ETHIOPIAN STANDARD

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Dried Tomatoes — 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 Tomatoes — Specification

1. Scope

This Ethiopian Standard prescribes requirements, methods of sampling, and test for dried tomatoes of varieties *Solanum lycopersicum* L., of the Solanaceae 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 document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

TZS 4, *Rounding off numerical values*

TZS 109, *Food processing units — Code of hygiene*

TZS 118, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of microorganisms — Colony-count technique at 30 °C*

TZS 131 / ISO 7954, *Microbiology of food and animal feeding stuff — General guidance for enumeration of yeasts and moulds — Colony-count technique at 25 °C*

TZS 131 / 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*

Codex Stan 192, *General standard for food additives*

TZS 268, *General atomic absorption spectrophotometric method for determination of lead in foodstuffs*

TZS 538 / EAS 38, *Labelling of pre-packaged foods — General requirements*

TZS 730 (Part 2) / ISO 16649 (Part 2), *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of β-glucuronidase-positive Escherichia coli — Part 2: Colony-count technique at 44 °C using 5-bromo-4-chloro-3-indolyl-β-D-glucuronide*

TZS 789 / EAS 12, *Potable water — Specification*

TZS 963-3, *Starch and derived products — Heavy metals content — Part 3: Determination of lead content by atomic absorption spectrometry with electro-thermal atomization*

TZS 1502, *Fruits and Vegetables — Determination of arsenic content*

TZS 1581-1, *Determination of cadmium content — Method: graphite furnace atomic absorption spectrometry*

TZS 1581-2, *Determination of cadmium content — Method: flame atomic absorption spectrometry*

3. Terms and Definitions

For the purposes of this Standard, the following terms and definitions shall apply:

3.1
dried tomatoes
prepared from ripe tomatoes and processed by drying either by sun or by other recognized methods of dehydration, with or without added sweetening agent and food additives, into a form of marketable dried product.

4. Presentation Style

Dried tomatoe 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. Requirements

5.1 General requirements

5.1.1 Tomatoes to be used

Tomatoes shall be ripe, fresh, and clean, conforming to the characteristics of tomatoes and of a quality suitable for human consumption.

5.1.2 Physical appearance

When examined visually, dried tomatoes shall be:

a) free from damage caused by pests;

b) intact (only for wholes and slices), except for edges that are slightly torn, with slight superficial damage and slight scratches;

c) free from rot or deterioration that may make them unfit for consumption; and

d) free from blemishes, areas of discoloration, or spread stains in pronounced contrast with the rest of the produce, affecting an aggregate not more than 5% of the surface of the produce.

5.1.3 Color, odour, and flavor

Dried tomatoes shall have their characteristic color, odour, and flavour. They shall be free from off-odour, off-flavour, and foreign taste, including rancidity and mustiness. Dried tomatoes shall be free of fermentation.

5.1.4 Moulds and insects

Dried tomatoes shall be free from mould filaments and insect infestation, including the presence of dead insects and/or mites, their debris, or excreta, when examined visually.

5.1.5 Extraneous matter

Dried tomatoes shall be practically free from extraneous matter, including soil particles, loose stalks, and rodent excreta when examined visually.

5.2 Specific requirements

When examined in accordance with the method in Annex A, the dried tomatoes shall have different moisture contents as indicated in Table 1. The texture of the dried tomatoes shall vary according to the moisture content as indicated in Table 1.

Table 1 Compositional requirement of dried tomatoes

S.No	Characteristics	Requirement	Test Methods
1	Moisture content, % Max. for non-chemically preserved dried tomato Dried tomatoes chemically preserved (m/m), % Max.	15 25	Annex A
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

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 tomatoes shall comply with the Guidelines for the Use of Flavourings (CAC/GL 66:2000).

7. Contaminants

7.1 Pesticide residues

Dried tomatoes 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 tomatoes 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 tomatoes 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 Dried tomato 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 Tomato" …**;

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

Dried tomatoes shall be sampled in accordance with ANNEX B.

Annex A
(Normative)
Determination of the moisture content for dried tomatoes

NOTE: This method is the same as that prescribed by the AOAC: Official Methods of Analysis, XIIIth edition, 1980, 22.013 – *Moisture in Dried Fruits and Vegetables*, Official Final Action.

A.1 Definition

The moisture content of dried tomatoes is defined as being the loss of mass determined under the experimental conditions described in this annex.

A.2 Principle

The principle of the method is the heating and drying of a sample of dried fruit at a temperature of 70 °C ± 1 °C at a pressure not exceeding 100 mm Hg.

A.3 Apparatus

Usually laboratory apparatus is used, together with the following items:

a) Electrically heated constant-temperature oven, capable of being controlled at 70 °C ± 1 °C at a pressure of 100 mm Hg

b) Dishes with lids, of corrosion-resistant metal of about 8.5 cm in diameter

c) Mincer, either hand or mechanically operated

d) Desiccator, containing an effective desiccant

e) Precision balance

A.4 Procedure

A.4.1 Preparation of the sample

Take approximately 50 g of dried fruit from the laboratory sample, and mince it twice with the mincer.

A.4.2 Test portion

Place 2 g of finely divided asbestos into the dish, tare the dish with its lid and the asbestos, dried beforehand. Weigh, to the nearest 0.01 g, about 5 g of prepared sample.

NOTE: Dried sand which has previously been washed in hydrochloric acid and then rinsed thoroughly with water may be used in place of the asbestos. Analysts using this technique should note that it is a deviation from the AOAC procedure, and should mention this in their report.

A.4.3 Determination

Moisten the sample and the asbestos thoroughly with a few milliliters of hot water. Mix the sample and the asbestos together with a spatula. Wash the spatula with hot water to remove the sample residues from it, letting the residues and the water fall into the dish.

Heat the open dish on a boiling-water bath (*Bain-marie*) to evaporate the water to dryness. Then place the dish, with the lid alongside it, in the oven and continue drying for six hours at 70 °C under a pressure not exceeding 100 mm Hg, during which time the oven should not be opened. During drying admit a slow current of air (about two bubbles per second) to the oven, the air having been dried by passing through H_2SO_4.

The metal dish must be placed in direct contact with the metal shelf of the oven. After drying, remove the dish, cover it immediately with its lid and place it in the desiccator. After cooling to ambient temperature, weigh the covered dish to the nearest 0.01 g.

A.5 Calculation and expression of results

The moisture content of the sample, as percentage by mass, is calculated as follows:

Moisture content=100×M1−M2M1−M0\text{Moisture content} = 100 \times \frac{M_1 - M_2}{M_1 - M_0}Moisture content=100×M1−M0M1−M2

where:

- $\mathbf{M_0}$ is the mass, in grams, of the empty dish with its lid and containing the asbestos
- $\mathbf{M_1}$ is the mass, in grams, of the dish with its lid, asbestos and test portion before drying
- $\mathbf{M_2}$ is the mass, in grams, of the dish with its lid after drying

The results are expressed to one decimal place.

Duplicate determinations should agree to within 0.2 % moisture.

Annex B
(Informative)
Sampling of tomatoes

B.1 Definitions

B.1.1 Package

Individually packaged part of a lot, including contents so as to facilitate handling and transport of a number of sales units or of products loose or arranged, in order to prevent damage by physical handling and transport.

Road, rail, ship and air containers are not considered as packages.

B.1.2 Sales package

Individually packaged part of a lot, including contents, which is so as to constitute a sales unit to the final user or consumer at the point of purchase.

B.1.3 Pre-packages

Sales packages such as the packaging encloses the foodstuff completely or only partially, but in such a way that the contents cannot be altered without opening or changing the packaging. Protective films covering a single product are not considered as a pre-package.

B.1.4 Consignment

Quantity of product to be sold by a given trader found at the time of inspection and defined by a document. A consignment may consist of one or several types of product; it may contain one or several lots of dried fruit.

B.1.5 Lot

Quantity of product which, at the time of inspection at one place, has similar characteristics with regard to:

a) Packer and/or dispatcher;

b) Country of origin;

c) Nature of product;

d) Class of product;

e) Size (if the product is graded according to size);

f) Variety or commercial type (according to the relevant provisions of the standard); and

g) Type of packaging and presentation.

If it is difficult to distinguish between different lots and/or presentation of individual lots, all lots of a specific consignment may be treated as one lot if they are similar in regard to type of product, dispatcher, country of origin, class and variety or commercial type, if this is provided for in the relevant marketing standard.

B.1.6 Sampling

Collective sample(s) taken temporarily from a lot during conformity check.

B.1.6.1 Primary sample

Package taken at random from the lot, in case of packed product, or, in case of bulk product (direct loading into a transport vehicle or compartment thereof), a quantity taken at random from a point in the lot.

B.1.6.2 Bulk sample

Several primary samples supposed to be representative for the lot so that the total quantity is sufficient to allow the assessment of the lot with regard to all criteria.

B.1.6.3 Secondary sample

Equal quantity of product taken at random from the primary sample.

The secondary sample shall comprise 30 units, in case the net weight of the package is 25 kg or less and the package does not contain any sales packages. In certain cases this means that the whole content of the package has to be checked, if the primary sample contains not more than 30 units.

B.1.6.4 Composite sample

Mix, weighing at least 3 kg, of all the secondary samples taken from the bulk sample. Product in the composite sample shall be evenly mixed.

B.1.6.5 Reduced sample

Quantity of product taken at random from the bulk or composite sample whose size is restricted to the minimum quantity necessary but sufficient to allow the assessment of certain individual criteria.
If the inspection method would destroy the product, the size of the reduced sample shall not exceed 10% of the bulk sample. In the case of small dry or dried products (that is, 100 g include more than 100 units) the reduced sample shall not exceed 300 g.

Several reduced samples may be taken from a bulk or composite sample in order to check the conformity of the lot against different criteria.

Sampling method

Identification of lots and/or getting a general impression of the consignment

The identification of lots shall be carried out on the basis of their marking or other criteria. In the case of consignments which are made up of several lots it is necessary for the inspector to get a general impression of the consignment with the aid of accompanying documents or declarations concerning the consignments.

The inspector shall then determine how far the lots presented comply with the information in these documents.

If the product is to be or has been loaded onto a means of transport, the registration number of the latter shall be used for identification of the consignment.

Presentation of product

The inspector shall decide which packages are to be checked. The presentation shall be made by the operator and shall include the presentation of the bulk sample as well as the supply of all information necessary for the identification of the consignment or lot.

If reduced or secondary samples are required, these shall be identified by the inspector from the bulk sample.

The inspector shall determine the size of the bulk sample in such a way as to be able to assess the lot. The inspector selects at random the packages to be inspected or, in the case of bulk product, the points of the lot from which individual samples shall be taken.

Care shall be taken to ensure that the removal of samples does not adversely affect the quality of the product.

Damaged packages shall not be used as part of the bulk sample. They shall be set aside and may, if necessary, be subject to a separate examination and report.

The bulk sample shall comprise the following minimum quantities whenever a lot is declared unsatisfactory or the risk of a product not conforming to the standard has to be examined:

Number of packages in the lot	Number of packages to be taken (primary samples)
Packaged products	5
Upto100	5
From 101 to 300	7
From 301 to 500	9
From 501 to 1000	10
More than 1000	15 (minimum)
Product in bulk	
Quantity of lot in kg or number of Bundles in the lot	Quantity of primary samples in kg or number of bundles
Up to 200	10
From 201 to 500	20
From 501 to 1000	30
From 1001 to 5000	60
More than 5000 100 (minimum	100 (minimum

In the case of bulky dried fruit and vegetables (over 2 kg per unit), the primary samples shall be made up of at least five units. In the case of lots comprising fewer than five packages or weighing less than 10 kg, the check shall cover the entire lot.

If the inspector discovers, after an inspection, that a decision cannot be reached, another physical check shall be undertaken and the overall result reported as an average of the two checks.

B.2.3 Control of product

In case of packed product, the primary samples shall be used to check the general appearance of the product, the presentation, the cleanliness of the packages and the labelling. In all other cases, these checks shall be done on the basis of the lot or transport vehicle.

The product shall be removed entirely from its packaging for the conformity check. The inspector may only dispense with this where the sampling is based on composite samples.

The inspection of uniformity, minimum requirements, quality classes and size shall be carried out on the basis of the bulk sample, or on the basis of the composite sample.

When defects are detected, the inspector shall ascertain the respective percentage of the product not in conformity with the standard by number or weight.

External defects shall be checked on the basis of the bulk or composite sample. Certain criteria on the degree of development and/or ripeness or on the presence or absence of internal defects may be checked on the basis of reduced samples. The check based on the reduced sample applies in particular to checks which destroy the trade value of the product.

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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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