



**United States
Department of
Agriculture**

**Agricultural
Marketing
Service**

**Fruit and
Vegetable
Division**

**Processed
Products
Branch**

United States Standards for Grades of Orange Juice

Effective date January 10, 1983

This is the first issue of the United States Standards for Grades of Orange Juice combining all the previously issued orange juice standards. This issue includes grade standards for reduced acid frozen concentrated orange juice. The following standards are superseded: the United States Standards for Grades of Canned Orange Juice (Eighth Issue, as amended, July 1, 1969); the United States Standards for Grades of Frozen Concentrated Orange Juice (Fourth Issue, as amended, September 21, 1968); the United States Standards for Grades of Concentrated Orange Juice for Manufacturing (Third Issue, November 17, 1964); the United States Standards for Grades of Canned Concentrated Orange Juice (Fourth Issue, as amended, September 21, 1968); the United States Standards for Grades of Dehydrated Orange Juice (First Issue, as amended, September 21, 1968); the United States Standards for Grades of Pasteurized Orange Juice (First Issue, as amended, July 1, 1969); and the United States Standards for Grades of Orange Juice from Concentrate (First Issue, as amended, July 1, 1969). This issue was published in the **FEDERAL REGISTER** of December 10, 1982 (47 FR 55455) to become effective January 10, 1983.

Voluntary U.S. grade standards are issued under the authority of the Agricultural Marketing Act of 1946, which provides for the development of official U.S. grades to designate different levels of quality. These grade standards are available for use by producers, suppliers, buyers, and consumers. As in the case of other standards for grades of processed fruits and vegetables, these standards are designed to facilitate orderly marketing by providing a convenient basis for buying and selling, for establishing quality control programs, and for determining loan values.

The standards also serve as a basis for the inspection and grading of commodities by the Federal inspection service, the only activity authorized to approve the designation of U.S. grades as referenced in the standards, as provided under the Agricultural Marketing Act of 1946. This service, available as on-line (in-plant) or lot inspection and grading of all processed fruit and vegetable products, is offered to interested parties, upon application, on a fee-for-service basis. The verification of some specific recommendations, requirements, or tolerances contained in the standards can be accomplished only by the use of on-line inspection procedures. In all instances, a grade can be assigned based on final product factors or characteristics.

In addition to the U.S. grade standards, grading manuals or instructions for inspection of several processed fruits and vegetables are available upon request for a nominal fee. These manuals or instructions contain detailed interpretations of the grade standards and provide step-by-step procedures for grading the product.

Grade standards are issued by the United States Department of Agriculture (USDA) after careful consideration of all data and views submitted, and the USDA welcomes suggestions which might aid in improving the standards in future revisions. Comments may be submitted to, and copies of standards and grading manuals obtained from:

Chief, Processed Products Branch
Fruit and Vegetable Division, AMS
U.S. Department of Agriculture
P.O. Box 96456, Rm. 0709, So. Bldg.
Washington, D.C. 20090-6456

United States Standards for Grades of Orange Juice

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Authority: Agricultural Marketing Act of 1946, Secs. 203, 205, 60 Stat. 1087, as amended, 1090, as amended (7 U.S.C. 1622, 1624).	

Note: Compliance with the provisions of these standards shall not excuse failure to comply with the provisions of the Federal Food, Drug, and Cosmetic Act, or with applicable State laws and regulations.

§52.1551 Product description.

(a) For the purpose of these standards the following products are represented as defined in the Standards of Identity issued under the Federal Food, Drug, and Cosmetic Act.

(1) **Pasteurized orange juice** (21 CFR 146.140).

(2) **Canned orange juice** (21 CFR 146.141).

(3) **Orange juice from concentrate** (21 CFR 146.145).

(4) **Frozen concentrated orange juice** (21 CFR 146.146).

(5) **Reduced acid frozen concentrated orange juice** (21 CFR 146.148).

(6) **Canned concentrated orange juice** (21 CFR 146.150).

(7) **Concentrated orange juice for manufacturing** (21 CFR 146.153 and 21 CFR 146.154).

(b) For the purpose of these standards the following product is not defined in the Standards of Identity issued under the Federal Food, Drug, and Cosmetic Act. The product is defined as follows:

"Dehydrated orange juice" is the product made from any of the products listed in paragraph (a) of this section. Optional functional ingredient(s) permissible under the Federal Food, Drug, and Cosmetic Act may be used. The dehydrated orange juice is reduced to a suitable moisture content necessary for preservation.

§52.1552 Styles.

(a) Unsweetened.

(b) Sweetened (not applicable to reduced acid frozen concentrated orange juice).

§52.1553 Definitions of terms.

In these U.S. Standards, unless otherwise required by the context, the following terms shall be construed, respectively, to mean:

- (a) **Acid** means the percent, by weight, of total acidity (calculated as anhydrous citric acid).
- (b) **Appearance** means the physical properties of orange juice which are evaluated by the human eye.
- (c) **Brix** means the total soluble solids as determined when tested with a Brix hydrometer and applying the applicable temperature correction. The Brix may be determined by any other method that gives equivalent results.
- (d) **Brix/acid ratio** means the ratio of the degrees Brix of the juice to the grams of anhydrous citric acid per 100 grams of the juice.
- (e) **Brix value** means the refractometric sucrose value determined in accordance with the **International Scale of Refractive Indices of Sucrose Solutions** and to which the applicable correction for acid is added. The Brix value is determined in accordance with the refractometric method outlined in the **Official Methods of Analysis of the Association of Official Analytical Chemists**.
- (f) **Brix value/acid ratio** means the ratio of the Brix value of the concentrate, in degrees Brix, to the grams of anhydrous citric acid per 100 grams of concentrate.
- (g) **Coagulation** means curdling of orange juice.
- (h) **Color.**
The color of the orange juice is evaluated by comparing the color of the juice with the USDA Orange Juice Color Standards as points of reference.
- (i) **Color standards** means the official USDA Orange Juice Color Standards. The availability and procedure for using the color standards may be obtained from:

Chief, Processed Products Branch
Fruit and Vegetable Division, AMS
U.S. Department of Agriculture
P.O. Box 96456, Rm. 0709, So. Bldg.
Washington, D.C. 20090-6456

Any device approved by the USDA which gives values equivalent to the USDA Color Standards may be used.

- (j) **Defects** means juice cells, pulp, seeds or portions of seeds, specks, particles of membrane, core, peel, or any other distinctive features that adversely affect the appearance or drinking quality of the orange juice.
- (1) **Practically free from defects** means defects in excess of that normally expected in orange juice are not present.
- (2) **Reasonably free from defects** means the presence of defects does not seriously affect the appearance or drinking quality of the orange juice.
- (k) **Flavor.** The flavor is evaluated based upon characteristics normal to each type of product.
- (1) **Very good flavor** means that the flavor is fine, distinct, and substantially typical of orange juice extracted from fresh mature sweet oranges and is free from off flavors of any kind.
- (2) **Good flavor** means the flavor is similar to the flavor of juice extracted from fresh mature sweet oranges. The orange juice may be slightly affected by processing, packaging, or storage conditions.
- (3) **Poor flavor** means orange juice that fails the requirements for **good flavor**.
- (l) **Reconstituted juice** means the product obtained by thoroughly mixing the concentrate with the amount of water prescribed on the label or other appropriate directions.
- (m) **Reconstitutes properly** means that, upon mixing with water, the concentrate dissolves readily and has no material coagulation or separation.
- (n) **Recoverable oil** means the volume of oil that may be recovered from orange juice as determined by the **Methods of Analysis of the Association of Official Analytical Chemists**.
- (o) **Sample unit** means a portion of orange juice selected for grading.
- (p) **Separation** means that the lighter suspended material rises and heavier suspended material sinks resulting in a zone of clear or transparent liquid.

§52.1554 Recommended sample unit size.

The requirements for all factors of quality are based on the following:

- (a) The entire contents of a container;
- (b) A representative portion of the contents of a container;
- (c) Combination of the contents of two or more containers; or
- (d) A portion of unpacked product.

§52.1555 Grades.

- (a) **U. S. Grade A** is the quality of orange juice that meets the applicable requirements of Tables I - VIII;
- (b) **U. S. Grade B** is the quality of orange juice that meets the applicable requirements of Tables I - VIII;
- (c) **Substandard** is the quality of orange juice that fails to meet the requirements for **Grade B**.

§52.1556 Factors of quality and analysis.

The grade of a lot of product is based on observation and analysis of the orange juice for the following applicable quality and analytical factors:

- (a) **Quality:**
 - (1) Appearance;
 - (2) Coagulation;
 - (3) Color;
 - (4) Defects;
 - (5) Flavor;
 - (6) Reconstitution;
 - (7) Separation; and
 - (8) Total score points.

(b) Analytical:

- (1)** Acid;
- (2)** Brix measurement or Brix value measurements;
- (3)** Brix/acid ratio or Brix value/acid ratio; and
- (4)** Recoverable oil.

§52.1557 Requirements for grades.

Table I - Canned Orange Juice

Factors	Grade A				Grade B			
Quality:								
Coagulation.	None.				Slight.			
Color.	Good. (Equal to or better than USDA OJ 6.)				Reasonably good. (Not as good as USDA OJ 6, but not off color.)			
Score Points	36 - 40.				32 - 35.			
Defects.	Practically free.				Reasonably free.			
Score Points	18 - 20.				16 - 17.			
Flavor.	Very good.				Good.			
Score Points	36 - 40.				32 - 35.			
Total Score Points.	Minimum - 90.				Minimum - 80.			
Analytical:	Unsweetened		Sweetened		Unsweetened		Sweetened	
Brix:Minimum	10.5°		10.5°		10.0°		10.5°	
Brix/Acid Ratio	Min	Max	Min	Max	Min	Max	Min	Max
Brix < 11.5°	10.5:1	20.5:1	.....	.....	9.5:1	20.5:1	.....	.....
Brix 11.5° or more.	9.5:1	20.5:1	.....	.....	9.5:1	20.5:1	.....	.....
Brix < 15° .....	.....	.....	12.5:1	20.5:1	.....	.....	12.5:1	20.5:1
Brix 15° or more. .	.....	.....	9.5:1	20.5:1	.....	.....	9.5:1	20.5:1
Acid (wt/100 g):								
California/ Arizona.	0.70g	1.40g	0.70g	1.40g	0.55g	1.55g	0.60g	1.60g
Outside California/ Arizona.	0.60g	1.40g	0.60g	1.40g	0.55g	1.55g	0.60g	1.60g
Recoverable Oil (percent by volume): Maximum .	0.035		0.035		0.055		0.055	

Table II - Frozen Concentrated Orange Juice

Factors	Grade A				Grade B			
Quality: 1/								
Appearance	Fresh orange juice				Fresh orange juice.			
Reconstitution.	Reconstitutes properly.				Reconstitutes properly.			
Color.	Very Good. (Equal to or better than USDA OJ 5.)				Good. (Not as good as USDA OJ 5, but not off color.)			
Score points	36-40				32-35			
Defects.	Practically free.				Reasonably free.			
Score points	18-20				16-17			
Flavor.	Very good.				Good.			
Score points	36-40				32-35			
Total Score Points.	Minimum - 90				Minimum - 80			
Analytical:	Unsweetened		Sweetened		Unsweetened		Sweetened	
Concentrate: Brix value: Minimum.	41.8°		42.0°		41.8°		42.0°	
Brix value/Acid Ratio:	Min	Max	Min	Max	Min	Max	Min	Max
California/ Arizona.	11.5:1	19.5:1	12.0:1	19.5:1	10.0:1		10.0:1	
Outside California/ Arizona.	12.5:1	19.5:1	13.0:1	19.5:1	10.0:1		10.0:1	
Reconstituted Juice:								
Brix: Minimum.	11.8°				11.8°			
Soluble Orange Solids, exclusive of sweetener (percent by weight of finished product): Minimum.			11.8				11.8	
Recoverable Oil (percent by volume): Maximum	0.035				0.040			

1/ Reconstituted prior to grading.

Table III - Reduced Acid Frozen Concentrated Orange Juice

Factors	Grade A	Grade B		
Quality: <u>1/</u>				
Appearance.	Fresh orange juice.	Fresh orange juice.		
Reconstitution.	Reconstitutes properly.	Reconstitutes properly.		
Color.	Very good. (Equal to or better than USDA OJ 5.)	Good. (Not as good as USDA OJ 5, but not off color.)		
Score points.	36 - 40.	32 - 35.		
Defects.	Practically free.	Reasonably free.		
Score points.	18 - 20.	16 - 17.		
Flavor.	Very good.	Good.		
Score points.	36 - 40.	32 - 35.		
Total Score Points. .	Minimum - 90.	Minimum - 80.		
Analytical:				
Concentrate:				
Brix value: Minimum.	41.8°	41.8°		
Brix value/Acid Ratio.	Min	Max	Min	Max
	21.0:1	26.0:1	21.0:1	26.0:1
Reconstituted Juice:				
Brix: Minimum.	11.8°	11.8°		
Recoverable Oil (percent by volume):Maximum. .	0.035.	0.040.		

1/ Reconstituted prior to grading.

Table IV - Concentrated Orange Juice for Manufacturing

Factors	Grade A		Grade B	
Quality: 2/				
Reconstitution.	Reconstitutes properly.		Reconstitutes properly	
Color.	Good. (Equal to or better than USDA OJ 6.)		Reasonably good. (Not as good as USDA OJ 6, but not off color)	
Score Points.	36 - 40.		32 - 35.	
Defects.	Practically free.		Reasonably free.	
Score Points.	18 - 20.		16 - 17.	
Flavor.	Very good.		Good.	
Score Points.	36 - 40.		32 - 35.	
Total Score Points. .	Minimum - 90.		Minimum - 80.	
Analytical:				
Soluble orange solids, exclusive of sweetener (percent by weight of finished product): Minimum.	11.8°		11.8°	
Brix value/Acid Ratio. . .	Min	Max	Min	Max
	8.0:1	24.0:1	8.0:1	24.0:1

2/ Reconstituted to 11.8° Brix prior to grading.

Table V - Canned Concentrated Orange Juice

Factors	Grade A				Grade B			
Quality: 1/								
Appearance.	Reasonably characteristic of fresh orange juice.				Fairly characteristic of fresh orange juice.			
Reconstitution.	Reconstitutes properly.				Reconstitutes properly.			
Color.	Very good. (Equal to or better than USDA OJ 5.)				Good. (Not as good as USDA OJ 5, but not off color)			
Score Points. . .	36 - 40.				32 - 35.			
Defects.	Practically free.				Reasonably free.			
Score Points. . .	18 - 20.				16 - 17.			
Flavor.	Very good.				Good.			
Score Points. . .	36 - 40.				32 - 35.			
Total Score Points. .	Minimum - 90.				Minimum - 80.			
Analytical:								
Concentrate:	Unsweetened		Sweetened		Unsweetened		Sweetened	
Brix value: Minimum.	41.8°		42.0°		41.8°		42.0°	
Brix/Acid Ratio.	Min	Max	Min	Max	Min	Max	Min	Max
	11.5:1	20.0:1	12.0:1	20.0:1	9.5:1	20.0:1	10.0:1	20.0:1
Reconstituted Juice:								
Brix: Minimum.	11.8°				11.8°			
Soluble orange solids, exclusive of sweetener (percent by weight of finished product): Minimum. . .			11.8°				11.8°	
Recoverable Oil (percent by volume): Maximum.	0.035				0.040			

1/ Reconstituted prior to grading.

Table VI - Dehydrated Orange Juice

Factors	Grade A	Grade B		
Quality: 2/				
Appearance.	Reasonably characteristic of fresh orange juice.	Fairly characteristic of fresh orange juice.		
Reconstitution.	Reconstitutes properly.	Reconstitutes properly.		
Color.	Good. (Equal to or better than USDA OJ 6.)	Reasonably good. (Not as good as USDA OJ 6, but not off color)		
Score Points.	36 - 40.	32 - 35.		
Defects.	Practically free.	Reasonably free.		
Score Points.	18 - 20.	16 - 17.		
Flavor.	Very good.	Good.		
Score Points.	36 - 40.	32 - 35.		
Total Score Points.	Minimum - 90.	Minimum - 80.		
Analytical: 3/				
Brix: Minimum.	11.8°	11.8°		
Brix/Acid Ratio.	Min	Max	Min	Max
	12.0:1	18.0:1	10.5:1	19.0:1
Soluble orange solids, exclusive of sweetener (percent by weight of reconstituted juice): Minimum.	11.8	11.8		
Recoverable Oil (percent by volume): Maximum.	0.035	0.045		

2/ Reconstituted to 11.8° Brix prior to grading.

3/ Reconstituted by label directions prior to analysis.

Table VII - Pasteurized Orange Juice

Factors	Grade A				Grade B			
Quality:								
Appearance.	Fresh orange juice.				Fresh orange juice.			
Coagulation.	None.				None.			
Separation	No material.				Some.			
Color.	Very Good. (Not as good as OJ 5 but much better than OJ 6.)				Good. (Fails Grade A, but not off color.)			
Score Points ..	36 - 40.				32 - 35.			
Defects.	Practically free.				Reasonably free.			
Score Points	18 - 20.				16 - 17.			
Flavor.	Very good.				Good.			
Score Points ..	36 - 40.				32 - 35.			
Total Score Points.	Minimum - 90.				Minimum - 80.			
Analytical:								
	Unsweetened		Sweetened		Unsweetened		Sweetened	
Brix: Minimum.	11.0		11.0		10.5		10.5	
Soluble orange solids, exclusive of sweetener (percent by weight of finished product): Minimum.			11.0				10.5	
Brix/Acid Ratio:	Min	Max	Min	Max	Min	Max	Min	Max
California/Arizona ...	11.5:1	18.0:1	12.5:1	20.5:1	10.5:1	23.0:1	10.5:1	23.0:1
Outside California/Arizona	12.5:1	20.5:1	12.5:1	20.5:1	10.5:1	23.0:1	10.5:1	23.0:1
Recoverable Oil (percent by volume): Maximum.	0.035				0.045			

Table VIII - Orange Juice from Concentrate

Factors	Grade A				Grade B			
Quality:								
Appearance.	Fresh orange juice.				Fresh orange juice.			
Coagulation.	None.				None.			
Separation.	No material.				Some.			
Color.	Very good. (Not as good as OJ 5 but much better than USDA OJ 6.)				Good. (Fails Grade A, but not off color.)			
Score Points . . .	36 - 40.				32 - 35.			
Defects.	Practically free.				Reasonably free.			
Score Points . . .	18 - 20.				16 - 17.			
Flavor.	Very good.				Good.			
Score Points . . .	36 - 40.				32 - 35.			
Total Score Points. .	Minimum - 90.				Minimum - 80.			
Analytical:	Unsweetened		Sweetened		Unsweetened		Sweetened	
Brix: Minimum.	11.8°		11.8°		11.8°		11.8°	
Soluble orange solids, exclusive of sweetener (percent by weight of finished product): Minimum. . .			11.8				11.8	
Brix/Acid Ratio:	Min	Max	Min	Max	Min	Max	Min	Max
California/Arizona	11.5:1	18.0:1	12.5:1	20.5:1	11.0:1	23.0:1	11.0:1	23.0:1
Outside California/Arizona	12.5:1	20.5:1	12.5:1	20.5:1	11.0:1	23.0:1	11.0:1	23.0:1
Recoverable oil (percent by volume): Maximum	0.035				0.045			

§52.1558 Sample size.

The sample size to determine acceptance with the requirements of these standards shall be as specified in the sampling plans and procedures in the **Regulations Governing Inspection and Certification of Processed Fruits and Vegetables, Processed Products Thereof, and Certain Other Processed Food Products** (7 CFR 52.1 - 52.83).

§52.1559 Lot requirements.

A lot of orange juice is considered as meeting requirements for quality if:

- (a) The requirements specified in Tables I, II, III, IV, V, VI, VII, VIII, as applicable, are met; and
- (b) The sampling plans and procedures in 7 CFR 52.1 - 52.83 are met.

Done at Washington, D. C. on: November 30, 1982

/s/ _____

William T. Manley
Deputy Administrator
Marketing Programs Operations