

**KENYA STANDARD**

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# **Dehydrated vegetables- Specification**

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## TECHNICAL COMMITTEE REPRESENTATION

The following organizations were represented on the Technical Committee:

Jomo Kenyatta University of Agriculture and Technology- Department of Food Science and Technology  
Victoria Juice Co Ltd  
Kevian Kenya Ltd  
Government chemist  
Consumer Information Network  
Premier Foods Ltd.  
Pest control products board  
Kenya Industrial Research and Development Institute  
Ministry of Health- Food Safety Unit  
Ministry of Agriculture, Livestock and Fisheries  
Kenya plant health inspectorate services  
National Public Health Laboratory services  
Ten senses Africa Ltd  
Coca-Cola East Africa Ltd  
Del Monte Kenya Ltd  
Agri Pro-pak Ltd  
Horticultural Crops Directorate  
Kenya Bureau of Standards — Secretariat

## REVISION OF KENYA STANDARDS

In order to keep abreast of progress in industry, Kenya Standard shall be regularly reviewed. Suggestions for improvements to published standards, addressed to the Bureau are welcome.

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# **Dehydrated vegetables- Specification**

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## FOREWORD

This Kenya Standard was developed by the Technical Committee on Processed Fruits and Vegetables under the guidance of the Standards Projects Committee, and it is in accordance with the procedures of the Kenya Bureau of Standards.

This standard stipulates the essential compositional, quality, microbiological, contaminants and labelling requirements for dehydrated vegetables.

In the preparation of this standard useful information was derived from members of the technical committee, and local manufacturers

PUBLIC REVIEW DRAFT

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**KENYA STANDARD****DEHYDRATED VEGETABLES- SPECIFICATION**

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**1. SCOPE**

This Kenya Standard specifies requirements and methods of test and sampling for dehydrated vegetables, as defined in Section 3 below and which are offered for direct consumption or further processing, including for catering purposes or for repackaging if required.

**2. Normative references**

KS EAS 38, labeling of prepackaged foods  
KS EAS 39, Code of practice for hygiene in the food and drink manufacturing industry  
KS EAS 12, Drinking (Potable) water- Specification  
KS EAS 803; Nutrition labeling – Requirements  
KS EAS 804:2013 Claims on foods – Requirements  
KS EAS 805; Use of Nutrition and health claims  
Codex Stan 195, General Standard for Food Additives  
Codex Stan 193, General Standard for contaminants  
KS 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  
KS ISO 6888-1; Microbiology of food and animal feeding stuffs -- Horizontal method for the enumeration of coagulase-p-staphylococci (*Staphylococcus aureus* and other species) -- Part 1: Technique using Baird-Parker agar medium  
KS ISO 16649-1; Microbiology of food and animal feeding stuffs -- Horizontal method for the enumeration of beta-glucuronidase-positive *Escherichia coli* -- Part 1: Colony-count technique at 44 degrees C using membranes and 5-bromo-4-chloro-3-indolyl beta-D-glucuronide  
KS ISO 763; Fruit and vegetable products -- Determination of ash insoluble in hydrochloric acid  
KS ISO 7251, Microbiology of food and animal feeding stuffs - Horizontal method for the detection and enumeration of presumptive *Escherichia coli* - Most probable number technique  
KS ISO 5522, Fruits, vegetables and derived products - Determination of total *sulphur dioxide content*  
KS ISO 6561-2:2005; Fruits, vegetables and derived products -- Determination of cadmium content -- Part 2: Method using flame atomic absorption spectrometry  
KS ISO 6636-2:1981; Fruits, vegetables and derived products -- Determination of zinc content -- Part 2: Atomic absorption spectrometric method  
KS ISO 17239; Fruits, vegetables and derived products - Determination of arsenic content - Method using hydridegeneration atomic absorption spectrometry  
KS ISO 7952; Fruits, vegetables and derived products - Determination of copper content - Method using flame atomic absorption spectrometry  
KS ISO 5517; Fruits, vegetables and derived products - Determination of iron content - 1,10- Phenanthroline photometric method  
KS ISO 9526; Fruits, vegetables and derived products - Determination of iron content by flame atomic absorption spectrometry  
KS ISO 6633; Fruits, vegetables and derived products - Determination of lead content - Flameless atomic absorption spectrometric method  
KS ISO 6637; Fruits, vegetables and derived products - Determination of mercury content - Flameless atomic absorption method  
KS ISO 2447; Fruits, vegetables and derived products - Determination of tin content  
KS ISO 6636-2; Fruits, vegetables and derived products - Determination of zinc content - Atomic absorption spectrometric method

**3 DESCRIPTION**

### 3.1 Product definition

#### 3.2. Dehydrated vegetables are products:

- a) prepared from edible portion of clean, sound, mature named vegetables and dried under natural or artificially induced conditions and they can undergo operations such as washing, peeling, grading, cutting, blanching or dipping etc., depending on the type of product.
- b) Obtained by drying pieces of one or more of named vegetables

## 4. Essential composition and quality factors

### 4.1. Composition

#### 4.1.1. Basic Ingredients

Vegetables as defined in clause 3

Examples of the Vegetables suitable for Drying are but not limited to those listed in Annex A

### 4.2 Quality Criteria

- Dehydrated vegetables shall have characteristic colour, flavour and odour of dried vegetables, corresponding to the variety and type of the named vegetable and shall possess and maintain the product's essential texture, physical, chemical, organoleptic, and nutritional characteristics of the vegetable(s).
- The product shall be prepared from wholesome vegetables free from blight, discolouration or fungi.
- Only the edible portion of the vegetable shall be used and it shall be free from stalks, peel stems and extraneous leaves.
- The dried or dehydrated vegetables may contain permitted preservatives.
- The finished product shall be of good edible quality and shall reasonably reconstitute to its original shape and quality on boiling from fifteen minutes to an hour.
- The finished product should be free from visible mould, insects or larvae.

## 5. FOOD ADDITIVES

5.1 Only those food additive listed below may be used in products covered by this Standard.

- Citric acid
- Sodium (or potassium) di-hydrogen pyrophosphate.
- Calcium (or magnesium) stearate.
- Sodium carbonate
- Ascorbic acid or erythrosascorbic acid.
- Sulphur dioxide, or sodium (or potassium) hydrogen sulphate or m-hydrogen sulphite.
- For carrots only starch, complying with the Kenya Standard specification for edible starch (KS 05-340).

- Pectin.
- Vegetable flavours such as garlic, onion, pepper, etc.

**5.2** Acidity regulators, colours, colour retention agents, antioxidants, and firming agents used shall be in accordance to the *General Standard for Food Additives* (CODEX STAN 192-1995)

### 5.3 Nutrients

For the purpose of product fortification, essential nutrients such as vitamins and minerals may be added to products. Such additions shall comply with national legislation established for this purpose.

**NOTE:** any optional ingredients added are subject to ingredient labelling requirements (see Clause 10)

## 5. Physico- Chemical Requirements

**5.1 Moisture Content** — dehydrated vegetables may vary in their moisture content but shall not contain more than 8.0 % m/m moisture, when tested in accordance to test method provided in Annex B

**5.2 Total ash on dry basis** — dehydrated vegetables shall not contain more than 5.0 % m/m total ash on dry basis when tested in accordance to KS ISO 1026

**5.3 Acid Insoluble Ash** — dehydrated vegetables shall not contain more than 0.5 % m/m acid insoluble ash on dry basis when tested according KS ISO 763

**5.4 Content of Defective Vegetables** — on testing in accordance with the method in Appendix C, the content of vegetables having major defects shall not exceed 1per cent.

**5.4 Sulphur Dioxide Content** — when tested in accordance to KS ISO 5522, the sulphur dioxide of the product shall not exceed the following values:

- a) cabbage and cauliflower – 2500 ppm
- b) potatoes – 550 ppm
- c) other vegetables – 1000 ppm

**5.6 Peroxide Activity** — Vegetables which have undergone the blanching process shall show a negative reaction when tested according to the method given in **Annex C**. This requirement is not applicable to vegetables which have not been blanched.

### 5.7 Defects and Allowances

Dehydrated vegetables should be substantially free from defects. Certain common defects should not be present in amounts greater than the 1% when tested in accordance to method provided in **Annex D**.

## 7. 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 193-1995).

## 7.1 Pesticide residues

The products covered by this Standard shall comply with the maximum residue limits for pesticides established by the Codex Alimentarius Commission.

## 7.2 Heavy Metal Contaminants

The products covered by the provisions of this standard shall conform to those maximum limits for Heavy metals contaminants established by the Codex Alimentarius Commission for these products in table 3 below

**Table 1 – Heavy metal contaminants limits for dried vegetables**

CONTAMINANTS	MAXIMUM LEVEL	Method of Test
Arsenic (As)	0.2mg/kg	
Lead (Pb)	0.3 mg/kg	KS ISO 6733
Tin (Sn)	250 mg/kg	KS ISO 2447
Mercury (Hg)	0.01	KS ISO 6037
Cadmium (cd)	0.05 mg/kg	KS ISO 6732

## 7.3 Other contaminants

The products covered by the provisions of this standard shall conform to those maximum levels for contaminants established by the Codex Alimentarius Commission for these products, in table 1 below

## 8. Hygiene

**8.1** It is recommended that the products covered by the provisions of this Standard be prepared and handled in accordance with the appropriate sections of the KS CAC RCP 5:1971; Recommended international code of hygienic practice for dehydrated fruits and vegetables including edible fungi and other relevant standards such as codes of hygienic practice and codes of practice

**8.2** The products shall conform to microbiological criteria in Table 2 and those provided in KS 2455; Food Safety -general standard and other microorganisms of food safety concern

**Table 2 - Microbiological limits for dried vegetables**

<u>SL No.</u>	<u>Microorganism</u>	<u>Limit</u>	<u>Method of Test</u>
i.	<u>Total plate count, cfu/g. max</u>	<u>2×10<sup>4</sup></u>	<u>KS ISO 4833</u>
ii.	<u>Escherichia coli, (cfu/g), max</u>	<u>Absent</u>	<u>KS ISO 7251</u>
iii.	<u>Staphylococcus aureas, (cfu/25g)</u>	<u>Absent</u>	<u>KS ISO 6888-1</u>
iv.	<u>Salmonella. CfU/25g</u>	<u>Absent</u>	<u>KS ISO 6579</u>
v.	<u>Coliforms, CFU/g</u>	<u>Absent</u>	<u>KS ISO 4833</u>
vi.	<u>Vibrio cholera, cfu/25g</u>	<u>Absent</u>	<u>KS ISO 4833</u>



vii.	Yeast and Moulds (cfu/25g), max	Absent	KS ISO 7954
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## 9. Packaging

The products covered by the provisions of this standard shall be packaged in clean food grade packaging material to protect the product from contamination. The packaging materials and process shall not contaminate the product or otherwise affect its technological, nutritional or sensory quality.

## 10. LABELLING

In addition to the Standard for the Labelling of Pre-packaged Foods (KS EAS 38), the following specific provisions apply:

### 10.1 The name of the product:

The name of the product as declared on the label shall be (X) Dehydrated vegetables or Dried (X) Vegetables or Dehydrated (X) Vegetables where X is the name of the dried vegetable;

**10.2** In the case of mixed dried vegetables; List of the names of the various vegetables species used in the mix, shall be listed in descending order of the proportions

**10.3 List of Ingredients** — a complete list of ingredients shall be declared on the label in descending order of proportion.

**10.4 Nutrition declaration** - Any added essential nutrients declaration should be labelled in accordance with the Guidelines on Nutrition Labelling (KS EAS 803), General Guidelines on Claims (KS EAS 804) and the KS EAS 805; Guidelines for Use of Nutrition and Health Claims

**10.5 Net Contents** — the net contents shall be declared by volume in metric units (*Systeme Internationale*).

**10.6 Name or business name and Address** of the manufacturer, packager, distributor, importer, exporter or vendor of the product, whichever may apply, shall be declared.

**10.7 Instructions for use and storage shall be declared**

**10.8 Lot Identification** — each container shall be embossed or otherwise permanently marked in code or in clear identity the producing factory and the lot.

**10.9 Place/country of origin**

**10.10 Date of expiry**

## 11. Methods of sampling and test

The products covered by the provisions of this standard shall be tested using appropriate standard methods declared in this standard. Other test may be performed as per the methods given in the latest AOAC/ Codex/ ISO and other internationally recognized methods. Sampling shall be as described in the Standard

## ANNEX A

### Examples of Vegetables Suitable for Drying:

Asparagus  
Beets  
Brussels Sprout  
Broccoli  
Cabbage  
Carrots  
Cauliflower  
Celery  
Sweet corn  
Chard  
Cucumber  
Garlic  
spinach,  
cow peas leaves (Kunde)  
beet,  
mustard,  
turnip  
greens  
kale

- African egg plant
- African indigenous vegetables (amaranth, night shade, slender leaf, spider plant, jute mallow etc)
- Onions
- Peas
- Pepper and pimientos
- Potatoes (Irish and white)
- Pumpkin and squash
- Rutabagas
- Sweet potatoes
- Sauer kraut
- Chayote and chirabi
- Tomatoes
- Horsedish
- Okra
- Mushrooms
- Parsnips
- Parsley
- Peppers (red, green and chilli)

## ANNEX B

### DETERMINATION OF MOISTURE CONTENT

- B1.** Weigh out 25 g of the specimen, grind it thoroughly, and sieve through a No. 20 sieve weigh out, to an accuracy of  $1 \text{ mg} \times x \text{ g}$  (approximately 2 g) of the sieved specimen into a weighed drying dish. Place the open dish in a vacuum oven at a temperature of  $70 \text{ }^\circ\text{C}$ , 6 h pressure of  $55 \pm 10 \text{ mm Hg}$ . During drying admit air to the oven at the rate of 2 bubbles per second through concentrated  $\text{H}_2\text{SO}_4$  bubbler. After 6 h stop vacuum pump and introduce air at such rate that the oven is at atmospheric pressure within 5 min. remove the dish, replace cover, cool in a desiccator and weigh within 30 min.
- B2.** When the pressure in the oven drops to 100 mm of mercury, pass a slow current of dry air into the oven, at the rate of 2 bubbles per second.
- B3.** After drying for 6 h relieve the vacuum. Close the mouth of the dish, and allow it to cool to room temperature, whilst in a desiccator.
- B4.** Repeat the weighing and determine the loss in mass ( $N \text{ g}$ ) and then calculate the moisture content ( $A \text{ per cent}$ ) by using the formula:

$$A = \frac{N}{x} \times 100$$

## Annex C

### TEST FOR PEROXIDE ACTIVITY

#### C1. REAGENTS

**C1.1 Guaiacol Solution** — A solution containing 1 g guaiacol per 100 ml. This may be prepared by an alcohol solution containing 1 g guaiacol per 10 ml with distilled water.

**C1.2 Hydrogen Peroxide Solution** — 15 per cent.

**C1.3 Mixed Solution** — Containing equal parts by volume of the solutions in **D1.1** and **D1.2**.

**C2. PROCEDURE**

Pour the dried vegetable sample into a 200 ml wide-mouth flask until the flask is approximately one-quarter full. Add 20 ml of this mixed solution (reagent 3), close the flask and shake well for a few seconds. Open the flask, and pour the contents into a wide porcelain dish, and see whether any reddish-brown colour is present.

**C3. CONCLUSION**

If this colour does not appear clearly in an appreciable part of the specimen, within one minute, then the reaction is negative.

**ANNEX D  
DETERMINATION OF DEFECTS**

**D1.** Spread 20 g of the specimen on a sheet of white paper or white ceramic tile, and collect the pieces of vegetables which appear defective. Compare these pieces with the standard established pieces, and determine the seriousness of the defect.

**D2.** Collect the pieces which have serious defects, those which have moderate defects, and those which have moderate defects, and those which have minor defects and weigh each group separately.