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare ARSO Standards. Draft ARSO Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an ARSO Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ARSO shall not be held responsible for identifying any or all such patent rights.

This African Standard was prepared by the ARSO Technical Harmonization Committee on *Agriculture and Food Products* (ARSO/THC 02).

© African Organisation for Standardisation 2017 — All rights reserved*

ARSO Central Secretariat
International House 3rd Floor
P. O. Box 57363 — 00200 City Square
NAIROBI, KENYA

Tel. +254-20-2224561, +254-20-3311641, +254-20-3311608

E-mail: arso@arso-oran.org
Web: www.arso-oran.org

* © 2017 ARSO — All rights of exploitation reserved worldwide for African Member States' NSBs.

Copyright notice

This ARSO document is copyright-protected by ARSO. While the reproduction of this document by participants in the ARSO standards development process is permitted without prior permission from ARSO, neither this document nor any extract from it may be reproduced, stored or transmitted in any form for any other purpose without prior written permission from ARSO.

Requests for permission to reproduce this document for the purpose of selling it should be addressed as shown below or to ARSO's member body in the country of the requester:

© African Organisation for Standardisation 2017 — All rights reserved

ARSO Central Secretariat
International House 3rd Floor
P.O. Box 57363 — 00200 City Square
NAIROBI, KENYA

Tel: +254-20-2224561, +254-20-3311641, +254-20-3311608

E-mail: arso@arso-oran.org
Web: www.arso-oran.org

Reproduction for sales purposes may be subject to royalty payments or a licensing agreement. Violators may be prosecuted.

Introduction

There are two different methods for making banana crisps. One of these is to deep fry thin slices of banana in hot oil, in the same way as potato chips or crisps. The other is to dry slices of banana, either in the sun or using a solar or artificial dryer. The products made by the two methods are quite different. The deep-fried crisps tend to be a savoury, high calorie product that is eaten as a snack food. Because they are deep fried in oil they have a fairly short shelf life—up to 2 months maximum when stored in the correct conditions. The oil is prone to turning rancid and the crisps to becoming soft if they are not stored in air-tight containers.

The dried crisps are a more 'wholesome' product. They too are eaten as a snack food and are often added to cereal mixes such as muesli. The crisps can be dried without any additives or they can be coated with a syrup or honey dip prior to drying which gives a sweeter tasting, higher calorie and possibly more attractive looking product. Crisps made by drying have a longer shelf life (up to 6 months) as long as they are dried to a low moisture content and stored in a cool dry place.

To prepare fried banana crisps, unripe mature banana or plantain is cut into thin slices and fried to a crisp texture. The slices can be partially dried before frying which removes some of the moisture, uses less oil and makes them more crispy. Frying removes some of the water, gelatinizes the starch, destroys enzymes and micro-organisms and gives a crisp product with a characteristic aroma and taste. The low moisture content inhibits microbial growth and packaging prevents recontamination.

ENQUÊTE PUBLIQUE N° 19

Banana crisps — Specification

1 Scope

This African Standard specifies the requirements for crisps made from the cooking bananas of the species (*M. balbisiana*) and (*M. acuminata*).

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 831, *Fresh bananas — 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 7932, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of presumptive Bacillus cereus — Colony-count technique at 30 degrees C*

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*

ISO 21871, *Microbiology of food and animal feeding stuffs — Horizontal method for the determination of low numbers of presumptive Bacillus cereus — Most probable number technique and detection method*

ISO 24333, *Cereals and cereal products — Sampling*

3 Definitions

For the purpose of this standard the following definitions apply.

3.1

crisp

thin firm slices of peeled and washed bananas, 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 banana 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 banana crisps:

4.1.1 Bananas — Complying with ARS 831. They shall be mature, fresh, peeled and clean.

4.1.2 Vegetable oil — Shall comply with the relevant African Standards.

4.2 Optional ingredients

4.2.1 Edible salt — Shall comply with ARS 471.

4.2.2 Spices and condiments — Shall comply with the relevant African Standards.

4.3 Physical requirements of the finished product

4.3.1 The banana crisps shall be well cooked, firm, free from sogginess and excessive oil.

4.3.2 Banana crisps shall be golden to yellow in colour.

4.3.3 The banana crisps shall be uniform in symmetry.

4.3.4 Banana crisps, when packed, shall not contain more than 10 per cent by mass of irregular and broken pieces.

4.3.5 Banana crisps shall be of good flavour, free from rancidity, bitterness, foreign matter and any other adulterant.

4.3.6 The banana crisps shall be free from artificial colouring matter.

4.3.7 When packed, not more than 1 per cent of the product shall have the following defects:

- (i) Surface or internal pigmentation.
- (ii) Black, dark brown or reddish discolouration.
- (iii) Peels.

4.4 Chemical requirements

Banana crisps shall conform to the chemical requirements specified in Table 1.

Table 1 — Chemical requirements for banana crisps

S/N	Parameter	Requirements	Method of test
1	Moisture content, %, by mass, max.	4.7	ISO 712
2	Fat content on dry weight basis, %, max.	35	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, if used in the preparation of banana crisps, shall comply with CODEX Stan 192.

6 Contaminants

6.1 Pesticide residues

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

6.2 Other contaminants

6.2.1 Banana crisps shall comply with the maximum levels of CODEX STAN 193.

6.2.2 The dried cassava chips shall contain not more than 10 micrograms per kilogram aflatoxin of which not more than 5 micrograms per kilogram may be aflatoxin B1 when tested in accordance with ISO 16050.

7 Hygiene

Banana crisps shall be prepared and handled in a hygienic manner in accordance with ARS 53 and shall conform to microbiological limits specified in Table 2.

Table 2 — Microbiological limits for banana crisps

S/N	Micro-organism(s)	Requirements	Method of test
1	Total plate count, cfu/g	10 ³	ISO 4833
2	<i>Staphylococcus aureus</i> cfu/g max	10 ²	ISO 6888
3	<i>Escherichia coli</i> , cfu/g, max.	absent	ISO 7251
4	<i>Salmonella</i> , per 25g, max.	absent	ISO 6579
5	Coliforms g (per 100 g)	absent	ISO 4832
6	Bacillus cereus, per 25g, max.	absent	ISO 7932
7	Yeasts and moulds, cfu/g, max.	10 ³	ISO 21527-2

8 Packaging

8.1 Banana 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 banana crisps may be required to meet the relevant regulations of the destination country.

9 Labelling

9.1 In addition to the requirements of ARS 56, the following specific labelling requirements shall apply and shall be **legibly** and **indelibly** marked:

- a) common name of the product 'Banana Crisps';
- b) name, and physical address of the manufacturer/ distributor and /or trade name/ brand name;
- c) if spiced they shall be labelled 'Spiced Banana 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 banana 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 Na₂SO₄.

A.3 Reagents

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

A.3.2 Na₂SO₄

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 832:2017(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:

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

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 AgNO_3 in excess.

Back titration of the surplus 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 AgNO_3 solution, 0.1 N (16.9888 g AgNO_3)

C.4.3 NH_4SCN solution, 0.1 N (7.6113 g NH_4SCN). In practice a slightly higher weight is taken and the solution is adjusted by dilution against a 0.1 N 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 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°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 AgNO₃ 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, AgNO₃ added;
- V_3 is the volume, in mL, NH₄SCN 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 ± 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.

Acknowledgment and appreciation

This African Standard was harmonized under the project titled:

Harmonization of African Standards for Agriculture and Food Products
June 2015 — August 2018

financed by the **African Development Bank (AfDB)** through the **African Trade Fund (AfTra)** Programme. ARSO acknowledges and appreciates this support on behalf of its Member States.

ENQUÊTE PUBLIQUE N° 19

ENQUETE PUBLIQUE N° 19