



EAS 66-3:2010  
ICS 67.080.20

## EAST AFRICAN STANDARD

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Tomato products — Specification — Part 3: Tomato juice



EAST AFRICAN COMMUNITY

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## Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in East Africa. It is envisaged that through harmonized standardization, trade barriers which are encountered when goods and services are exchanged within the Community will be removed.

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that "Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose".

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

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## Introduction

In the preparation of this East African Standard, the following sources were consulted extensively:

*United States Standards for Grades of Tomato Juice*, Effective date July 22, 1985

CODEX STAN 247:2005, *General Standard for Fruit Juices and Nectars*

CODEX STAN 228:2001 (Rev.1:2004), *General methods of analysis for contaminants*

CODEX STAN 230:2001 (Rev.1:2003), *Maximum levels for lead*

CODEX STAN 193:1995 (Rev.3:2007), *General Standard for Contaminants and Toxins in Foods*

Codex Alimentarius website: [http://www.codexalimentarius.net/mrls/pestdes/jsp/pest\\_q-e.jsp](http://www.codexalimentarius.net/mrls/pestdes/jsp/pest_q-e.jsp)

USDA Foreign Agricultural Service website: <http://www.mrlatabase.com>

USDA Agricultural Marketing Service website: <http://www.ams.usda.gov/AMSV1.0/Standards>

USDA Plant Inspectorate Service website: [http://www.aphis.usda.gov/import\\_export/plants](http://www.aphis.usda.gov/import_export/plants)

European Union: [http://ec.europa.eu/sanco\\_pesticides/public](http://ec.europa.eu/sanco_pesticides/public)

Assistance derived from these sources and others inadvertently not mentioned is hereby acknowledged.

This standard has been developed to take into account:

- the needs of the market for the product;
- the need to gain market access locally, regionally and internationally;
- the structure of the CODEX, UNECE, USA, ISO and other internationally recognized standards;
- the needs of the producers in gaining knowledge of market standards and conformity assessment; and
- the need to promote good manufacturing practices that will enhance wider market access, involvement of small-scale traders and hence making production of fruit and vegetable products a viable means of wealth creation.

## Tomato products — Specification — Part 3: Tomato juice

### 1 Scope

This standard applies to unfermented but fermentable juice, intended for direct consumption, obtained by a mechanical process from sound, ripe, red or reddish tomatoes (*Lycopersicon esculentum* L.) 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.

CAC/GL 21, *Principles for the Establishment and Application of Microbiological Criteria for Foods*

CAC/RCP 1, *Recommended International Code of Practice — General Principles of Food Hygiene*

CAC/RCP 53, *Code of Hygienic Practice for Fresh Fruits and Vegetables*

EAS 35, *Edible salts — Specification*

EAS 38, *Labelling of prepackaged foods — Specification*

EAS 41, *Fresh fruit and vegetable products — Sampling and method of test*

EAS 76, *Methods of test for tomato products*

EAS 217, *Methods for microbiological examination of foods*

CD/K/370:2010 [CAC/GL 21], *Principles for the establishment and application of microbiological criteria for foods*

CD/K/371:2010 [CAC/GL 30], *Principles and guidelines for the conduct of microbiological risk*

CD/K/344:2010 [CODEX STAN 234], *Recommended methods of analysis and sampling*

CD/K/372:2010 [CAC/GL 33], *Sampling for pesticide residues for the determination of compliance with MRLs — Recommended methods*

CD/K/375:2010 [CAC/GL 50], *General guidelines on sampling*

### 3 Description and definitions

#### 3.1 Product description

Tomato juice is the food intended for direct consumption, obtained from the unfermented liquid extracted from mature tomatoes of the red or reddish varieties of *Lycopersicon esculentum* P. Mill, with or without scalding followed by draining. In the extraction of such liquid, heat may be applied by any method which does not add water thereto. Such juice is strained free from peel, seeds, and other coarse or hard substances, but contains finely divided insoluble solids from the flesh of the tomato in accordance with current good manufacturing practice. Such juice may be homogenized, may be seasoned with salt, and may be acidified with any safe and suitable organic acid. The juice may have been concentrated and later reconstituted with water and/or tomato juice to a tomato soluble solids content of not less than 5.0 percent by weight. The food is preserved by heat sterilization (canning), refrigeration, or freezing. When sealed in a container to be held at ambient temperatures, it is so processed by heat, before or after sealing, as to prevent spoilage.

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## 3.2 Definitions

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

### 3.2.1 colour

- (1) **General.** The amount of red in tomato juice and tomato juice from concentrate is determined by comparing the color of the product with the Munsell color discs with specified percentages. Any method or device (including electronic color meters) which gives equivalent results may be used.
- (2) **Good colour** means a color that is bright and characteristic of tomato juice, made from mature red tomatoes, which is not affected by caramelization, oxidation or other similar causes. Such color contains as much red as, or more red than, that produced by spinning the specified Munsell color discs in the following combinations or an equivalent of such composite color:
  - 65 percent of the area of Red (5R 2.6/13) (glossy finish);
  - 21 percent of the area of Yellow (2.5 YR 5/12) (glossy finish), and
  - 14 percent of the area of either Black (N1) (glossy finish) or Grey (N4) (mat finish); or
  - 7 percent of the area of Black (N1) (glossy finish) and
  - 7 percent of the area of Grey (N4) (mat finish), whichever most nearly matches the reflectance of the product.
- (3) **Reasonably good color** means a color that is typical of red tomato juice which may be slightly affected by caramelization, oxidation or other similar causes.

### 3.2.2 consistency

the viscosity of tomato juice or tomato juice from concentrate including the degree of separation of the insoluble solids

- (1) **Good consistency** means that the juice flows readily; has a normal amount of insoluble tomato solids in suspension; and that there is little solids separation.
- (2) **Reasonably good consistency** means that the juice flows readily; has a normal amount of insoluble tomato solids in suspension; and that there is not a marked degree of solids separation.

### 3.2.3 defects

dark specks or scale-like particles, seeds, particles of seed, tomato peel, core material, or other similar substances

- (1) **Practically free from defects** means that any defects present do not more than slightly affect the appearance or drinking quality of the product.
- (2) **Reasonably free from defects** means that any defects present may be noticeable, but are not so large, so numerous, or of such contrasting color as to seriously affect the appearance or drinking quality of the product.

### 3.2.3 flavor

evaluated based upon characteristics normal to tomato juice or tomato juice from concentrate

- (1) **Good flavor** means a distinct tomato juice flavor and odor characteristic of good quality tomatoes which is not materially affected by stems, leaves, crushed seeds, cores, immature tomatoes, or the effects of improper trimming or processing.
- (2) **Reasonably good flavor** means a characteristic tomato juice flavor which may be materially, but not seriously, affected by stems, leaves, crushed seeds, cores, immature tomatoes, or the effects of improper trimming or processing.

### 3.2.4

#### **natural tomato soluble solids (Ntss) content**

reading obtained on a refractometer at 20 °C expressed in terms of % sucrose, of the clear serum obtained for a tomato product containing no added salt, and that is uncorrected for acidity

### 3.2.5

#### **defects**

presence of seeds, skins, stems, cores and other coarse or hard substance

## 4 Essential composition and quality requirements for tomato juice

### 4.1 General quality requirements

**4.1.1** The strength and redness of color is not less than the composite color produced by spinning the Munsell color discs in the following combination: 53 percent of the area of Disc 1; 28 percent of the area of Disc 2; and 19 percent of the area of either Disc 3 or Disc 4; or 91/2percent of the area of Disc 3 and 91/2percent of the area of Disc 4, whichever most nearly matches the appearance of the tomato juice.

Tomato juice shall have a characteristic reddish colour of tomato juice extracted from sound and ripe tomatoes. No artificial colouring matter shall be added.

#### 4.1.2 Flavour

Tomato juice shall have characteristic tomato flavour and shall be free from flavour foreign to the product.

#### 4.1.3 Texture

Tomato juice shall have a good body with an evenly divided texture.

#### 4.1.4 Defects

Tomato juice shall be free from the following defects:

- (a) Dark specks or scale-like particles.
- (b) Seeds or other objectionable particles of seeds.
- (c) Tomato peels.
- (d) Extraneous plant materials.
- (e) Not more than two defects for peel and blemishes, either singly or in combination, in addition to three defects for seeds or pieces of seeds, defined as follows, per 500 milliliters:
  - (i) Pieces of peel 3.2 millimeters or greater in length.
  - (ii) Blemishes such as dark brown or black particles (specks) greater than 1.6 mm in length.
  - (iii) Seeds or pieces of seeds 3.2 millimeters or greater in length.

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## 4.1.5 Minimum fill

Tomato juice shall occupy a minimum fill of not less than 90 % of the water holding capacity of the container. The water holding capacity of the container shall be the volume of distilled water at 20 °C, which the sealed container shall hold when completely filled.

## 4.2 Compositional requirements for tomato juice

Tomato juice shall comply with the compositional requirements indicated in Table 1.

Table 1 — Compositional requirements for tomato juice

S/N	Characteristic	Requirement	Method of test
i	Edible salt content, per cent by mass, max.	0.6	EAS 76
ii	Natural tomato soluble solids content, % by mass, min.	Not less than 4.5	“
iii	pH	Not higher than 4.3	“

## 4.3 Lot acceptance

4.3.1 A container that fails to meet the natural total soluble solids requirements, as set out in 3.1.2, and/or one or more of the applicable quality requirements, as set out in 4.2 and 4.3, should be considered as a “defective”.

4.3.2 A lot should be considered as meeting the applicable quality requirements when:

- the number of “defectives”, as defined in 4.1.4, does not exceed the acceptance number (c) of the appropriate sampling plan with an AQL of 6.5 established in Annex B; and
- the maximum allowance for mould count is not exceeded (see Section 7.3.2).

These acceptance criteria do not apply to non-retail containers.

## 4.4 Compliance

4.4.1 Determine compliance as specified in Annex B.

4.4.2 If the quality of the tomato juice falls below the standard prescribed in 4.1, the label may bear the statement, “Below Standard in Quality \_\_\_”, the blank to be filled in with the words:

- “Poor color”.
- “Excessive pieces of peel”.
- “Excessive blemishes”.
- “Excessive seeds” or “excessive pieces of seed”.

## 5 Food additives

### 5.1 Acidity regulators

INS No.	Name of the Food Additive	Maximum Level
330	Citric Acid	GMP
331(i)	Sodium dihydrogen citrate	
331(iii)	Trisodium citrate	
332(i)	Potassium dihydrogen citrate	
332(iii)	Tripotassium citrate	
333	Calcium citrates	

## 6 Contaminants

### 6.1 Pesticide residues

6.1.1 The product covered by the provisions of this Standard shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for this product.

6.1.2 In order to consider the concentration of the product, the determination of the maximum pesticide residue limits shall take into account the natural total soluble solids, the reference value being 4.5 for fresh fruit. Table 2 gives the current Codex MRLs.

**Table 2 — Maximum pesticide residue limits and extraneous maximum residue limits in tomato juice (current as at 2009-06-09)**

Type	Unit symbol	Limit	Method of test	Notes
CARBARYL	MRL (mg/kg)	3		
MALATHION	MRL (undef)	0.01		
PIPERONYL BUTOXIDE	MRL (mg/kg)	0.3		

### 6.2 Heavy metal limits

Tomato juice shall not exceed the limits for heavy metal indicated in Table 3.

**Table 3 — Limits for heavy metal in tomato juice**

Heavy metal	Maximum limits, (mg/kg)	Test method
Arsenic (As)	0.2	EAS 41
Lead (Pb)	0.3	"
Copper (Cu)	5	"
Zinc (Zn)	5	"
Tin (Sn)	250	"
Iron as (Fe)	15	
Sum of copper, zinc and iron	20	
Sulphur dioxide	10	

## 7 Hygiene

7.1 Tomato ketchup shall be prepared and handled in accordance with the appropriate provisions of EAS 39, and relevant Codex texts such as codes of hygienic practice and codes of practice.

7.2 The products should comply with any microbiological criteria established in accordance CAC/GL 21.

### 7.3 Microbiological limits

7.3.1 Tomato ketchup shall be free from pathogenic organisms and shall comply with the microbiological limits indicated in Table 4.

**Table 4 — Microbiological limits for tomato sauce and ketchup**

Type of micro-organism	Limits (number of counts), maximum	Test method
Total viable counts	10 per g (cfu)	EAS 217
Yeast/moulds	Nil/g	"
Escherichia coli	Nil/g	"
Salmonella sp.	Nil/ 25 g	"

### 7.3.2 Howard count

The product shall not contain any mould filaments in a quantity indicative of unsuitable raw materials or unsanitary processing lines. A guide for determining compliance with these requirements would be

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a mould count, as determined by the Howard method see AOAC (1970) 40.085 = moulds (25); official final action and 40.002 (m), not in excess of 30 % positive fields.

### 8 Weights and measures

#### 8.1 Fill of container

##### 8.1.1 Minimum fill

The container should be well filled with the product which should occupy not less than 90% (minus any necessary head space according to good manufacturing practices) of the water capacity of the container. The water capacity of the container is the volume of distilled water at 20 °C which the sealed container will hold when completely filled. Determination of fill of container shall be in accordance with Annex A.

##### 8.1.2 Classification of “Defectives”

A container that fails to meet the requirement for minimum fill of 8.1.1 should be considered as a “defective”.

##### 8.1.3 Lot acceptance

A lot should be considered as meeting the requirement of 8.1.1 when the number of “defectives”, as defined in 8.1.2, does not exceed the acceptance number (c) of the appropriate sampling plan with an AQL of 6.5 specified in Annex B.

### 9 Packaging and labelling

#### 9.1 Packaging

Tomato juice shall be packaged in appropriate containers made up of glass, plastic, plain cans or cans with food grade acid-resistant lacquering materials that shall not affect the quality of the product. The interior of the can shall not show any black discolouration, rusting or pitting.

#### 9.2 General

The product covered by the provisions of this Standard shall be labelled in accordance with EAS 38. In addition, the following specific provisions apply:

#### 9.3 Name of the product

The name of the product shall be:

- (a) “Tomato juice” if it is prepared from unconcentrated undiluted liquid extracted from mature tomatoes of reddish varieties.
- (b) “Tomato juice from concentrate” if the finished juice has been prepared from concentrated tomato juice or if the finished juice is a mixture of tomato juice and tomato juice from concentrate.

#### 9.4 Labelling of non-retail containers

Information for non-retail containers shall be given either on the container or in accompanying documents, except that the name of the product, lot identification, and the name and address of the manufacturer, packer, distributor or importer, as well as storage instructions, shall appear on the container. However, lot identification, and the name and address of the manufacturer, packer, distributor or importer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

## 9.5 Other labelling details

- (a) Net weight in grams or minimum volume in millilitres or litres.
- (b) Date of manufacture.
- (c) Expiry Date.
- (d) Usage instructions.
- (e) Batch or lot number.
- (f) Nutritional information.
- (g) Storage instructions.

## 10 Methods of analysis and sampling

### 10.1 General

**10.1.1** The factors of quality and analysis may be determined based on the following sample unit sizes:

- (a) The entire contents of a container;
- (b) A representative portion of the contents of a container;
- (c) A combination of the contents of two or more containers; or
- (d) A representative portion of processed product stored or held in bulk containers.

**10.1.2** The methods of analysis referred to hereunder apply, as appropriate, to the East African Standards for Fruit Juices, Concentrated Fruit Juices and Fruit Nectars preserved exclusively by Physical Means.

### 10.2 Test of mineral impurities

According ISO 762:2003, *Fruit and vegetable products — Determination of mineral impurities content*

### 10.3 Determination of cadmium

According to the following standards:

- ISO 6561-1:2005, *Fruits, vegetables and derived products — Determination of cadmium content — Part 1: Method using graphite furnace atomic absorption spectrometry*
- ISO 6561-2:2005, *Fruits, vegetables and derived products — Determination of cadmium content — Part 2: Method using flame atomic absorption spectrometry*

### 10.4 Determination of benzoic acid

According to ISO 6560:1983, *Fruit and vegetable products — Determination of benzoic acid content (benzoic acid contents greater than 200 mg per litre or per kilogram) — Molecular absorption spectrometric method*

### 10.5 Determination of moulds and yeasts

According to ISO 7954:1987, *Microbiology — General guidance for enumeration of yeasts and moulds — Colony count technique at 25 degrees C*

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### 10.6 Determination of lactic acid

According to EN 2631:1999, *Lactic acid — Enzymatic determination*

### 10.7 Determination of ethanol

According to ISO 2448:1998, *Fruit and vegetable products — Determination of ethanol content.*

### 10.8 Determination of added salt

According to ISO 3634:1979, *Vegetable products — Determination of chloride content.* The determination of sodium is not necessary. Results are expressed as % m/m NaCl.

### 10.9 Determination of soluble solids and sugars

According to the following standards:

— ISO 2172:1983, *Fruit juice — Determination of soluble solids content — Pycnometric method*

— EAS 41-10 [ISO 2173:2003], *Fruit and vegetable products — Determination of soluble solids — Refractometric method*

### 10.10 Determination of pH

According to ISO 1842:1991, *Fruit and vegetable products — Determination of pH*

### 10.11 Determination of total titrable acidity

According to EAS 41-2 [ISO 750:1998], *Fruit and vegetable products — Determination of titrable acidity*

### 10.12 Determination of volatile acidity

According to ISO 6632:1981, *Fruits, vegetables and derived products — Determination of volatile acidity*

### 10.13 Determination of insoluble content

According:

ISO 751:1998, *Fruit and vegetable products — Determination of water-insoluble solids*

ISO 763:2003, *Fruit and vegetable products — Determination of ash insoluble in hydrochloric acid*

### 10.14 Determination of arsenic

According to following standards:

— ISO 6634:1982, *Fruits, vegetables and derived products — Determination of arsenic content — Silver diethyldithiocarbamate spectrophotometric method.*

— ISO 17239:2004, *Fruits, vegetables and derived products — Determination of arsenic content — Method using hydride generation atomic absorption spectrometry.*

### 10.15 Determination of copper

According to ISO 7952:1994, *Fruits, vegetables and derived products — Determination of copper content — Method using flame atomic absorption spectrometry.* Results are expressed as mg copper/kg

**10.16 Determination of iron**

According to following standards:

- EAS 41-7 [ISO 5517:1978], *Fruits, vegetables and derived products -- Determination of iron content — 1,10- Phenanthroline photometric method*
- ISO 9526:1990, *Fruits, vegetables and derived products — Determination of iron content by flame atomic absorption spectrometry*. Results are expressed as mg iron/kg.

**10.17 Determination of lead**

According to ISO 6633:1984, *Fruits, vegetables and derived products — Determination of lead content — Flameless atomic absorption spectrometric method*. Results are expressed as mg lead/kg.

**10.18 Determination of sulphur dioxide**

According to EAS 41-11 [ISO 5523:1981], *Liquid fruit and vegetable products — Determination of sulphur dioxide content (Routine method)*. Results are expressed as mg SO<sub>2</sub>/kg.

**10.19 Determination of tin**

According to EAS 41-6 [ISO 2447:1998], *Fruit and vegetable products — Determination of tin content*

**10.20 Determination of zinc**

According to the following standards:

- ISO 6636-1:1986, *Fruits, vegetables and derived products — Determination of zinc content — Part 1: Polarographic method*
- ISO 6636-2:1981, *Fruits, vegetables and derived products — Determination of zinc content — Part 2: Atomic absorption spectrometric method*
- ISO 6636-3:1983, *Fruit and vegetable products — Determination of zinc content — Part 3: Dithizone spectrometric method*

**Annex A**  
(normative)

**Determination of water capacity of containers**

**A.1 Scope**

This method applies to glass containers.<sup>1</sup>

**A.2 Definition**

The water capacity of a container is the volume of distilled water at 20 °C which the sealed container will hold when completely filled.

**A.3 Procedure**

**A.3.1** Select a container which is undamaged in all respects.

**A.3.2** Wash, dry and weigh the empty container.

**A.3.3** Fill the container with distilled water at 20 °C to the level of the top thereof, and weigh the container thus filled.

**A.4 Calculation and expression of results**

Subtract the weight found in A.3.2 from the weight found in A.3.3. The difference shall be considered to be the weight of water required to fill the container. Results are expressed as ml of water.

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<sup>1</sup> For determination of water capacity in metal containers the reference method is ISO 90.1:1986.

## Annex B (normative)

### Sampling and compliance

#### B.1 Compliance

Unless otherwise provided in a standard, a lot of canned vegetables shall be deemed in compliance for the following factors, to be determined by the sampling and acceptance procedure as provided in B.2, namely:

##### B.1.1 Quality

The quality of a lot shall be considered acceptable when the number of defectives does not exceed the acceptance number (c) in the sampling plans.

##### B.1.2 Fill of container

A lot shall be deemed to be in compliance for fill of container (packing medium and vegetable ingredient) when the number of defectives does not exceed the acceptance number (c) in the sampling plans.

##### B.1.3 Drained weight

A lot shall be deemed to be in compliance for drained weight based on the average value of all samples analyzed according to the sampling plans.

#### B.2 Sampling and acceptance procedure

##### B.2.1 Definitions

###### (i) Lot

A collection of primary containers or units of the same size, type, and style manufactured or packed under similar conditions and handled as a single unit of trade.

###### (ii) Lot size

The number of primary containers or units in the lot.

###### (iii) Sample size

The total number of sample units drawn for examination from a lot.

###### (iv) Sample unit

A container, a portion of the contents of a container, or a composite mixture of product from small containers that is sufficient for the examination or testing as a single unit. For fill of container, the sample unit shall be the entire contents of the container.

###### (v) Defective

Any sample unit shall be regarded as defective when the sample unit does not meet the criteria set forth in the standards.

###### (vi) Acceptance number (c)

The maximum number of defective sample units permitted in the sample in order to consider the lot as meeting the specified requirements.

###### (vii) Acceptable quality level (AQL)

The maximum percent of defective sample units permitted in a lot that will be accepted approximately 95 percent of the time.

## B.2.2 Sampling plans

Lot size (primary containers)	Size of container	
	$n^1$	$c^2$
<b>net weight equal to or less than 1 kg (2.2 lb)</b>		
4,800 or less	13	2
4,801 to 24,000	21	3
24,001 to 48,000	29	4
48,001 to 84,000	48	6
84,001 to 144,000	84	9
144,001 to 240,000	126	13
Over 240,000	200	19
<b>net weight greater than 1 kg (2.2 lb) but not more than 4.5 kg (10 lb)</b>		
2,400 or less	13	2
2,401 to 15,000	21	3
15,001 to 24,000	29	4
24,001 to 42,000	48	6
42,001 to 72,000	84	9
72,001 to 120,000	126	13
Over 120,000	200	19
<b>net weight greater than 4.5 kg (10 lb)</b>		
600 or less	13	2
601 to 2,000	21	3
2,001 to 7,200	29	4
7,201 to 15,000	48	6
15,001 to 24,000	84	9
24,001 to 42,000	126	13
Over 42,000	200	19
<sup>1</sup> $n$ = number of primary containers in sample. <sup>2</sup> $c$ = acceptance number.		

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