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General quality requirements for canned citrus fruits
柑橘罐头质量通则

(English Translation)

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Foreword

SAC/TC 64 is in charge of this English translation. In case of any doubt about the contents of English translation, the Chinese original shall be considered authoritative.

This document is drafted in accordance with the rules given in the GB/T 1.1—2020 *Directives for standardization Part 1:Rules for the structure and drafting of standardizing documents*.

This document specifies the technical requirements related to food quality. See relevant laws, regulations, policies, food safety standards and other documents for the requirements related to food safety.

This document replaces the GB/T 13210-2014 *Canned citrus fruits*.in whole.In addition to a number of editorial changes, the following technical deviations have been made with respect to the GB/T 13210-2014:

——the document name has been modified to *General quality requirements for canned citrus fruits*;

——the scope of application has been modified and the processing technology of canned citrus fruits has been improved;

——the terms and definitions of membrane, membrane-removed citrus segment, white point, white sediment, broken segment, abortive sacs, broken sacs, and content of broken sacs have been modified, and the terms and definitions of whole segment, fragment, and fiber strands have been added;

——the classification and code of canned citrus fruits have been modified;

——the requirements for citrus fruits for processing for reference have been added, and the requirements for raw and auxiliary materials such as liquid sugar, concentrated fruit & vegetable juice (pulp), fruit and vegetable juice (pulp), and fermented liquid of fruits and vegetables have been added.

——the sensory requirements have been modified, the sensory requirements for canned pummelo have been modified, the indicator of the content of broken mandarin orange segments of the high-quality product in terms of the structural state of canned mandarin orange has been modified, the quality standard of high-quality product has been further improved, and the sensory requirements for canned grapefruit and lemon have been added;

——the requirements for net content have been modified;

——the requirements for solid content in canned citrus fruits have been modified to being not lower than the labeled value in terms of the average, and the requirements for solid content deviation have been deleted;

——the requirements for soluble solid content have been modified;

——the pH indicator has been deleted;

——the requirements for packaging, labeling, transportation and storage have been modified;

——the hygienic requirements have been deleted.

Attention is drawn to the possibility that some of the elements of this document may

be the subject of patent rights. The issuing body of this document shall not be held responsible for identifying any or all such patent rights.

This document was prepared with reference to Codex Alimentarius Commission (CAC) CODEX STAN 254-2013 *Standard for certain canned citrus fruits*, and the degree of consistency is non-equivalent.

This document was prepared by National Technical Committee 64 on Food Industry of Standardization Administration of China (SAC/TC 64).

The previous editions of GB/T 24403 are as follows:

—— GB/T 13210-1991 and GB/T 13210-2014;

——This is the second revised edition.

General quality requirements for canned citrus fruits

1 Scope

This document defines the terms and definitions of canned citrus fruits, specifies the requirements for raw and auxiliary materials, sensory requirements, physicochemical indicators, *etc.*, of canned citrus fruits, describes the corresponding test methods, specifies contents of inspection rules, labeling, packaging, transportation and storage, and gives the product classification and code convenient for technical regulations.

This document is applicable to canned foods made of fresh, refrigerated, frozen citrus fruits or canned citrus fruits (as main raw materials) which, without preservatives added, are processed, graded, canned, added with packing media, exhausted, sealed, sterilized and cooled.

2 Normative References

The following normative documents contain contents which, through references in this text, constitutes indispensable provisions 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.

GB/T 317 *White granulated sugar*

GB 5749 *Standards for drinking water quality*

GB/T 10786 *Analytical methods of canned food*

GB/T 20882.4 *Quality requirements for starch sugar - Part 4: High fructose syrup*

GB/T 31121 *Fruit & vegetable juices and fruit & vegetable beverage (nectars)*

GB/T 35883 *Rock sugar*

QB/T 1006 *Inspection rules for canned food*

QB/T 4093 *Liquid sugar*

QB/T 4631 *Packaging, labeling, transportation and storage for canned food*

QB/T 5356 *Fermented liquid of fruits and vegetables*

3 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

3.1

membrane

the membrane wrapped around the citrus flesh segment

3.2

membrane-removed citrus segment

the citrus flesh segment completely removed from the membrane wrapped around it

3.3

white point

the white point on the surface of citrus segment that is produced from the petiole of juice sacs, which is mainly hesperidin

3.4

white sediment

the sediment or precipitate caused by separation of white substances such as hesperidin and dispersion in the packing media of canned citrus fruits

3.5

whole segment

the citrus segment with integrity being not less than three quarters of the original segment

3.6

broken segment

the broken citrus segment with integrity being not less than one third of the original segment

3.7

fragment

the broken citrus segment with integrity being less than one third of the original segment

3.8

fiber strands

the fiber strands inside citrus peel that are attached to the surface of a peeled citrus fruit ball

note: It is the reticular tissue between the spongy layer in the inner layer of citrus peel and the juice sacs, which is formed by vascular bundles and aerenchyma

3.9

juice sacs

single plump citrus flesh granule dispersed from membrane-removed flesh segment

3.10

abortive sacs

a layer of cell membrane of broken sacs, which has almost no juice

3.11

broken sacs

the juice sacs that still has juice but is not plump after membrane rupture

3.12

clearly separated among sacs

obvious separation seen between juice sacses

3.13

content of broken sacs

the ratio of the total number of broken sacs and abortive sacs in the canned juice sacs to the total number of juice sacs

4 Product Classification and Code

4.1 Product classification

4.1.1 Classification by raw materials

The product can be classified into canned mandarin orange, canned sweet orange (canned orange), canned pummelo, canned grapefruit, and canned lemon.

4.1.2 Classification by shape

The product can be classified into canned whole fruit, sliced fruit, whole segment, broken segment, and juice sacs.

4.1.3 Classification by packing media

According to different packing media, the product can be classified into:

——sugar syrup type: the packing media is the water solution of one or more of white granulated sugar, rock sugar, fructose syrup and liquid sugar;

——fruit and vegetable juice type: the packing media is the water solution of fruit juice (pulp), vegetable juice (pulp), concentrated fruit juice (pulp) or concentrated vegetable juice (pulp);

——blended type: the packing media is the water solution of two or more substances, such as white granulated sugar, rock sugar, fructose syrup, liquid sugar, sweetener, fruit and vegetable juice (pulp), concentrated fruit and vegetable juice (pulp), fermented liquid of fruits and vegetables, plant extract, plant fermentation liquid, *etc.*;

——sweetener type: the packing media is the water solution of sweetener;

——water type: the packing media is clear water.

4.2 Product code

The product can be labeled with code according to GB/T 41900 and shall comply with the provisions in Table 1 .

Table 1 Product code

Items	Product codes				
	Sugar syrup type	Fruit and vegetable juice type	Blended type	Sweetener type	Water type
Canned whole mandarin orange segment (membrane-removed)	601	601J	601B	601S	601W
Canned broken mandarin orange segment	601 2	601J 2	601B 2	601S 2	601W 2
Canned mandarin orange juice sacs	639	639J	639B	639S	639W
Canned whole sweet orange segment (membrane-removed)	649	649J	649B	649S	649W
Canned broken sweet orange segment	649 2	649J 2	649B 2	649S 2	649W 2
Canned sweet orange juice sacs	649 3	649J 3	649B 3	649S 3	649W 3
Canned whole pummelo segment (membrane-removed)	623	623J	623B	623S	623W

Canned broken pummelo segment	623 2	623J 2	623B 2	623S 2	623W 2
Canned pummelo juice sacs	623 3	623J 3	623B 3	623S 3	623W 3
Canned whole grapefruit segment (membrane-removed)	695	695J	695B	695S	695W
Canned broken grapefruit segment	695 2	695J 2	695B 2	695S 2	695W 2
Canned grapefruit juice sacs	695 3	695J 3	695B 3	695S 3	695W 3
Canned whole lemon	696	696J	696B	696S	696W
Canned sliced lemon	696 1	696J 1	696B 1	696S 1	696W 1

5 Requirements

5.1 Raw and auxiliary materials

5.1.1 Citrus raw materials

5.1.1.1 Sensory requirements

The varieties suitable for can processing shall be used. The citrus raw materials shall be fresh, refrigerated or frozen well, in moderate size and maturity. The size of fruit shape, shape and uniformity of juice sacs, color, compactness of juice sacs, texture, *etc.*, shall be well appropriate for processing, and it is appropriate to have no or less stones. The citrus fruits shall have normal flavor and there shall be no seriously deformed, wizened, or frostbitten fruits. Also, there shall be no rotting caused by disease and insect pests and mechanical injury. The fruit surface shall be clean, and fruits with pedicel dropped before harvest shall not be used for can processing.

Canned citrus fruits shall as specified in the quality requirements of this document.

5.1.1.2 Varieties, physicochemical indicators and test methods of citrus raw materials

See Annex A.

5.1.2 White Granulated Sugar

Shall as specified in the requirements in GB/T 317.

5.1.3 Fructose syrup

Shall as specified in the requirements in GB/T 20882.4.

5.1.4 Rock sugar

Shall as specified in the requirements in GB/T 35883.

5.1.5 Liquid sugar

Shall as specified in the requirements in QB/T 4093.

5.1.6 Concentrated fruit and vegetable juice (pulp) and fruit and vegetable juice (pulp)

Shall as specified in the requirements in GB/T 31121.

5.1.7 Fermented liquid of fruits and vegetables

Shall as specified in the requirements in QB/T 5356.

5.1.8 Water

Shall as specified in the requirements in GB 5749.

5.1.9 Other raw and auxiliary materials

Shall as specified in the requirements of corresponding standards.

5.2 Sensory requirements

As specified in the provisions in Table 2.

Table 2 Sensory requirements

Items		Superior-grade product					First-grade product				
		Canned mandarin orange	Canned sweet orange (canned orange)	Canned pummelo	Canned grapefruit	Canned lemon	Canned mandarin orange	Canned sweet orange (canned orange)	Canned pummelo	Canned grapefruit	Canned lemon
Colour	Solid matter	Mandarin orange segment, orange segment or its juice sacs shall be orange or orange yellow, with the uniform colour in the same can and the luster similar to the original pulp.		The pummelo segment or its juice sacs shall be yellow to golden yellow, white, pink or red, with the uniform colour in the same can and the luster similar to the original pulp.		The whole lemon or lemon slice shall be yellow-green, yellow or light yellow, with the uniform colour in the same can and the luster similar to the original pulp.	Mandarin orange segment, orange segment or its juice sacs shall be orange or yellow, with the uniform colour in the same can and the luster similar to the original pulp.		The pummelo segment or its juice sacs shall be yellow to golden yellow, white, pink or red, with the uniform colour in the same can and the luster similar to the original pulp.		The whole lemon or lemon slice shall be yellow-green, yellow or light yellow, with the uniform colour in the same can and the luster similar to the original pulp.
	Packing media	Sugar syrup type, sweetener type, water type: with clear and transparent packing media Fruit and vegetable juice type, blended type: with the proper colour of the product packing media					Sugar syrup type, sweetener type, water type: with clear and transparent packing media, and very slight white sediment is allowed Fruit and vegetable juice type, blended type: with the proper colour of the product packing media				
Taste and odour		With the proper taste and odour of the product; palatable in sour and sweet, without foreign taste					With the proper taste and odour of the product; palatable in sour and sweet, with a slightly cooked taste allowed				
Structural state	Solid matter	Canned citrus fruits with broken segment: the membrane shall be completely removed, and the structure shall be moderately soft and hard; the weight of fragment shall not exceed 10% of the weight of solids. The number of residual seeds per 200 g of solids shall not exceed 1. Canned citrus fruits of juice sacs shall meet the following requirements: juice sacs shall be full and clearly separated; the weight of residual seed shall not exceed 1% of the solids content,					Canned citrus fruits with broken segment: the membrane shall be completely removed, and the structure shall be moderately soft and hard; the weight of fragment shall not exceed 15% of the weight of solids. The number of residual seeds per 200 g of solids shall not exceed 1. Canned citrus fruits of juice sacs shall meet the following requirements: juice sacs shall be full and relatively clearly separated; the weight of residual seed shall not exceed 2% of the				

		and the content of broken sacs shall not exceed 20% of the weight of solids.			solids content, and the content of broken sacs shall not exceed 30% of the weight of solids.		
		The membrane shall be completely removed, and an extremely small amount of membrane and fiber strands are allowed to remain in individual mandarin orange segment. The total area of the residual membrane shall not exceed 7 cm^2/100 g, and the total length of the fiber strands shall not exceed 5 cm/100 g. The texture shall be tender and crisp, the mandarin orange segments shall be full and complete, the shape shall be nearly semi-circular, and the size and thickness shall be relatively uniform. A small amount of broken segment and fragment are allowed. The total weight of broken segment and fragment of water type products shall not exceed 10% of the weight of solids; the total weight of broken segment and fragment of sugar syrup type, fruit and vegetable juice type,	The membrane shall be completely removed, and a small amount of membrane and fiber strands are allowed to remain in individual pummelo segment or orange segment. The total area of the residual membrane shall not exceed 4 cm^2/100 g. The texture shall be tender and crisp, the pummelo segments and orange segments shall be basically complete, the shape shall be long semi-circular, and the size and thickness shall be relatively uniform. The segment with broken angle remaining a shape of more than 3/4 is allowed be regarded as whole segment, and the total weight of broken segment and fragment shall not exceed 10% of the weight of solids. The number of residual seeds with a maximum horizontal diameter	The whole and sliced lemons shall be complete with skin and core, uniform in size and thickness, wherein the lemon slices are nearly circular, with a thickness of 2 mm~6 mm, and the weight of the fragment shall not exceed 5% of the weight of solids	The membrane shall be completely removed, and an extremely small amount of membrane and fiber strands are allowed to remain in individual mandarin orange segment. The total area of the residual membrane shall not exceed 10 cm^2 /100 g, and the total length of the fiber strands shall not exceed 7 cm/100 g. The texture shall be tender and crisp, the mandarin orange segments shall be full, the canned mandarin orange of whole segment shall be basically complete, the shape shall be nearly semi-circular or long semi-circular, and the size and thickness shall be relatively uniform. A small amount of broken segment and fragment are allowed. The total weight of broken segment and fragment of water type products shall not exceed 20% of the weight of solids; the total weight of broken segment and fragment of sugar syrup type, fruit and vegetable juice type, sweetener type and blended type products shall not exceed 10% of the	The membrane shall be completely removed, and a small amount of membrane and fiber strands are allowed to remain in individual pummelo segment or orange segment. The total area of the residual membrane shall not exceed 5 cm^2/100 g. The texture shall be tender and crisp, the pummelo segments and orange segments shall be basically complete, the shape shall be long semi-circular, and the size and thickness shall be relatively uniform. The segment with broken angle remaining a shape of more than 3/4 is allowed be regarded as whole segment, and the total weight of broken segment and fragment shall not exceed 15% of the weight of solids. The number of residual seeds with a maximum horizontal diameter of more than	The whole and sliced lemons shall be complete with skin and core, uniform in size and thickness, wherein the lemon slices are nearly circular, with a thickness of 2 mm~6 mm, and the weight of the fragment shall not exceed 8% of the weight of solids

		sweetener type and blended type products shall not exceed 5% of the weight of solids. The number of residual seeds per 200 g of solids shall not exceed 1	of more than 9 mm per 500 g of content shall not exceed 4		weight of solids. The number of residual seeds per 200 g of solids shall not exceed 1	9 mm per 500 g of content shall not exceed 6	
	Packing media	The packing media of juice type and blended type juice (pulp) shall be fine and uniform, and a small amount of pulp particle precipitate will be displayed after standing					
Impurities		No visible foreign impurities by normal vision					

5.3 Physicochemical indicators

As specified in the provisions of Table 3.

Table 3 Physicochemical indicators

Items	Physicochemical indicators	
	Canned citrus fruits in tinned (chrome) thin steel plate container	Canned citrus fruits in other packages
Solid content,%	The average solid content of each batch of products shall not be lower than the marked value, and shall meet the following requirements: Canned mandarin orange, canned sweet orange (orange): ≥ 55 Canned grapefruit and canned lemon: ≥ 50 Canned pummelo: ≥ 40	The average solid content of each batch of products shall not be lower than the marked value, and shall be ≥ 50
Soluble solids (calculated by refractometry at 20 ℃),% ≤	22	
Net content	It shall comply with relevant standards and regulations, and the average net content of each batch of products shall not be lower than the marked value	

6 Test Methods

6.1 Sensory requirements

Inspect according to the method specified in GB/T 10786.

6.2 Content of broken sacs

Inspect according to the method specified in Annex B.

6.3 Physicochemical indicators

6.3.1 Solid content

Inspect according to the method specified in GB/T 10786.

6.3.2 Soluble solid content

Inspect according to the method specified in GB/T 10786.

6.3.3 Net content

Inspect according to the method specified in GB/T 10786.

7 Inspection Rules

As specified in the provisions in QB/T 1006. Sensory requirements, net content, solid content and soluble solid content are mandatory inspection items for delivery quality inspection.

8 Packaging, labeling, transportation and storage

8.1 As specified in relevant provisions in QB/T 4631.

8.2 The product name shall be indicated with the name of the minimum classification type, which can be marked according to the different packing media used, such as sugar syrup type mandarin orange, juice orange type mandarin orange (juice shall be indicated with specific name), blended type mandarin orange (ingredients of mixed juice shall be indicated in the ingredient list), and water type mandarin orange.

Canned mandarin orange of whole segment can be indicated as canned mandarin orange, and that of broken segment can be indicated as canned mandarin orange (broken segment).

Annex A

(Informative)

Varieties, physicochemical indicators and test methods of citrus raw materials

A.1 Varieties of Citrus Raw Materials

Common citrus varieties in Table A.1 can be used for canned food processing.

Table A.1 Varieties of citrus raw materials

Category	Latin name	Common citrus varieties
Mandarin orange	*Citrus reticulate* Blanco	Satsuma mandarin, red orange, early orange, local early orange, ponkan mandarin, Citrus reticulata cv. Tardiferax, Shatang tangering and other peelable mandarin (*Citrus reticulata* Blanco) varieties suitable for canned processing
Sweet orange (orange)	*Citrus sinensis* (L.), Osbeck	Navel orange, Jincheng orange, *etc.*
Pummelo	*Citrus Maxima Merr.* or *Citrus grandis* (L.)	Huyou pummelo, *etc.*
Grapefruit	*Citrus paradise* Macfadyen	Marsh, Star Ruby, *etc.*
Lemon	*Citrus limon* (Linnaeus) Burm.fil	Eureka, Lisbon, *etc.*

A.2 Physicochemical Indicators of Citrus Raw Materials

Refer to Table A.2 for screening of citrus raw materials.

Table A.2 Physicochemical indicators of citrus raw materials

Items			Early-maturity variety	Medium-maturity variety
Horizontal diameter of fruit, cm	Mandarin orange		5.0~8.5	
	Sweet orange		6.0~12.0	
	Pummelo		7.0~18.0	
	Grapefruit		6.0~12.0	
	Lemon		5.0~7.0	
Soluble solids (calculated by refractometry at 20 ℃),%		≥	8.0	8.5

A.3 Test Methods

A.3.1 Horizontal diameter of fruit

It shall be tested according to the method specified in GB/T 8210.

A.3.2 Soluble solids

It shall be tested according to the method specified in GB/T 8210.

Annex B

(Normative)

Test method for content of broken sacs of canned citrus fruits

B.1 Apparatus and Equipment

B.1.1 Round screen: with the diameter of 205 mm, woven with stainless steel wire, the diameter of which is 0.8 mm, with hole of 1.7 mm × 1.7 mm (equivalent to 10-mesh round screen).

B.1.2 White porcelain plate.

B.1.3 Beaker.

B.1.4 Plastic screen (common).

B.1.5 Tweezers.

B.2 Reagents and Solutions

0.1% methylene blue.

B.3 Inspection Procedures

B.3.1 After the canned citrus fruits of juice sacs is opened, drain for 3 minutes with plastic sieve, weigh 30 g of juice sacs, put into a 200-mL beaker, add 0.1% methylene blue to the scale of 160 mL, and soak for 1 minute.

B.3.2 Slowly pour the soaked juice sacs into a 10-mesh sieve, and wash the broken juice sacs off with 8 L of water. During the cleaning process, try to separate the large juice sacs block and lay the juice sacs flat on the screen as much as possible.

B.3.3 Incline the screen at an angle of 30° for 3 min to drain water (the remaining 100% stained juice sacs can be removed with tweezers). Record the weight of blank porcelain plate as m_1.

B.3.4 Gently turn the screen and tap the edge of the screen to pour most of the juice sacs onto the plate, while the broken juice sacs stick to the screen. Lightly transfer all full juice sacs to the plate with tweezers, remove all 100% stained juice sacs, and record the total weight of the plate and juice sacs as m_2.

B.4 Calculation

The content of broken sacs shall be calculated according to Formula (A.1):

$$X = [1 - \frac{m_2 - m_1}{30}] \times 100\% \cdots\cdots\cdots\cdots\cdots\cdots (A.1)$$

Where,

X——the content of broken sacs,%;

m_2——the total weight of plate and juice sacs, g;

m_1——the weight of blank porcelain plate, g;

30——the weight of sample juice sacs, g.

Bibliograpy

[1] GB/T 8210 *Method of inspection for fresh citrus fruit*

[2] GB/T 41900 *Code for canned foods*