
**Fresh carrots –
Specification and grading**

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Foreword

This Ethiopian Standard has been prepared under the direction of the Technical committee for fruit and vegetable (TC-13) and published by Ethiopian Standard Agency (ESA).

In preparation of this Ethiopian Standard, references have been made to the following:

CD/K/047:2010, Fresh carrots - Specification and grading, East African Standard.

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

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

Fresh carrots - Specification and grading

1 Scope

This standard applies to carrots of varieties (cultivars) grown from *Daucus carota* L. to be supplied fresh to the consumer, carrots for industrial processing being excluded.

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 73, *General standard for pre-packaged foods labeling*.

ES 577, *Recommended code of practice. General principles of Food hygiene*.

ES 929, *Code of practice - food hygiene management*.

ES 1246, *Code of practice for packaging and transport of fruits and vegetable*.

ES ISO 4833, *Microbiology of food and animal feeding stuffs- Horizontal method for the enumeration of microorganisms- Colony- count technique at 30 °C*.

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 definition shall apply:

3.1

similar varietal characteristics

the carrots in any lot are of the same general type. For example, carrots with a short, but blunt growth, like the Oxheart variety, shall not be mixed with long or half-long carrots, like the Emperor or Danvers varieties.

3.2

firm

the carrot is not soft, flabby, or shriveled.

3.3

fairly clean

the individual carrot is reasonably free from dirt, stain or other foreign matter and that the general appearance of the carrots in the lot is not more than slightly affected.

3.4

fairly well colored

the carrot has an orange, orange red, or orange scarlet color, but not a pale orange or distinct yellow color.

3.5

fairly smooth

the carrot is not rough, ridged, or covered with secondary rootlets to the extent that the appearance is materially affected.

3.6

well formed

the carrot is not forked, or misshapen to the extent that the appearance is more than slightly affected.

3.7

damage

any defect which materially affects the appearance, or the edible or shipping quality of the individual carrot root, or the general appearance of the carrot roots in the container, or causes a loss of more than 3 percent, by weight, in the ordinary preparation for use, or which materially affects the appearance or shipping quality of the tops. Any one of the following defects, or any combination of defects, the seriousness of which exceeds the maximum allowed for any one defect, shall be considered as damage:

- a) Growth cracks which are not shallow or not smooth, or which materially affect the appearance of the carrot;
- b) Sunburn which causes a loss of more than 3 percent, by weight, in the ordinary preparation for use, except that superficial light green color at the stem end which does not materially affect the appearance of the root shall be permitted; and,
- c) Yellowing or other discoloration or injury to the tops when the appearance of the bunch is materially affected. The appearance of the individual bunch shall be considered materially affected when the tops are trimmed to the extent that only a relatively few leaves remain. The appearance of bunches with tops having slight discoloration such as yellowing, browning or other abnormal color affecting a few leaflets shall not be considered materially affected if the tops as a whole show a predominantly normal green color.

3.8

fresh

the tops are not badly wilted.

3.9

full tops

the leafstems have not been cut back, but dried or damaged leaves or leafstems may have been removed.

3.10

diameter

the greatest dimension of the root measured at right angles to the longitudinal axis.

3.11

serious damage

any defect which seriously affects the appearance, or the edible or shipping quality of the individual carrot or the general appearance of the carrots in the container, or causes a loss of more than 20 percent, by weight, in the ordinary preparation for use.

4 Provisions concerning quality

4.1 General requirements

The purpose of the standard is to define the quality requirements of carrots at the export control stage, after preparation and packaging.

4.2 Minimum requirements

- 4.2.1** In all classes, subject to the special provisions for each class and the tolerances allowed, the carrots must be:

- 4.2.1.1 intact:** not having any mutilation or injury spoiling the integrity of the produce.

- 4.2.1.2 sound;** produce affected by rotting or deterioration such as to make it unfit for consumption is excluded: Carrots must be free from disease or serious deterioration which appreciably affects its appearance, edibility or market value. In particular, this excludes produce affected by rotting, even if the

signs are very slight but liable to make the produce unfit for consumption upon arrival at its destination.

4.2.1.3 clean, that is to say:

- a) practically free of any visible foreign matter, if they are washed. Washed carrots must be practically free of visible soil, dust, chemical residue or other visible foreign matter.
- b) practically free of excess dirt and impurities if they are not washed. Unwashed carrots must be practically free of excessive soil, dust, chemical residue or other visible foreign matter. However, 2% by weight of adhering soil may be regarded as normal.

4.2.1.4 practically free from pests. The produce must be practically free of insects or other pests. The presence of pests can detract from the commercial presentation and acceptance of the produce.

4.2.1.5 practically free from damage caused by pests: pest damage can detract from the general appearance, keeping quality and edibility of the produce.

4.2.1.6 firm: carrots which are no longer firm and have become shrivelled or dehydrated are excluded.

4.2.1.7 not forked, free of secondary roots: carrots grown in stony or poorly prepared ground can develop forked growth. Carrots must be single roots. Moreover, carrots with secondary root growths are excluded.

4.2.1.8 not woody: carrots which have become fibrous or woody are excluded.

4.2.1.9 not running to seed: carrots which have started to produce seed heads or stems are excluded.

4.2.1.10 free of abnormal external moisture i. e. sufficiently dried after washing: this provision applies to excessive moisture, for example, free water lying inside the package, but does not include condensation on produce following release from cool storage or refrigerated vehicle. In order that the carrots remain in good condition during transport and handling, they must be sufficiently dried before packaging.

4.2.1.11 free of foreign smell and/or taste: this refers particularly to produce which has been stored in badly kept premises or has travelled in a badly maintained vehicle, especially produce which has acquired a strong smell from other produce stored on the same premises or travelling in the same vehicle. For example, care should be taken to use only non-smelling materials as protection in packaging.

4.2.2 The development and condition of the carrots must be such as to enable them:

- a) to withstand transport and handling, and
- b) to arrive in satisfactory condition at the place of destination.

4.3 Classification

Carrots are classified in three classes defined below:

4.3.1 "Extra" Class

The carrots in this class must be of superior quality and washed. They must be characteristic of the variety or the varietal type. They must be carefully presented.

They must be free from defects with the exception of very slight superficial defects, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package. Such alterations may appear during cultivation, harvest, storage, packaging or transport.

The roots must be:

- smooth: with due regard to the varietal type, the surface of the carrot should be smooth and free from wrinkles, indentations or undulations.
- fresh in appearance: roots should be bright showing no signs of dehydration or ageing.
- regular in shape: roots should display a shape fully characteristic of the variety and they must not show any malformation.

- free of fissures
- free of bruises and cracks
- free of damage due to frost.

Green or violet/purple tops are not allowed.

4.3.2 Class I

Carrots in this class must be of good quality. They must be characteristic of the variety or the varietal type. Although the Class I quality requirements are less strict than for "Extra" Class, Class I carrots must, nevertheless, be characteristic of the variety or varietal type, carefully selected and presented.

The roots must be:

- fresh in appearance: roots should be bright showing no signs of dehydration or ageing. Slight silvering of the skin is permissible.

The following slight defects, however, may be allowed provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package:

- slight defects in shape: roots should remain characteristic of the varietal type; however, they may show slight distortions.
- slight defects in colouring: carrots must be characteristic of the varietal type; however a slight colour defect is allowed.
- slight healed cracks: small healed cracks caused during growth are acceptable provided they are shallow, clean and dry.
- slight cracks or fissures due to handling or washing provided they are fresh, shallow and cover only a small area. Fine cracks due to frost especially around the crown and shoulders are allowed provided the flesh remains firm.

Green or violet/purple tops up to 1 cm long for roots not exceeding 10 cm in length, and up to 2 cm for other roots, are allowed. This discoloration refers to the carrot where the root has protruded from the ground during growth.

4.3.3 Class II

This class includes carrots which do not qualify for inclusion in the higher classes but satisfy the minimum requirements specified above. The carrots in this class must be of marketable quality, suitable for human consumption and suitably presented.

The following defects may be allowed provided the carrots retain their essential characteristics as regards the quality, the keeping quality and presentation:

- defects in shape and in colouring: carrots can be distorted provided they retain the essential characteristics of the varietal type. Defects in colouring are allowed provided the carrots retain the essential characteristics of the varietal type.
- healed cracks not reaching the heart: healed cracks caused during growth are acceptable provided they do not expose the core of the carrot and are clean and dry.
- cracks or fissures due to handling or washing provided they are fresh and do not expose the core. Cracks due to frost especially around the crown and shoulders are allowed provided the flesh remains reasonably firm and substantially intact.

Green or violet/purple tops up to 2 cm long for roots not exceeding 10 cm in length, and up to 3 cm for other roots, are allowed. This discoloration refers to the carrot where the root has protruded from the ground during growth.

5 Provisions concerning sizing

Size is determined by the maximum diameter or the weight of the root when without foliage.

a) Early carrots¹ and small root varieties

Roots must not be less than 10 mm when sizing is by diameter and not less than 8 g when sizing is by weight.

Roots must not be more than 40 mm when sizing is by diameter and not more than 150 g when sizing is by weight.

Early carrots are those harvested before they are fully mature and have completed their growth.

b) Main-crop carrots and large root varieties

Roots must not be less than 20 mm when sizing is by diameter and not less than 50 g when sizing is by weight.

Roots classified in the "Extra" Class must not be more than 45 mm when sizing is by diameter and not more than 200 g when sizing is by weight and the difference in diameter or in weight between the smallest and the largest root in any one package must not be more than 20 mm or 150 g.

For roots classified in Class I, the difference in diameter or weight between the smallest and the largest root in any one package must not be more than 30 mm or 200 g.

For roots classified in Class II, the roots need only satisfy the minimum sizing requirements.

6 Provisions concerning tolerances

Tolerances in respect of quality and size shall be allowed in each package, or in each lot for produce presented in bulk, for produce not satisfying the requirements of the class indicated.

Tolerances are provided to allow for human error during the grading and packing process. During grading and sizing it is not permitted to deliberately include out of grade produce, i.e. to exploit the tolerances deliberately.

The tolerances are determined after examining each sample package and taking the average of all samples examined. The tolerances are stated in terms of percentage, by weight of produce in the total sample not conforming to the class or to the size indicated on the package.

6.1 Quality tolerances

Under no circumstances shall these tolerances apply to produce affected by rotting, or any other deterioration rendering it unfit for consumption.

6.1.1 "Extra" Class

5 per cent by weight of carrots not satisfying the requirements of the class, but meeting those of Class I or, exceptionally, coming within the tolerances of that class.

5 per cent by weight of carrots having a slight trace of green or violet/purple colouring at the top.

6.1.2 Class I

10 per cent by weight of carrots not satisfying the requirements of the class, but meeting those of Class II or, exceptionally, coming within the tolerances of that class. However, broken carrots and/or carrots which have lost their tips are excluded from that tolerance.

10 per cent by weight of broken carrots and/or carrots which have lost their tips.

6.1.3 Class II

10 per cent by weight of carrots satisfying neither the requirements of the class nor the minimum requirements, with the exception of produce affected by rotting or any other deterioration rendering it unfit for consumption.

In addition, not more than 25 per cent by weight of broken carrots may be allowed.

¹ Roots in which growth has not been arrested.

6.2 Size tolerances

For all classes: 10 per cent by weight of carrots not satisfying the requirements as regards sizing. The roots may fall below the minimum size or exceed the maximum permissible difference for the class.

7 Provisions concerning presentation

7.1 Uniformity

The contents of each package, or lot for produce presented in bulk, must be uniform and contain only carrots of the same origin, variety or varietal type, quality and size (if sized).

The visible part of the contents of the package, or lot for produce presented in bulk, must be representative of the entire contents.

A special effort should be made to suppress camouflage, i.e. concealing in the lower layers of the package produce inferior in quality and size to that displayed and marked.

Similarly prohibited is any packaging method or practice intended to give a deceptively superior appearance to the top layer of the consignment.

7.2 Packaging

7.2.1 Carrots must be packed in such a way so as to protect the produce properly.

7.2.2 Packages must be of a quality, strength and characteristics to protect the produce during transport and handling.

7.2.3 The materials used inside the package must be new, clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper or stamps, bearing trade specifications is allowed provided the printing or labelling has been done with non-toxic ink or glue.

7.2.4 Packages, or lots for produce presented in bulk, must be free of all foreign matter. This provision is designed to ensure suitable protection of the produce by means of materials inside the package which are new and clean and also to prevent foreign bodies such as leaves, sand or soil from spoiling its good presentation. A visible lack of cleanliness in several packages could result in the goods being rejected.

NOTE 1: Packaging materials may be required to meet different regulations in Ethiopia.

7.3 Presentation

Carrots may be presented:

7.3.1 bunched carrots

The roots must be presented with their foliage, which must be fresh, green and sound. Roots in the same bunch should be practically uniform in size. The bunches in each package should be practically uniform in weight and arranged evenly in one or more layers.

7.3.2 topped carrots

The foliage must be evened off or cut off at the top of the carrot without damaging it. The foliage should be trimmed neatly just above the crown without damage to the root.

The carrots may be presented:

- in small packages.
- arranged in several layers or jumble packed.
- in bulk (direct loading into a transport vehicle or vehicle compartment) for Class II.

8 Marking or labeling

8.1 Consumer packages

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

8.1.1 Nature of produce

If the produce is not visible from the outside, each package shall be labelled as to the name of the produce and may be labelled as to the name of the variety and/or commercial type.

8.2 Non - retail containers

Each package² must bear the following particulars, in letters grouped on the same side, legibly and indelibly marked, and visible from the outside.

Marking can be done either on a label attached to or printed on the package with water-insoluble ink.

For carrots transported in bulk (direct loading into a transport vehicle or vehicle compartment), these particulars must appear on a document accompanying the goods, and be attached in a visible position inside the transport vehicle.

In the case of reused packages, all previous labels must be carefully removed and previous indications deleted.

8.2.1 Identification

Name and address of exporter, packer and/or dispatcher. Identification code (optional)³.

8.2.2 Nature of produce

- "Bunched carrots" or "carrots" if the contents are not visible from the outside
- "Early carrots" or "main-crop carrots" if the contents are not visible from the outside
- Name of the variety or the varietal type for "Extra" Class.

8.2.3 Origin of produce

Country of origin and, optionally, district where grown, or national, regional or local place name.

8.2.4 Commercial specifications

- Class
- Size expressed in minimum and maximum diameter or weight (optional)
- Number of bunches in the case of bunched carrots.

8.2.5 Official control mark (optional)

9 Contaminants

Carrots shall comply with those maximum levels for heavy metals and pesticide residue established by the Codex Alimentarius Commission (Codex Stan 193) for this commodity respectively.

10 Hygiene

10.1 It is recommended that the produce covered by the provisions of this Standard be prepared and handled in accordance with the appropriate sections of ES 577, ES 929, and ES ISO 22002-1.

10.2 The produce should comply with any microbiological criteria established in accordance with ES ISO 4833.

²Package units of produce prepacked for direct sale to the consumer shall not be subject to these marking provisions but shall conform to the national requirements. However, the markings referred to shall in any event be shown on the transport packaging containing such package units.

³The national legislation of a number of countries requires the explicit declaration of the name and address. However, in the case where a code mark is used, the reference "packer and/or dispatcher (or equivalent abbreviations)" has to be indicated in close connection with the code mark.

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 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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