ETHIOPIAN STANDARD

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Dried mango — Specification

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Foreword

This Ethiopian Standard has been prepared under the direction of the Technical Commitee for Fruits and vegetables(Tc-13) and published by the Institute of Ethiopian Standards (IES).

In preparing this Ethiopian Standard reference have been made to the following:

Acknowledgements are made for the use of information from the above publication.

Dried mango — Specification

1. Scope

This Ethiopian Standard specifies requirements and methods of sampling and test for dried mangoes from *Mangifera indica,* of the Anacardiacea family and their hybrids and which are offered for direct consumption or further processing, including for catering purposes or for repackaging if required.

2. Normative References

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

AOAC 999.11, Determination of lead, iron, copper and zinc in food

EA S 38, General standard for labeling of prepackaged foods

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

ISO 21527-1,Microbiology of food and animal feeding stuffs—Horizontal method for the enumeration of yeasts and moulds -- Part 1: Colony count technique in products with water activity greater than 0.95

ISO 4832,Microbiology of food and animal feeding stuffs—Horizontal method for the enumeration of coliforms - Colony-count technique

ISO 6888-1, Microbiology of food and animal feeding stuffs -- Horizontal method for the enumeration of coagulase-positive staphylococci(Staphylococcusaureus and other species) --Part1:Technique using Baird-Parker agar medium

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

ISO 6636-2, Fruits, vegetables and derived products -- Determination of zinc content -- Part 2: Atomic absorption spectrometric method

ISO 6634, Fruits, vegetables and derived products -- Determination of arsenic content -- Silver diethyldithio carbamate spectrophotometric method

ISO 21872, Microbiology of the food chain — Horizontal method for the detection of potentially enteropathogenic Vibrio parahaemolyticus, Vibrio cholerae and Vibrio vulnificus

ISO 7952, Fruits, vegetables and derived products -- Determination of copper content -- Method using flame atomic absorption spectrometry

ISO 2447,Fruit and vegetable products—Determination of tin

3. Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

3.1
dried mango
prepared from sound fruit of varieties characteristics of mango fruit and processed by drying either by sun or by other recognized methods of dehydration, which may be preceded by sulphuring, with or without added sweetening agent and food additives, into a form of marketable dried product.

3.2
immature mango
mangoes which are not fully ripen.

3.3
immature dried mango
dried mango processed from an immature mango fruit.

3.4
overripe mango
passed beyond maturity or ripeness towards decay.

3.5
broken dried mango
piece of dried mango fruit smaller than a normal set slice.

3.6
spoiled dried mango
dried mango fruit that is darkened in colour or showing presence of mushy tissue, visible decomposition caused by bacteria, fungi, visible mould hyphae or any other indicating spoilage or infection.

3.7
pest infested dried mango
dried mango fruit damaged by insect and/or mite infestation.

3.8
extraneous matter
dirt, pieces of skin, calyx, leaf, peduncle, twigs, bits of wood, soil or any other foreign matter among or on the dried mango.

3.9
fermented dried mango
dried mango damaged by fermentation to the extent that the characteristic appearance and/or flavour is substantially affected.

4. Presentation Style

Dried mango may be presented in the following styles.

a) Sliced; varying lengths and thickness.

b) Diced into chunks and/or cubes.

c) Chips and strips of irregular shapes; and

d) Pieces or powdered. When in powder form, it shall be free flowing and free from agglomerates.

5. Requirement

5.1. General Requirements

5.1.1.Odour and taste

Dried mangoes shall have an odour and taste characteristic of the variety.

They shall be free from foreign odour and traces of odour coming from abnormal fermented mangoes.

5.1.2.Free from insects, mould, mite and other parasites

Dried mangoes shall be free from living insects, mites or other parasites and moulds; and shall be practically free from dead insects, live insect fragments and rodent contamination visible to the naked eye or with magnifying lens.

5.1.3.Extraneous matter

The proportion of extraneous matter shall not exceed the class values given in Table 1.

5.1.4.Pest infested dried mango

The proportion of pest infested and spoiled dried mangoes shall not exceed the class value given in Table 1.

5.1.5.Immature dried mangoes

The proportion of immature dried mangoes shall not exceed the class values given in Table 1.

5.1.6.Spoiled dried mangoes

The proportion of spoiled dried mangoes shall not exceed the class values given in Table 1.

5.1.7.Colour

The colour of dried mangoes shall be characteristic of the variety.

5.2. Classification

Dried mangoes are classified into three classes as follows:

5.2.1.Extra class

Dried mangoes in this class shall have a uniform colour, shape and surface. They shall not exceed the allowance percentages for the various defects given in Table 1.

5.2.2.Class I

Dried mangoes in this class satisfy the requirements given in table 1. They shall be characteristic of the variety.

The following slight defects are allowed, provided that these do not affect the general appearance of the product, the keeping quality or presentation in the package.

a) Slight defects in shape
b) Slight defects in colour
c) Slight defects on the surface

5.2.3.Class II

Dried mangoes in this class shall satisfy the requirements specified in Table 1 below.

The following defects are allowed, provided that the dried mangoes retain their essential characteristics as regards general appearance and presentation.

a) Defects in shape
b) Defects in colour
c) Surface defects

Table 1 Class defect classification limit

Class	Pest infested dried mango % (m/m), Max.	Spoiled dried mango % (m/m), Max.	Broken dried mango % (m/m), Max.	Immature dried mango % (m/m), Max.	Extraneous matter % (m/m), Max.	Test Methods
Extra	1	2b)	5c)	1	0.5	Annex A
Class I.	2	3	10	2	1.0	
Class II	3	4	15	4	1.5	

5.3. Specific Requirement

Dried mango shall conform to the compositional requirement in Table 2 below.

Table 2 Compositional requirement of dried mango

S.No	Characteristics	Requirement	Test Methods
1	Moisture content, % Max. for non-chemically preserved dried mango Dried mangoes chemically preserved (m/m), % Max.	15 25	Annex B
2	Acid insoluble ash content, % (m/m)	0.1	ES ISO 763
3	Water activity, aw, Max.	0.70	ES ISO 18787

6. Food additives and processing aids

6.1. Additives like sweeteners, colorants and preservatives used shall be in accordance to the General Standard for Food Additives (Codex Stan 192:1995).

6.2. Flavourings used in dried mangoes shall comply with the Guidelines for the Use of Flavourings (CAC/GL 66:2000).

7. Contaminants

7.1. Pesticide residues

Dried mangoes shall conform to the pesticide residue limits prescribed by the Codex Alimentarius Commission of the respective commodity.

7.2. Mycotoxin

The maximum content of aflatoxins in dried mango when determined in accordance with the method described in ES ISO 16050 shall not exceed 10 ppb for total aflatoxins and 5 ppb for aflatoxin B1.

7.3. Metal contaminants

Dried mangoes shall not contain metal contaminants in excess of the quantities specified in Table 3 below.

Table 3 Metal Contaminants

S.No	Characteristics	Maximum (mg/kg)	Test Methods
1	*Arsenic (as As)*	0.02	ES ISO 6634
2	*Lead (as Pb)*	0.6	ES ISO 6633
3	Tin (Sn)	250	ES ISO 2447
4	Mercury (Hg)	0.01	ES ISO 6637
5	Cadmium (Cd)	0.05	ES ISO 6561-2
6	*Zinc (as Zn)*	1.5	ES ISO6636-2
7	*Copper (as Cu)*	1.5	ES ISO 7952

8. Hygiene

8.1. The product shall be manufactured and handled in a hygienic manner in accordance with ES 577, ES 929 and ES ISO 22002-1.

8.2. Died mango shall be free of pathogenic microorganisms and shall conform to the microbiological requirements in Table 4 below.

Table 4 Microbiological Limits

S.No	Microorganism	Limit	Test Methods
1	Total plate count,(cfu/g), Max.	2×10^4	ES ISO 4833-1
2	*Coli form,* (cfu/g), Max.	10^2	ES ISO 4832
3	Yeasts and moulds, (cfu/g), Max.	10^2	ES ISO 21527-1 ES ISO 21527-1
4	*Salmonella spp*, cfu/25g	Absent	ES ISO 6579
5	*Staphylococcus aureus*, cfu/g, Max.	Absent	ES ISO 6888-1 ES ISO 6888-2 ES ISO 6888-3
6	E. coli cfu/g	Absent	ES ISO 7251

9. Packaging and Labelling

9.1. Packaging

9.1.1 Dried mango shall be packed in clean, sound, free from insects and fungi infection and the packing material shall be of food grade quality.

9.1.2 The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They shall not impart any toxic substance or undesirable odor or flavor to the product.

9.2. Labelling

The labeling shall comply with the requirements of CES 73, and shall be legibly and indelibly marked with the following:

a) Name of the product including its presentation style. Example as **"Sliced Dried mango" …**;

b) Name and physical address of the manufacturer;

c) Declaration of preservative by common name or international numbering; if any

d) Batch/Lot number;

e) Net content (mass) in SI unit;

f) Class of the product;

g) Country of origin;

h) Date of packing/manufacture (dd/mm/yy);

i) Expiry date (dd/mm/yy);

j) Instruction for use

k) Storage condition.

10. Sampling Method

Sampling shall be carried out in accordance with Annex C.

Annex A
(Normative)
Determination of the content of pest-infested and spoiled dried mango, immature fruits, extraneous matter and deviations from main colour.

A.1 Principle

Visual inspection of a test portion of dried mangoes. Physical separation of the damaged pieces, immature fruits and extraneous matter from the sound, healthy and ripe pieces of the sample.

A.2 Procedure

Weigh to the nearest 0.02g, a test portion of about 599 g. Separate carefully, by hand or using tweezers the pest-infested and spoiled dried mango, immature fruits, extraneous matter and the dried mango which show deviations from the main colour.

Weigh to the nearest 0.02 g, each of the categories separately.

A.3 Expression of results

The proportion, p, expressed as a percentage by mass, of each category separately is equal to;

$$P = \frac{m1 \times 100}{M0}$$

Where:

M0 is the mass, in grams, of the test portion

M1 is the mass, in grams of the relevant category (see A-2)

A.4 Test Report

The test report shall specify;

a) All information necessary for the complete identification of the sample;

b) The sampling method used, if known;

c) The test method used, with reference to this East Africa Standard;

All operating details not specified in this East Africa Standard; or regard as optional, together with details of any incidents which may have influenced the test result(s);

e) The test result(s) obtained, or, if the repeatability has been checked, the final quoted result obtained

Annex B
(Normative)
Determination of moisture content

B.1 Principle

Heating and drying of test portion of dried mango at a temperature of 70 ^{0}C $\pm$ 1 ^{0}C under pressure not exceeding 13 kPa (100 mmHg).

B.2 Materials

Use only materials of recognized analytical grade and distilled or dematerialized water or water of equivalent purity.

B.2.1 Sand

B.3 Apparatus

Usual laboratory apparatus and, in particular the following:

B.3.1 Electrical oven, capable of being maintained at 70 ^{0}C $\pm$ 1 ^{0}C at a pressure of 13 kPa (100Hg).

B.3.2 Dish, of corrosion-resistant metal, of diameter about 8.5 cm, with tight-fitting lid.

B.3.3 Fruit chopper made of a material, which does not absorb moisture.

B.3.4 Desiccators, containing an effective desiccant

B.3.5 Steam bath

B.3.6 Balance, capable of weighing to the nearest 0.01 g.

B.4 Preparation of test sample

Take approximately 50.0g dried mango and pass it through the fruit chopper (A.3.3) three times, mixing thoroughly after each grinding. Keep it in a completely filled, airtight, closed container to prevent absorption of water.

B.5 Procedure

B.5.1 Preparation of dish and lid

Add about 2 g of sand (A.2.1) to the dish (A.3.2) and dry, with the lid for 2h in the oven (A.3.1) set at 70 ^{0}C. Leave to cool to room temperature in the desiccators (A.3.4) and weigh sample to the nearest 0.01 g. Repeat the same drying procedure until a constant weight is achieved.

B.5.2 Test Portion

Weigh, to the nearest 0.02 g, about 5 g of the test sample (A.4) and spread this test portion as evenly as possible over the bottom of the dish (A.3.2) containing the sand (A.2.1).

B.5.3 Determination

Moisten the test portion and sand (B.5.2) thoroughly with a few milliliters of hot water. Mix the test portion sand with a spatula. Wash the sample residue on the spatula in to the dish with the minimum volume of hot water, Heat the open dish on the steam bath (A.3.5) to evaporate the water to dryness. Then put the dish, with the lid alongside, in the electric oven (A.3.1) set at 70 ^{0}C and continue drying for 6 hrs under a pressure not exceeding 13 kPa (100 mmHg). Do not open the electric oven during this period. During drying admit to the oven a slow current of air (about 2 bubbles per second) dried by passing through sulfuric acid. The metal dish shall be placed in direct contact with the metal shelf of oven. After drying, remove the dish, cover it immediately with its lid and place it in the desiccators (A.3.4). After cooling to room temperature, weigh it, still covered to the nearest 0.02 g.

B.6 Calculation

The moisture content, m, expressed as a percentage by mass, of the test portion is equal to;

$$m = \frac{m1+m2}{m1-m0} x\ 100$$

Where:

mo is the mass, in grams, of the dish with its lid and the sand;

m1 is the mass, in grams, of the dish with its lid and the sand with the test portion before moistening and oven

drying;

m2 is the mass, in grams, of the dish with its lid and the sand with the test portion after oven drying. Give the

result to one decimal place.

B.7 Repeatability

The absolute difference between two independent single test results, obtained using the same method on identical test material in the same laboratory by the same operator using the same equipment within a short interval of time, should not be grater then 0.2 g of water per 100 g of sample.

NOTE: If it is required to check whether the repeatability requirement is met, carry out two single determinations in accordance with A.5.1 to A.5.3 under repeatability conditions.

B.8 Test report

The test report shall specify;

B.8.1 All information necessary for the complete identification of the sample;

B.8.2 The test method used, with reference to this Standard.

B.8.3 All operating details not specified in this Standard or regarded as optional together with details of any incidents which may have influenced the test result(s).

B.8.4 The test result(s) obtained, or, if the repeatability has been checked, the final quoted result obtained.

Annex C
(Normative)
Sampling

C.1 Definitions

C.1.1

lot

collection of primary containers or units of the same size, type, and style manufactured or packed under similar conditions and handled as a single unit of trade

C.1.2

lot size

number of primary containers or units in the lot

C.1.3

sample size

total number of sample units drawn for examination from a lot

C.1.4

Sample unit

container, a portion of the contents of a container, or a composite mixture of product from small containers that is sufficient for the examination or testing as a single unit. For fill of container, the sample unit shall be the entire contents of the container

Sampling plans

Lot size (primary containers)	Size of container, n^1
Net weight equal to or less than 1 kg (2.2 lb)	
4800 or less	13
4801 to 24000	21
24001 to 48000	29
48001 to 84000	48
84001 to 144000	84
144001 to 240000	126
Over 240000	200
Net weight greater than 1 kg (2.2 lb) but not more than 4.5 kg (10 lb)	
2400 or less	13
2401 to 15000	21
15001 to 24000	29
24001 to 42000	48
42001 to 72,000	84
72001 to 120000	126
Over 120000	200
Net weight greater than 4.5 kg (10 lb)	
600 or less	13
601 to 2000	21
2001 to 7200	29
7201 to 15000	48
15001 to 24000	84
24001 to 42000	126
Over 42000	200
[1] n = number of primary containers in sample.	

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INSTITUTE OF ETHIOPIAN STANDARDS

Organization and Objectives

The Institute of Ethiopian Standards (IES) is the national standards body of Ethiopia. IES is re-named by the proclamation number 1263/2021, from Ethiopian Standards Agency (ESA) to Institute of Ethiopian standards, with the mandate given by the regulation Number, 193/2010 and proclamation number, 1263/2021.

IES's objectives are:

- Develop Ethiopian standards and establish a system that enable to check whether goods and service are in compliance with the required standards,
- Facilitate the country's technology transfer through the use of standards,
- Develop national standards for local products and services so as to make them competitive in the international market.
- Conduct standards related research and provide training and technical support.

Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational and research institutes, governmental organizations, certification, inspection, and testing organizations, regulatory bodies, consumer association etc. The requirements and/ or recommendations contained in Ethiopian Standards are consensus based that reflects the interest of the TC representatives and also of comments received from the public and other sources. Ethiopian Standards are approved by the National Standardization Council and are kept under continuous review after publication and updated regularly to take account of latest scientific and technological changes.

Orders for all Ethiopian Standards, International Standard and ASTM standards, including electronic versions, should be addressed to the Documentation and Publication Team at the Head office and Branch (Liaisons) offices). A catalogue of Ethiopian Standards is also available freely and can be accessed from our website.

 International Involvement IES, representing Ethiopia, is a member of the International Organization for Standardization (ISO), International Electro-technical Commission (IEC) and Codex Alimentarius Commission (CODEX). It also maintains close working relations with the American Society for Testing and Materials (ASTM). It is a founding member of the African Regional Organization for standardization (ARSO).

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