
Strawberry Juice - Specification

Foreword

This Ethiopian Standard has been prepared under the direction of the Technical Committee for Fruits and Vegetables (TC 13) and published by the Ethiopian Standards Agency (ESA).

In preparing this Ethiopian Standard reference has been made to the following.

US 818: 2018, Fruit Juice and Nectars- Specification, Uganda National Bureau of Standards.

Codex Stan 192, General standard for food additives.

Codex Stan 193, Codex general standard for contaminants and toxins in food and feed.

Codex Stan 247, Codex general standard for fruit juices and nectars.

EAS 77-1:2000, Soft fruit juices – Specification Part1: Soft drinks and fruit juices, Kenyan Standard

Israel Standard, SI 1071, Non-alcohol drinks

United States Department of Agriculture (USDA), Commodity Specification bottled juices.

Acknowledgement is made for the use of information from the above publications.

Strawberry Juice - Specification

1. Scope

This Ethiopian Standard specifies the requirements for strawberry juice preserved exclusively by physical means.

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.

CES 58, Drinking water (other than any packaged water) - Specification.

CES 73, General standard for prepackaged foods - Labeling.

ES 577, Recommended code of practice-General principle of food hygiene.

ES ISO 750, Fruits and vegetables products - Determination of titratable acidity.

ES 929, Code of practice-food hygiene management.

ES 1202, Honey-Specification.

ES ISO 1842, *Fruits and vegetables products - Determination of pH.*

ES ISO 2172, Fruit juice - Determination of soluble solids content - Pycnometric method.

ES ISO 2173, Fruit and vegetable products - Determination of soluble solids - Refractometric method.

ES ISO 2447, Fruits, vegetables and derived products - Determination of tin content.

ES ISO 2448, *Fruits and vegetable products - Determination of ethanol content.*

ES 2834, Sampling plans for prepackaged foods (AQL6.5).

ES ISO 4832, Microbiology of food and animal feeding stuffs - Horizontal method for the enumeration of Coliforms - Colony-count technique.

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

ES ISO 6633, Fruits, vegetables and derived products - Determination of lead content - Flameless atomic absorption spectrometric method.

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

ES ISO 6637, Fruits, vegetables and derived products - Determination of mercury content - Flameless atomic absorption method.

ES ISO 7251, Microbiology of food and animal feeding stuffs - Horizontal method for the detection and enumeration of presumptive *Escherichia coli* - Most probable number technique.

ES ISO 7952, Microbiology of food and animal feeding stuffs - Horizontal method for the detection and enumeration of presumptive *Escherichia coli* - Most probable number technique.

ES ISO 9526, Fruits, vegetables and derived products - Determination of iron content by flame atomic absorption spectrometry.

ES ISO 17239, Fruits, vegetables and derived products - Determination of arsenic content - Method using hydridegeneration atomic absorption spectrometry.

ES 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.

ES 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.

ES ISO 22002-1, Prerequisite programmes on food safety - Part 1 Food manufacturing.

3. Terms and definitions

For the purpose of this standard the following definitions shall apply.

3.1.

brix

percent of soluble solids content of a liquid as determined by a refractometer calibrated at 20 °C and read as degrees Brix' on the International Sucrose Scale.

3.2.

refractometer

is instrument used to measure the percent soluble solids of sugar referred to as degree brix (°Bx); concentration of sugars expresses in terms of number of grains of sucrose per 100g of liquid.

4. Product Description

Strawberry juice is the unfermented but fermentable liquid obtained from the edible part of sound, appropriately mature and fresh fruit or of fruit maintained in sound condition by suitable means including post-harvest surface treatments applied in accordance with the applicable provisions of the Codex Alimentarius Commission.

The juice is prepared by suitable processes, which maintain the essential physical, chemical, organoleptic and nutritional characteristics of the juices of the fruit from which it comes. The strawberry juice may be cloudy or clear and may have restored aromatic substances and volatile flavour components, all of which must be obtained by suitable physical means, and all of which must be recovered from fruit.

5. Essential composition

5.1 Basic ingredient

5.1.1 Fruits

Edible part of sound, appropriately mature and fresh fruit or of fruit maintained in sound condition by suitable means.

5.1.2 Water

The water used for the manufacture of fruit drinks shall be drinking water and complying with the requirements of CES 58.

5.2 Other permitted ingredient

5.2.1 Sugars and honey

One or more of the sugars as defined in Ethiopian standard shall be added. Sugar, in the form of sugar, honey (as defined in ES 1202) or both sugar and honey, may be added to a product. Honey may be used if it is the sole added sweetening agent.

Sugars with less than 2% moisture as defined in the standard for Sugar: Sucrose, dextrose anhydrous, glucose, fructose, may be added. Syrups (as defined in the Standard for Sugars), liquid sucrose, invert sugar solution, invert sugar syrup, fructose syrup, liquid cane sugar, isoglucose and high fructose syrup may be added.

5.2.2 Lemon juice or lime juice

Lemon juice or lime juice may be added for acidification purpose.

6. Requirements

6.1. General requirement

6.1.1 The strawberry juices shall have the characteristic colour, aroma and flavour of juice from the same kind of fruit from which it is made.

6.1.2 The strawberry shall retain no more water from washing, steaming or other preparatory operations than technologically unavoidable.

6.2. Specific requirements

Strawberry juices shall conform to the compositional requirement in Table 1 below.

Table 1 - Compositional requirement of strawberry juices

Characteristics	Requirement	Test Methods
Single strength fruit ingredient or the equivalent from concentrated fruit ingredient, % m/m, Min.	30	AOAC 920.151
Brix, (% v/v) at 20 °C, Min.	8.5	ES ISO 2172 ES ISO 2173
Ethanol, mg/kg. Max.	3	ES ISO 2448
pH	3.2 - 4.0	ES ISO 1842
Titrate acids (expressed as citric acid), total	0.2 to 0.5	ES ISO 750

7. Food additives

Only the food additives permitted in Codex Stan192 for food additives should be used.

8. Contaminants

The products covered by this Standard shall comply with the maximum levels of the General Standard for Contaminants and Toxins in Food and Feed (Codex Stan 193).

8.1 Pesticide residues

strawberry juices shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for this product.

8.2 Metal contaminants

strawberry juices shall not exceed levels of metals specified in Table 2 below.

Table 2 - Maximum limit for strawberry juices

Characteristic	Maximum level (mg/kg)	Test method
Tin (as Sn)	250	ES ISO 2447
Zinc (as Zn)	5	ES ISO 6636-2
Lead (as Pb)	0.05	ES ISO 6633
Arsenic (as As)	0.2	ES ISO 17239
Copper (as Cu)	5	ES ISO 7952
Iron (as Fe)	15	ES ISO 9526
Mercury (as Hg)	0.05	ES ISO 6637

NOTE: The sum of copper, iron and zinc shall not be more than 20 mg/kg.

9. Hygiene

9.1. The products shall be prepared under hygienic conditions in accordance with ES 577, ES 929 and ES ISO 22002-1.

9.2. The products shall be free from pathogenic organisms and shall comply with the microbiological limits indicated in Table3.

Table 3 - Microbiological limit

Characteristic	Limit	Test method
Total plate count, cfu/ml, Max	50	ES ISO 4833-1
Coliform count	Nil/ml	ES ISO 4832
Yeast and mould count, cfu/ml, Max	5	ES ISO 21527-1 ES ISO 21527-2
E-coli	Absent	ES ISO 7251

10. Packaging and Labeling

10.1. Packaging

10.1.1 The product shall be packed which shall be clean, sound, and free from insects and fungi infection and the packing material shall be of food grade quality.

10.1.2 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.

NOTE: Packaging materials may be required to meet different regulations in Ethiopia.

10.2. 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;
- b) Name and physical and postal address of manufacturer, exporter/importer;
- c) Batch or identification code;
- d) Net weight in liter;
- e) Expiry date;
- f) List of ingredients;
- g) Storage instruction;
- h) Country of origin;
- i) Date of manufacture;
- j) Instructions on disposal of used package;
- k) Additional requirements. The following additional specific provisions shall apply:
 - i. No fruit or fruit nectar may be represented pictorially on the label except peach or peach nectar.
 - ii. No claim shall be made in respect of "Vitamin C" nor shall the term "Vitamin C" appear on the label unless the product contains such quantities of "Vitamin C" as would be accepted by national authorities in the country in which the product is sold, as warranting such claim or the use of such term.
 - iii. When the product contains honey, the declaration "contains honey" shall be in close proximity to the name of the product.

11. Method of Sampling

Sampling of mango puree and mango concentrate puree shall be done in accordance with ES 2834.

METHODS OF ANALYSIS AND SAMPLING

PROVISION	METHOD	PRINCIPLE
Acetic acid (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 12632 IFU Method No. 66 (1996)	Enzymatic determination
Alcohol (ethanol) (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	IFU Method No. 52 (1996)	Enzymatic determination
Anthocyanins (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	IFU Method No. 71 (1998)	High performance liquid chromatography (HPLC)
Ascorbic acid-L (Section 4 Additives)	IFU Method No. 17a (1995)	High performance liquid chromatography (HPLC)
Ascorbic acid-L (Section 4 Additives)	AOAC 967.21 IFU Method No. 17 ISO 6557-2:1984	Indophenol method
Ascorbic acid-L (Section 4 Additives)	ISO 6557-1:1986	Fluorescence spectrometry
Ash in Strawberry products (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	AOAC 940.26 EN 1135 (1994) IFU Method No. 9 (1989)	Gravimetry
Beet sugar in juices (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	AOAC 995.17	Deuterium Nuclear Magnetic Resonance (Deuterium NMR)
Benzoic acid and its salts	ISO5518:1978 ISO6560:1983	Spectrometry
Benzoic acid and its salts; sorbic acid and its salts	IFU Method No. 63 (1995) NMKL 124 (1997)	High performance liquid chromatography (HPLC)
C¹³/C¹² ratio of ethanol derived from strawberry juices (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	JAOAC 79, No. 1, 1996, 62-72	Stable isotope mass spectrometry

⁸See Section 5.4 - Verification of Composition, Quality and Authenticity.

PROVISION	METHOD	PRINCIPLE
Carbon dioxide (Sections 4 Additives and 5 Processing aids)	IFU Method No. 42 (1976)	Titrimetry (back-titration after precipitation)
Carotenoid, total/individual groups (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 12136 (1997) IFU Method No. 59 (1991)	Spectrophotometry
Cellobiose	IFU Recommendation No. 4 October 2000	Capillary gas chromatography
Centrifugable pulp (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 12134 (1997) IFU Method No. 60 (1991)	Centrifugation/% value
Chloride (expressed as sodium chloride) (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 12133 (1997) IFU Method No. 37 (1991)	Electrochemical titrimetry
Citric acid (Section 4 Additives)	AOAC 986.13	High performance liquid chromatography (HPLC)
Citric acid (Section 4 Additives)	EN 1137:1994 IFU Method No. 22 (1985)	Enzymatic determination
Essential oils (Scott titration) (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	AOAC 968.20 IFU Method No. 45b ¹³	(Scott) distillation, titration
Fermentability (Sections 3.2 Quality Criteria and 3.3 Authenticity) ¹¹	IFU Method No. 18 (1974)	Microbiological method

PROVISION	METHOD	PRINCIPLE
Formol number (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 1133 (1994) IFU Method No. 30 (1984)	Potentiometric titration
Free amino acids (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 12742 (1999) IFU Method No. 57 (1989)	Liquid Chromatography
Fumaric acid (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	IFU Method No. 72 (1998)	High performance liquid chromatography (HPLC)
Glucose and fructose – Determination of glucose, fructose and saccharose (Section 3.1.2 Permitted ingredients)	EN 12630 IFU Method No. 67 (1996) NMKL 148 (1993)	High performance liquid chromatography (HPLC)
Glucose-D and fructose-D (Section 3.1.2 Permitted ingredients)	EN 1140 IFU Method No. 55 (1985)	Enzymatic determination
Gluconic acid (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	IFU Method No. 76 (2001)	Enzymatic determination
Glycerol (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	IFU Method No. 77 (2001)	Enzymatic determination
Hesperidin and naringin (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 12148 (1996) IFU Method No. 58 (1991)	High performance liquid chromatography (HPLC)
Hydroxymethylfurfural (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	IFU Method No. 69 (1996)	High performance liquid chromatography (HPLC)
Hydroxymethylfurfural (Sections 3.2 Quality Criteria and 3.3 Authenticity) ¹⁸	ISO 7466:1986	Spectrometry
Isocitric acid-D (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 1139 (1999) IFU Method No. 54 (1984)	Enzymatic determination
Lactic acid- D and L (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 12631 (1999) IFU Method No. 53 (1983/1996)	Enzymatic determination

PROVISION	METHOD	PRINCIPLE
Malic acid (Section 4 Additives)	AOAC 993.05	Enzymatic determination and high-performance liquid chromatography (HPLC)
Malic acid-D	EN 12138 IFU Method No. 64 (1995)	Enzymatic determination
Malic acid-L	EN 1138 (1994) IFU Method No. 21 (1985)	Enzymatic determination
Naringin and neohesperidin in orange juice (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	AOAC 999.05	High performance liquid chromatography (HPLC)
Pectin (Section 4 Additives)	IFU Method No. 26 (1964/1996)	Precipitation/photometry
pH-value (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	NMKL 179:2005	Potentiometry
pH-value (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 1132 (1994) IFU Method No. 11 (1989) ISO 1842:1991	Potentiometry
Phosphorus/phosphate (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 1136 (1994) IFU Method No. 50 (1983)	Photometric determination
Preservatives in strawberry juices - (sorbic acid and its salts)	ISO 5519:1978	Spectrometry
Proline by photometry – non-specific determination (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 1141 (1994) IFU Method No. 49 (1983)	Photometry

PROVISION	METHOD	PRINCIPLE
Relative density (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 1131 (1993) IFU Method No. 1 (1989) & IFU Method No. General sheet (1971)	Pycnometry
Relative density (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	IFU Method No. 1A	Densitometry
Saccharin	NMKL 122 (1997)	Liquid chromatography
Sodium, potassium, calcium, magnesium in strawberry juices (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 1134 (1994) IFU Method No. 33 (1984)	Atomic Absorption Spectroscopy
Soluble solids	AOAC 983.17 EN 12143 (1996) IFU Method No. 8 (1991) ISO 2173:2003	Indirect by refractometry
Sorbitol-D (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	IFU Method No. 62 (1995)	Enzymatic determination
Stable carbon isotope ratio in the pulp of strawberry juices (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	ENV 13070 (1998) Analytica Chimica Acta 340 (1997)	Stable isotope mass spectrometry
Stable carbon isotope ratio of sugars from juices (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	ENV 12140 Analytica Chimica Acta 271 (1993)	Stable isotope mass spectrometry
Stable hydrogen isotope ratio of water from juices (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	ENV 12142 (1997)	Stable isotope mass spectrometry
Stable oxygen isotope ratio in juice water (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	ENV 12141(1997)	Stable isotope mass spectrometry

PROVISION	METHOD	PRINCIPLE
Starch (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	AOAC 925.38 (1925) IFU Method No. 73 (2000)	Colorimetric
Sucrose (Section 3.1.2 Permitted ingredients)	EN 12630 IFU Method No. 67 (1996) NMKL 148 (1993)	High performance liquid chromatography (HPLC)
Sucrose (Section 3.1.2 Permitted ingredients)	EN 12146 (1996) IFU Method No. 56 (1985/1998)	Enzymatic determination
Sulphur dioxide (Section 4 Additives)	Optimized Monier Williams AOAC 990.28 IFU Method No. 7A (2000) NMKL 132 (1989)	Titrimetry after distillation
Sulphur dioxide (Section 4 Additives)	ISO5522:1981 ISO5523:1981	Titrimetry after distillation
Sulphur dioxide (Section 4 Additives)	NMKL 135 (1990)	Enzymatic determination
Titration acids, total (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 12147 (1995) IFU Method No. 3 (1968) ISO 750:1998	Titrimetry

PROVISION	METHOD	PRINCIPLE
Total dry matter (vacuum-oven drying at 70°C)⁹ (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 12145 (1996) IFU Method No. 61 (1991)	Gravimetric determination
Total nitrogen	EN 12135 (1997) IFU Method No. 28 (1991)	Digestion/titration
Total solids (Microwave oven drying)⁹ (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	AOAC 985.26	Gravimetric determination
Vitamin C (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	EN 14130 (2004)	High performance liquid chromatography (HPLC)
Vitamin C (dehydro-ascorbic acid and ascorbic acid) (Sections 3.2 Quality Criteria and 3.3 Authenticity) ⁸	AOAC 967.22	Microfluorometry

⁹Because there is no numerical value in the Standard, duplicate Type I methods have been included which may lead to different results.

Annex

Minimum brix¹⁰ level for reconstituted strawberry juice (% v/v) at 20 °C

Botanical Name	Fruit's Common Name	Minimum Brix Level for Reconstituted Fruit Juices and Reconstituted Purée	Minimum Juice and/or Purée Content (% v/v) for Fruit Nectars
<i>Fragaria x. ananassa</i> Duchense (<i>Fragaria chiloensis</i>) Duchesne x <i>Fragaria virginiana</i> Duchesne)	Strawberry	7.5	40.0

¹⁰For the purposes of the Standard the Brix is defined as the soluble solids content of the juice as determined by the method found in the Section on Methods of Analysis and Sampling.

Bibliography

AOAC 920.151, Solids (total) in fruits and fruit products.

DRAFT

Organization and Objectives

The Ethiopian Standards Agency (ESA) is the national standards body of Ethiopia established in 2010 based on regulation No. 193/2010. ESA is established due to the restructuring of Quality and Standards Authority of Ethiopia (QSAE) which was established in 1998.

ESA's objectives are:-

- ❖ Develop Ethiopian standards and establish a system that enable to check whether goods and services 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.

Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational institutions, research institutes, government 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 in from our website.

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International Involvement

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

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