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Asparagus — Specification and test methods

Asperges — Spécifications et méthodes d'essai

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 3, *Fruits, vegetables and their derived products*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Asparagus is an ancient crop, native to the eastern Mediterranean and Asia Minor, and first cultivated by the Romans. Popular in sixteenth century France and England, it made its way to America through the colonists. A member of the lily family, it has great nutritional value. It is low in calories and very low in sodium. Asparagus is a particularly good source of vitamin B6, calcium, magnesium, zinc, vitamin A, vitamin C, vitamin E, vitamin K, thiamin, riboflavin, rutin, niacin, folic acid, iron, phosphorus, potassium, copper, manganese, selenium, chromium, dietary fibre and protein. Asparagus spears can be eaten raw or cooked.

Asparagus, *Asparagus officinalis*, is an herbaceous perennial plant in the family Asparagaceae, which is grown for its young shoots, or spears, which are eaten as a vegetable. The asparagus plant is tall with scale-like leaves emerging from the underground stem (rhizome) and has stout stems and feathery foliage. The flowers are bell-shaped and occur alone or in pairs. They are green-white to yellow in colour. After flowering, a round red berry is formed with one to six black seeds. Asparagus can live for 20 or more years and can attain a height of between 100 cm to 150 cm. Asparagus originates from Europe, northern Africa and western Asia.

Asparagus — Specification and test methods

1 Scope

This document specifies requirements and test methods for fresh asparagus shoots of commercial varieties of asparagus grown from *Asparagus officinalis* L., of the Liliaceae family, offered to consumers after preparation and packaging.

This document is applicable to all asparagus except green and violet/green asparagus with a diameter less than 3 mm and white and violet asparagus with a diameter less than 8 mm, packed in uniform bundles or unit packages.

This document does not apply to processed asparagus.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 874, *Fresh fruits and vegetables — Sampling*

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 4186, *Asparagus — Guide to storage*

ISO 6882, *Asparagus — Guide to refrigerated transport*

CXC 44-1995, *Code of Practice for Packaging and Transport of Fresh Fruit and Vegetables*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Description

Asparagus shoots are subsoil, surface soil suckers and shoots of commercial varieties of asparagus grown from *Asparagus officinalis* L. of the Liliaceae family, to be supplied fresh to the consumer, after preparation and packaging.

5 Classification and requirements

5.1 General

Asparagus are divided into groups according to their colour (see 5.2.1), divided into classes according to their quality characteristics and diameter (see 5.2.2) and divided into sizes according to their length (see 5.2.3).

5.2 Classification

5.2.1 Groups

Asparagus are divided into four groups according to their colour;

— white;

— violet;

— violet/green;

— green.

5.2.2 Classes

Asparagus are divided into three classes according to their quality characteristics and diameter:

— Extra class;

— Class I;

— Class II.

5.2.3 Sizes

Asparagus are divided into three sizes according to their length;

— long;

— short;

— tip.

5.3 Requirements

5.3.1 General requirements

Asparagus shall be:

— whole and sound;

— clean and free from visible foreign matter;

— fresh looking and fresh smelling;

— free from insects and insect damage;

— free from any wounds;

— free from rots and suitable for handling and transportation.

Asparagus shall not:

— contain abnormal external moisture;

— have a foreign taste and smell;

— contain hollows, clefts, peelings or fractures.

When asparagus reach their destination, they shall be in a satisfactory condition.

When asparagus are packaged in a bunch, to ensure a sleek appearance, the outer surfaces of the suckers' end parts shall be trimmed as clean as possible.

5.3.2 Group requirements

The features of the four colour groups are:

— white: completely white;

— violet: purple, pink to purple tips;

— violet/green: part of both green and violet;

— green: ends and a portion of green.

5.3.3 Class requirements

5.3.3.1 General

The minimum diameters for different classes of asparagus are given in Table 1.

Table 1 — Minimum diameter values according to group and class

Group	Class	Diameter (mm) minimum	Explanation
White and violet	Extra	12	Difference between the diameter of the asparagus in the same package or bundle of asparagus shall not be more than 8 mm.
	Class I	10	The difference between Class I in the same package or bundle of asparagus shall not be more than 10 mm in diameter.
	Class II	8	No uniformity requirement.
Violet/green and green	Extra and Class I	3	The difference between the diameter of the asparagus Extra and Class I in the same package or bundle of asparagus shall not be more than 8 mm.
	Class II	3	No uniformity requirement.

5.3.3.2 Extra class

Shoots in this class shall be of superior quality, very well formed and practically straight. This class shall have a unique colour. They shall be intact. The tips shall be very tight and in a closed state. The external appearance of the product shall have no defects. The packaging shall not affect the presentation and quality of ingredients.

Only a few very slight traces of rust caused by non-pathogenic agents on the shoot, removable by normal peeling by the consumer, are allowed.

For the white asparagus group, the tips and shoots shall be white; only a faint pink tint is allowed on the shoots. Green asparagus shall be green for at least 95 % of the length.

The cut at the base of the shoots shall be as square as possible. However, to improve presentation when the asparagus is packed in bundles, those on the outside may be slightly bevelled, so long as the bevelling does not exceed 1 cm.

Asparagus of this class shall show no sign of lignification.

5.3.3.3 Class I

Shoots in this class shall be of good quality and well formed. These shall bear the characteristics of the group, such as the unique colour, and they shall also be well developed and whole. The ends shall be tight and closed but may be slightly skewed. Slight rust traces, which can be removed by regular peeling, are allowed.

For the white asparagus group, a faint pink tint may appear on the tips and the shoots. Woody suckers shall not be present in white asparagus. Slight lignification signs, which can be removed by regular peeling by consumers, are allowed in other colour groups of asparagus.

Green asparagus shall be green for at least 80 % of the length.

The cut at the base of the shoots shall be as square as possible.

5.3.3.4 Class II

This class includes shoots which are not included in the other classes due to their quality fall into this class but satisfy the minimum requirements specified in 5.3.1.

Asparagus in this class are less smooth than the other classes. They have less tight and more curved ends. There can be slight rust traces caused by non-pathogenic agents, which can be removed by regular peeling by consumers. Suckers can have a slight woody structure.

The tips of violet asparagus can be slightly green. At least 60 % of the total length of green asparagus shall be green. The tips of white asparagus can have a colouration including a green tint.

The cut at the base of the shoots can be slightly oblique.

5.3.4 Size requirements

Asparagus are divided into three size groups:

— long: longer than 17 cm;

— short: 12 cm to 17 cm;

— tip: shorter than 12 cm.

Class II asparagus placed into packages shall have the following specifications:

— white and violet asparagus shall be between 12 cm and 22 cm in length;

— green asparagus shall be between 12 cm and 27 cm in length.

Length difference shall be 5 cm at most for packaged sucker bunches.

6 Tolerances

6.1 General

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

6.2 Group tolerances

The contents of each package, each unit package or each bundle in the same package shall be uniform and contain only asparagus of the same origin, quality, colour group and size (if sized).

Nevertheless, with respect to colour, shoots of a different colour group may be allowed within the following limits:

a) white asparagus: 10 % by number or weight of violet asparagus in the Extra class and Class I, and 15 % in Class II;

b) violet, violet/green and green asparagus: 10 % by number or weight of asparagus of another colour group.

For Class II, a mixture of white and violet asparagus is allowed provided it is appropriately marked.

The visible part of the contents of the package, unit package or bundle shall be representative of the entire contents.

6.3 Class tolerances

6.3.1 Extra class

The tolerance is 5 % by number or mass of shoots not satisfying the requirements of the class, but meeting those of Class I or, exceptionally, coming within the tolerances of that class, or having slight unscarred cracks appearing after harvesting.

6.3.2 Class I

The tolerance is 10 % by number or mass of shoots not satisfying the requirements of the class, but meeting those of Class II or, exceptionally, coming within the tolerances of that class, or having slight unscarred cracks appearing after harvesting.

6.3.3 Class II

The tolerance is 10 % by number or mass of shoots 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 to the above, 10 % by number or mass can be allowed for hollow shoots or shoots showing very slight cracks due to washing. In no case can there be more than 15 % hollow shoots in each package or bundle.

6.4 Size tolerances

For all classes, the tolerance is 10 % by number or mass of shoots not corresponding to the size indicated and deviating from the specified limits with a maximum deviation of 1 cm in length. For all classes, the tolerance is 10 % by number or mass of shoots not corresponding to the size indicated and deviating from the specified limits with a maximum deviation of 2 mm in diameter. In no case shall the diameter be less than 3 mm.

7 Sampling

Samples are taken from the lot. Asparagus with the same group, class, size, packaging and same inspection time is considered as a lot. It is important that the laboratory receives a sample that is truly representative and has not been damaged during storage and transportation.

Sampling shall be done in accordance with ISO 2859-1 and ISO 874.

8 Requirements for contaminants

The maximum level for contaminants shall be:

— cadmium: 0,1 mg/kg;

— lead: 0,1 mg/kg.

9 Test methods

9.1 General

The organoleptical and visual inspections, sniffing, tasting, weighing and measuring of the asparagus should be done upon the request of the customer.

If necessary, analyses given in 9.2 to 9.6 should also be done.

9.2 Determination of titratable acidity

The titratable acidity value of the samples can be determined in accordance with ISO 750.

9.3 Determination of water-insoluble solids

The water-insoluble solids of the samples can be determined in accordance with ISO 751.

9.4 Determination of mineral impurities content

The mineral impurities content of the samples can be determined in accordance with ISO 762.

9.5 Determination of pH

The pH value of the samples can be determined in accordance with ISO 1842.

9.6 Determination of soluble solids content

The soluble solids content of the samples can be determined in accordance with ISO 2173.

10 Packaging and marking

10.1 Packaging

Asparagus shall be packed in such a way as to protect the produce properly. The materials used inside the package shall be clean and of such a quality 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.

Packages shall be free of all foreign matter.

Asparagus shall be bundled or packaged in bulk. When packaged into bundles, they are bound tightly into bundles, each bundle is wrapped in packing paper and is properly stacked. When packaged in bulk, the packaging is put into bundles without a lining.

Asparagus shall be packed in each container in accordance with the recommended international Code of Practice for Packaging and Transport of Fresh Fruit and Vegetables (CXC 44-1995).

10.2 Marking

The container and case shall be marked or labelled with the following:

a) the name of the product or variety, and the trademark or brand name, if any;

b) the name and address of the producer or packer;

