



NIGERIAN INDUSTRIAL STANDARD

NIS 723: 2015

Standard for Maize Flour

ICS 67.220.20

**Price Group B
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Approved by SON Governing Council

STANDARDS ORGANISATION OF NIGERIA

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Foreword

The Nigerian Industrial Standard for Maize Flour – NIS 723: 2015 was elaborated by the Technical Committee for Food Fortification Programme. It replaces the 2010 version.

The standard made provision for inclusion of folic acid and zinc in Maize Flour in line with the nation's nutrition's policy of mandatory fortification of selected food vehicles to prevent the prevalence of the deficiency in the diet leading to high mortality among our women and children. The electrolytic iron present in current flour standards is hereby replaced with NaFeEDTA which is more bioavailable.

This edition therefore incorporates changes such as Foreword, Normative Reference, Mandatory Micronutrients Requirements comprising of Vitamins A, B12, B9, B2, B1, B3, B6, Iron (NaFeEDTA) and Zinc, Labelling requirements among others.

In elaborating this standard, references made to the Codex Alimentarius Commission, relevant Nigerian Industrial Standards, and technical inputs from stakeholders and research Institutes are hereby acknowledged.

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1. Scope

This Nigerian Industrial Standard specifies the quality and safety requirements, sampling and test methods for edible Maize grits from degermed kernel of maize (*Zea may L*).

2. Normative References

- (i) Codex Alimentarius Commission Standard for Degermed Maize (corn) Meal and Maize (Corn) Grit 155-1985 Rev 1995
- (ii) NIS 253: 2003 - Nigerian Industrial Standard for Maize Grains
- (iii) CODEX STAN (CAC/MRLSI – 2009/2012) Codex Alimentarius Commission Standard - Pesticides Residues in Food
- (iv) CAC/RCP, Vol 10 2007 - Codex Alimentarius Commission - General Requirement for Food Hygiene.
- (v) CODEX STAN 234-REV 1-2009 - Codex Alimentarius Commission Sampling Plan for Packaged Foods (AQL – 6.5) CAC/RM42-1969, Recommended Method of Analysis and Sampling.
- (vi) CODEX STAN 1-1987, Rev2010 - Codex Alimentarius Commission (CAC): General Standard for the Labelling of Pre-packaged Foods.
- (vii) National Agency for Food and Drug Administration and Control (NAFDAC) Guidelines for Food Hygiene Practice, 2007.
- (viii) AOAC Official Method 999.07 for the Determination of Total Aflatoxins
- (ix) AOAC Official Method 2001.04, Determination of Fumonisin B1 and B2 in Corn and Corn flakes - Liquid Chromatography with Immunoaffinity Column Clean up
- (x) ISO 4833 - Microbiology of Food and Animal Feeding Stuffs - Horizontal Method for the Enumeration of Microorganisms - Colony-Count Technique at 30°C
- (xi) ISO 6579 - Microbiology of Food and Animal Feeding Stuffs - Horizontal Method for the Detection of *Salmonella* spp.
- (xii) ISO 6888-1 - 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.
- (xiii) ISO 6888-2 - Microbiology of Food and Animal Feeding Stuffs - Horizontal Method for the Enumeration of Coagulase-Positive Staphylococci (*Staphylococcus aureus* and other species) - Part 2: Technique using Rabbit Plasma Fibrinogen Agar Medium
- (xiv) ISO 6888-3 - Microbiology of Food and Animal Feeding Stuffs - Horizontal Method for the Enumeration of Coagulase-Positive Staphylococci (*Staphylococcus aureus* and other species) - Part 3: Detection and MPN Technique for Low Numbers

- (xv) ISO 7251 - Microbiology of Food and Animal Feeding Stuffs - Horizontal Method for the Detection and Enumeration of Presumptive *Escherichia coli* - Most Probable Number Technique
- (xvi) ISO 7932 - Microbiology of Food and Animal Feeding Stuffs - Horizontal Method for the Enumeration of Presumptive *Bacillus cereus* - Colony-Count Technique at 30°C
- (xvii) 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
- (xviii) ISO/TS 21872-1 - Microbiology of Food and Animal Feeding Stuffs - Horizontal Method for the Detection of Potentially enteropathogenic *Vibrio* spp. - Part 1: Detection of *Vibrio parahaemolyticus* and *Vibrio cholera*
- (xix) ISO/TS 21872-2 - Microbiology of Food and Animal Feeding Stuffs - Horizontal Method for the Detection of Potentially enteropathogenic *Vibrio* spp. - Part 2: Detection of species other than *Vibrio parahaemolyticus* and *Vibrio cholera*
- (xx) National Agency for Food and Drug Administration and Control (NAFDAC) Regulations on the Labeling of Pre-packaged food, 2005
- (xxi) CAC-(CX 193-1995-2010) Codex Alimentarius Commission Maximum Limits for Contaminants
- (xxii) CODEX STAN 193-1995, 2010 General Standard for Contaminants and Toxins in Food and Feed

3. Terminology

For the purpose of this standard, the following definitions and terms shall apply;

- 3.1 Contaminants** - Any substance not intentionally added to food which is present in such food as a result of the production, manufacture, processing, preparation, treatment, packing, packaging, transport or holding of such food or as a result of environmental contamination. The term does not include insect fragment, rodent hairs and other extraneous matter.
- 3.2 Degermed Maize** -Maize that shall be free from germ
- 3.3 Food Additive** - A natural or artificial substances that is added to food to enhance nutritional values, textures, flavour and to prevent or delay spoilage.
- 3.4 Maize Flour:** This is the product prepared from fully mature, sound, degermed kernels of maize (corn), by a milling process in which the grain is comminuted to a suitable degree of fineness to comply with granularity requirement of this standard and from which bran and germ are removed. During preparation, coarse particles of milled maize kernel may be separated, remilled and recombined with all of the material from which they were separated.

4. Ingredients

4.1 Essential Ingredients

Maize grain used for maize flour production shall meet the quality requirement in the NIS 253: 2010

4.2 Optional Ingredients

Ascorbic acid

4.3 Mandatory Micronutrients

Maize Flour shall be fortified with the micronutrients as stated in Table 1.

Table 1 – Mandatory Micronutrients Requirements of Maize Flour

Micronutrients	Requirements
Vitamin A (Dry Vitamin A Palmitate 250 SN/CWSCWD) (mg/kg)	2.0
Vitamin B9 (Folic Acid Food grade) (mg/kg)	2.6
Vitamin B12 (Vitamin B12 0.1% SN/CWS/CWD) (mg/kg)	0.02
Iron (NaFeEDTA) (mg/kg)	40.0
Vitamin B2 (Riboflavin Fine powder) (mg/kg)	5.0
Zinc (Zinc oxide) (mg/kg)	50.0
Vitamin B1 (Thiamine Mononitrate) (mg/kg)	6.0
Vitamin B3 (Niacinamide) (mg/kg)	45.0
Vitamin B6 (Pyridoxine Hydrochloride) (mg/kg)	6.0

4.4 Food Additives

In addition to Table 1, Only Food additives as approved by Codex Alimentarius Commission (CAC): General Standard for Food Additives (GSFA) 2006 shall be used.

5. Quality Requirements

The product shall comply with the quality requirements specified in Table 2.

Table 2 – Quality Requirements of Maize Flour

Parameter	Requirement	Test Method
Moisture content (%) (max)	13.50	AOAC 925.10
Protein (%) (min)	5.00	AOAC 979.09
Crude fat (%) (max)	1.50	AOAC 920.39C
Ash (%) (max)	0.71	AOAC 923.09
Acid Insoluble ash (%) (max)	0.05	AOAC 955.03
pH of 10% suspension	7.0-8.0	Standard Method
Particle size	90% by weight shall pass through a sieve of 356 micron	Using 356 micron sieve

6. Contaminants

6.1 Microbial Contaminants

The allowable limit for microbial contaminants in maize flour shall be as in Table 3

Table 3 – Allowable Limit for Microbial Contaminants in Maize Flour

Micro organism(s)	Requirement	Method of Test
Total plate count, (cfu/g) (max)	1×10^5	ISO 4833
<i>Staphylococcus aureus</i> (cfu/g) (max)	1×10^2	ISO 6888
<i>Escherichia coli</i> , (cfu/g)	3	ISO 7251
Salmonella, per 25g	Absent	ISO 6579
<i>Bacillus cereus</i> , per 25g	Absent	ISO 7932
Yeast and moulds, (cfu/g)	1×10^3	ISO 21527-2
<i>Vibrio cholera</i>	Absent	ISO/TS 21872

6.2 Metallic Contaminants

The allowable limit for metals as contaminants in maize flour shall be as specified in Table 4.

Table 4 – Allowable Limit of Metallic Contaminants Maize Flour

Metals	Requirement	Test Method
Arsenic (mg/kg) (max)	1.0	AOAC 999.11
Lead (mg/kg) (max)	2.0	AOAC 999.11
Iron (mg/kg)(max)	2.0	AOAC 999.11
Copper(mg/kg) (max)	2.0	AOAC 999.11

6.3 Chemical Contaminants

6.3.1 Mycotoxin

The maximum level of mycotoxin shall be as stated in Table 5.

Table 5 – Maximum Allowable Limit of Mycotoxins

Mycotoxin	Requirement	Test Method
Aflatoxin B1 (ppb)	2	AOAC 999.07
Fumonisin B ₁ ,B ₂ (ppb)	3	AOAC 2001.04

6.3.2 Pesticides Residues

The maximum residue limit shall be in conformity with the Codex Alimentarius Commission ((CAC/MRLSI – 2009/2012) and as amended.

7. Hygiene

To the extent possible in Good Manufacturing Practice, the product shall be produced and handled in accordance with the relevant section of the General Principles of Food Hygiene CAC/RCP (Vol. 10- 2007)and the National Agency for Food and Drug Administration and Control Guidelines for Food Hygienic Practice 2004

When tested by appropriate methods of sampling and examination, the product shall;

- (i) To the extent possible in good manufacturing practice, the product shall be free from objectionable matter.
- (ii) be free from organisms which may represent a hazard to health and
- (iii) not contain any substance originating from microorganisms in amount which may represent a hazard to health
- (iv) Also the premises, people engaged in handling maize flour must be clean. The equipment used for manufacture and vehicles used for distribution of maize flour must be in good state.

8. Packaging, Labelling, Handling and Storage

8.1 Packaging

8.1.1 There shall be an inner packaging food grade liner bag for the products.

8.1.2 The packaging material shall not impact any odour, taste and colour any other extraneous matter to the product and shall not result in contamination of the product with substances of which the packaging material is made.

8.1.3 The packaging materials shall be as to protect the product against bacteria and other contaminant. It shall protect the product as much as possible against infiltration of moisture, insect infestation and leakage.

8.2 Labelling

In addition to the provision of Codex Alimentarius Commission for Food labelling (4th Edition, 2005) and the National Agency for Food and Drug Administration and Control Regulations (2005) on the labelling of pre-packaged food, the following shall apply:

- (i) Name of product shall be presented on the principal display panel of the label and shall not be obstructed by printed or graphics in bold capital letters of some colour size
- (ii) Name and location address of the manufacturer, or importer
- (iii) Batch Number or Code Number
- (iv) Date of Production and Best Before Date
- (v) List of Ingredients in descending order of magnitude
- (vi) Net weight in metric unit
- (vii) MANCAP NIS Logo
- (viii) Country of origin
- (ix) NAFDAC Number

8.3 Handling and Storage

8.3.1 Product shall be handled in a manner that will prevent opening during storage or transportation.

8.3.2 Product shall be stored in a well aerated area to prevent humidity build up that could result in product rancidity, objectionable odour, colour and flavour.

9. Analysis

9.1 Methods of Sampling

9.1.1 Lot

Lot shall mean the quantity of packaged product of the same batch of production. Samples shall be selected for analysis from each lot to ascertain their conformity to the specifications laid down in this standard

9.1.2 Scale

The scale of sampling shall be as stated below

- (i) For routine test, the sample size shall be 1kg, which shall be chosen at random from the lot
- (ii) In case of dispute, larger representative samples shall be taken. The samples drawn shall be divided at random into three equal sets. One set of samples shall be for Standards Organisation of Nigeria. The second set for the manufacturer, and third set goes to an independent analyst
- (iii) To allow for adequate mixing, sampling at mill shall be done on not less than 8 randomly selected container
- (iv) If the maize grit is from a mainstream, an interval of 10 - 15 minutes shall be allowed between the takings of each sample.

10. Criteria for Conformity

A lot shall be declared as conforming to this standard if each or composite sample inspected/ analysed for quality requirements conforms to clauses 4 - 7.