



DEAS 768:2023

ICS 67.060

EAST AFRICAN STANDARD

Fortified milled maize (corn) products — Specification

EAST AFRICAN COMMUNITY

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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 018, *Nutrition and foods for special dietary uses*.

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

This third edition cancels and replaces the second edition (EAS 768: 2019), which has been technically revised.

Introduction

The Health Ministers of the East, Central and Southern Africa Health Community (ECSA-HC) passed a resolution in 2002 directing the Secretariat to work with the countries to fortify commonly consumed foods in the region after recognizing that there is high level of malnutrition in the region. ECSA-HC is an intergovernmental organization that fosters cooperation in health among countries in the East, Central and Southern African Region. ECSA-HC members includes Kenya, Uganda, Tanzania, Malawi, Zambia, Zimbabwe, Lesotho, Swaziland, Mauritius and Seychelles.

Following initial promotion efforts, the countries identified staple foods suitable for fortification as oil, sugar, maize meal/ flour and wheat flour. These foods can be used as vehicles to deliver essential micronutrients to the populations. Based on scientific evidence and working with countries using country data, the Secretariat developed implementation focused guidelines on fortification of these foods to help countries start up programmes and scale up the existing programmes. These guidelines included fortification levels for addition of micronutrients at the factory, and levels for monitoring at commercial level.

Based on the guidelines and other available information, most of the countries in the East African Region and in the larger Africa have initiated national programmes on oil fortification with vitamin A; and wheat and maize meal/flour fortification with iron, zinc, folic acid, niacin, vitamin B-1, B-2, B-12, B-6 and vitamin A. Sugar fortification with vitamin A has also been considered as a way of supplementing other sources of the vitamin in order to prevent and reduce problems associated with the deficiency of this vitamin. Salt fortification with iodine continues to be implemented in all the countries.

With the increased trade of food commodities including these fortified foods within the region, it has become imperative to develop regional standards that over and above the other standards, stipulate minimum and maximum levels of the added nutrients, provide clauses on how to pack the fortified product and the use of health and nutrition claims. The guidelines developed through ECSA have now been incorporated into food standards to provide for specific fortified products. It is envisaged that, the implementation of these standard within the region will help countries adopt food fortification as a strategy to prevent, alleviate or eliminate micronutrient deficiency in the region. Standards will not only promote the health of the population but will also ensure safety of food products and enhance fair trade.

Fortified milled maize (corn) products— Specification

1 Scope

This Draft East African Standard specifies the requirements, sampling and test methods for fortified milled maize (corn) products prepared from the grains of common maize (*Zea mays* L.) 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 2001.13, *Determination of Vitamin A (Retinol) in food — Liquid Chromatography*

AOAC 2004.05, *Total folates in cereal and cereal foods — Microbiological Assay-Trienzyme Procedure*

AOAC 2011.14, *Calcium, Copper, Iron, Magnesium, Manganese, Potassium, Phosphorus, Sodium and Zinc in fortified food products. Microwave Digestion and Inductively Coupled Plasma-Optical Emission Spectrometry*

AOAC 944.02, *Official Method for Determination of Iron in flour. Spectrophotometric method*

AOAC 952.13, *Arsenic in food — Silver diethyldithiocarbamate*

AOAC 953.17, *Thiamine (vitamin B1) in grain products. Fluorometric (rapid) method*

AOAC 961.15, *Vitamin B6 (pyridoxine pyridoxal pyridoxamine) in food extracts. Microbiological method*

AOAC 965.22, *Sorting Corn Grits Sieving Method Modified*

AOAC 970.65, *Riboflavin (Vitamin B2) in foods and vitamin preparations*

AOAC 975.41, *Niacin and niacinamide in cereal products. Automated method*

CODEX STAN 192, *Codex general standard for food additives*

EAS 2, *Maize grains — Specification*

EAS 38, *Labelling of pre-packaged foods — Specification*

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

EAS 44, *Milled maize (corn) products — Specification*

EAS 803, *Nutrition labelling — Requirements*

EAS 804, *Claims on food — General requirements*

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

EAS 900, *Cereals and Pulses - Sampling*

EAS 901, *Cereals and Pulses – Test Methods*

ISO 11085, *Cereals, cereals-based products and animal feeding stuffs — Determination of crude fat and total fat content by the Randall extraction method*

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*

ISO 20634, *Infant formula and adult nutritionals — Determination of vitamin B12 by reversed phase high performance liquid chromatography (RP-HPLC)*

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

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

ISO 5498, *Agricultural food products — Determination crude fibre Content-General method*

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

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

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

ISO 6579-1, *Microbiology of the food chain — Horizontal method for the detection, enumeration and serotyping of Salmonella — Part 1: Detection of Salmonella spp.*

ISO 6633, *Fruits, vegetables and derived products — Determination of lead content — Flameless atomic absorption spectrometric method*

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*

ISO 7305, *Milled cereal products -- Determination of fat acidity*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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>

3.1 diluent

suitable, inert, edible food-grade carrier for micronutrients

3.2 fortification premix

blend of fortificants and diluents formulated to provide specified and determinable amounts of micronutrients

3.3

fortified milled maize (corn) products

milled maize products to which essential micronutrients have been added

3.4

fortificant

compound which contains essential micronutrient intended to be added to a food

3.5

food fortification

practice of deliberately adding micronutrient(s), that is vitamins and minerals (including trace elements) in a food, so as to improve the nutritional quality of the food supply and provide a public health benefit with minimal risk to health

3.6

essential micronutrients

refers to any micronutrient, which is needed for growth and development and the maintenance of healthy life, that is normally consumed as a constituent of food and cannot be synthesized in adequate amounts by the body.

3.7

milled maize (corn) products

products obtained from maize grains (*Zea mays L.*) through milling process including granulated maize meal, sifted maize meal, whole maize meal and maize flour

3.7.1

granulated maize meal

coarse product obtained from milling and sifting of clean shelled maize

3.7.2

sifted maize meal

form of granulated maize meal that has been reduced to a certain degree of fineness

3.7.3

whole maize meal

food prepared from fully mature, sound, un-germinated, whole kernels of maize, *Zea mays L.*, by a grinding process in which the entire grain is comminuted to a suitable degree of fineness

3.7.4

maize flour

product obtained by removing the germ and bran followed by grinding, clean maize kernels using roller mills or other methods and sifting the resulting product to suitable degree of fineness

4 Requirements

4.1 Raw materials

Fortified milled maize (corn) products shall be prepared from milled maize complying with EAS 44 or maize grains complying with EAS 2.

4.2 General requirements

Fortified milled maize (corn) products shall be:

- a) of characteristic colour of milled maize or maize grains from which they were prepared;
- b) free from foreign matter such as insects, fungi or dirt;
- c) free from fermented musty or other objectionable odour; and

d) wholesome and fit for human consumption.

4.3 Specific requirements

Fortified milled maize (corn) products shall comply with the requirements given in Table 1 when tested in accordance with tested method specified therein.

Table 1 — Specific requirements for fortified milled maize (corn) products

S/N	Characteristic	Type				Test method
		Sifted maize meal	Granulated maize meal	Whole maize meal	Maize flour	
i.	Crude fibre, % by m/m, max.	0.7	1.0	3.0	0.7	ISO 5498
ii.	Crude fat on moisture free basis, % by m/m, max.	3.0	3.0	3.1*	3.0	ISO 11085
iii.	Moisture content, % by m/m, max.	14	14	14	14	EAS 901 Clause 5
iv.	Total ash, % by m/m, max.	1.0	1.0	3.0	1.0	ISO 2171
v.	Acid insoluble ash, % by m/m, max.	0.15	0.35	0.40	0.15	ISO 5985
vi.	Fat acidity, mg KOH per 100 g of product, m/m, max.	80	80	80	80	ISO 7305
vii.	Residue on sieving through 1000-micron sieve, % by m/m, max	0.5	N/A	N/A	0.5	AOAC 965.22

* Minimum crude fat on moisture free basis for whole maize meal

5 Fortification requirements

5.1 Levels of micronutrients

The fortified milled maize (corn) products shall comply with the levels of micronutrients provided in Table 2 when tested in accordance with test methods specified therein.

Table 2 — Requirements for micronutrients in fortified milled maize (corn) products

S/N	Nutrient	Fortificant	Limits, mg/kg		Test method
			Min.	Max.	
i.	Vitamin A _a)	Vitamin A (Retinyl) palmitate, spray-dried or equivalent, 75 000 µg RE/g ^b) (7.5 % retinol), min.	0.5	1.4	AOAC 2001.13

ii.	Vitamin B ₁ ^{a)}	Thiamin Mononitrate, 81 %, min.	3.0	N/A ^{c)}	AOAC 953.17
iii.	Vitamin B ₂ ^{a)}	Riboflavin, 100 %, min.	2	N/A	AOAC 970.65
iv.	Niacin ^{a)}	Niacinamide, 99 %, min.	14.9	N/A	AOAC 975.41
v.	Vitamin B ₆ ^{a)}	Pyridoxine hydrochloride, 82 %, min.	2	N/A	AOAC 961.15
vi.	Folate	Folic acid, 90.5 %, min.	0.6	1.7	AOAC 2004.05
vii.	Vitamin B ₁₂	Vitamin B ₁₂ , WS, 0.1 %, min.	0.007	N/A	ISO 20634
viii.	Zinc	Zinc oxide, 80 %, min.	33	65	AOAC 2011.14
ix.	Total iron	Total iron	21	NA	AOAC 944.02

^{a)}The addition of these micronutrients is optional in Tanzania

^{b)}1µg RE = 3.33 IU, RE = Retinol equivalent

^{c)}NA-Not Applicable. The maximum limits for these nutrients are not necessary because the upper tolerance limits of these nutrients are very high.

NOTE 1 Any other fortificants listed by either British Pharmacopoeia (BP); Food Chemical Codex (FCC); Merck Index (MI); United States National Formulary (NF); European Pharmacopoeia (Ph Eur); United States Pharmacopoeia (USP); or FAO WHO Codex Alimentarius Commission may be used.

NOTE 2 Only NaFeEDTA, 12.5 % Fe, min or Ferrous fumarate, 32 %, min shall be used as a source of iron so as to provide iron at 10 -30 mg/kg and 10 -30 mg/kg respectively for milled maize (corn) product fortification.

5.2 Fortificants and fortification premixes

The fortificants and fortification premixes may be formulated in accordance with EAS 1023

6 Food additives

The product may contain food additives in accordance with CODEX STAN 192.

7 Hygiene

7.1 Fortified milled maize (corn) products shall be produced, prepared and handled in accordance with EAS 39.

7.2 The product shall comply with microbiological limits given in Table 3 when tested in accordance with the test methods specified therein

Table 3 — Microbiological limits for fortified milled maize (corn) products

S/N	Micro-organism	Maximum limit	Test method
i.	Total aerobic count, cfu/g	10 ⁵	ISO 4833-1
ii.	<i>Escherichia coli</i> , cfu/g	10 ²	ISO 16649-2
iii.	<i>Salmonella spp in 25 g</i>	Absent	ISO 6579-1
iv.	Yeast and moulds, cfu/g	10 ⁴	ISO 21527-2
v.	<i>Staphylococcus aureus</i> , cfu/ g	<10	ISO 6888-1

8 Contaminants

8.1 Heavy metals

Fortified milled maize (corn) products shall comply with maximum limits for heavy metals as given in Table 4 when tested in accordance with the test methods specified therein.

Table 4 — Heavy metals limits for fortified milled maize (corn) products

S/N	Heavy metal	Limit mg/kg	Test method
i.	Arsenic (As)	0.1	AOAC 952.13
ii.	Lead (Pb)	0.2	ISO 6633
iii.	Cadmium (Cd)	0.1	AOC 999.11

8.2 Pesticide residues

Fortified milled maize (corn) products shall comply with the maximum residue limits established by the Codex Alimentarius Commission for this commodity.

NOTE : Where the use of certain pesticides is prohibited by some Partner States, it should be notified to all Partner States accordingly.

8.3 Mycotoxins

Fortified milled maize (corn) products shall comply with mycotoxin limits specified in Table 5 when tested in accordance with test methods specified therein.

Table 5 — Mycotoxins limits for fortified milled maize (corn) products

S/N	Mycotoxin	Maximum limit µg/kg	Test method EAS 901
i.	Total aflatoxins	10	Clause 9
ii.	Aflatoxins B1	5	Clause 10
iii.	Fumonisin	2 000	Clause 11 Clause 12

9 Packaging

Fortified milled maize (corn) products shall be packaged in food grade packaging materials.

10 Labelling

11.1 General labelling

In addition to the requirements in EAS 38, each package shall be legibly and indelibly marked with the following:

Name of product shall be "Fortified Whole Maize Meal' or 'Fortified Sifted Maize meal' or 'Fortified Maize flour' or 'Fortified Granulated Maize meal";

NOTE :Each product unit may also be marked with the national food fortification logo, where the industry qualifies to use the mark.

11.2 Nutrition labelling

The amount of micronutrients in the fortified maize (corn) products shall be declared on the label in accordance with EAS 803.

11.3 Nutrition and health claims

Fortified milled maize (corn) products may have claims on the importance of the micronutrients in nutrition and health. Such claims when declared shall be in compliance with EAS 804 and EAS 805.

11 Sampling

Sampling shall be done in accordance with EAS 900.

Bibliography

- [1] EAS 768:2012, Fortified milled maize (corn) products — Specification
- [2] CODEX STANDARD 154, Codex Standard for whole maize (corn) meal
- [3] CODEX STANDARD 155, Codex Standard for degermed maize (corn) meal and maize (corn) grits
- [4] ECSA-HC, Guidelines of fortification levels for staples.

DEAS FOR PUBLIC REVIEW

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