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United States Standards for Grades of Canned Lemon Juice

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This is a reprint of the United States Standards for Grades of Canned Lemon Juice (27 FR 10315) which have been in effect since December 8, 1962 and were updated to modify the format and to correct and align the text as originally published in the CFR.

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 fresh and processed fruits, vegetables, and specialty crops 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 U.S. grade standards and inspection instructions for all fresh and processed fruits, vegetables, and specialty crops are available on the internet and upon request at the address below. These documents provide detailed interpretations of the grade standards and provide step-by-step procedures for grading the product.

Grade standards are issued by the U.S. Department of Agriculture (USDA) after careful consideration of all data and views submitted during rulemaking. The Department welcomes suggestions for improving the standards in future revisions. Comments may be submitted to, and copies of standards and inspection instructions obtained from:

Director, Specialty Crops Inspection Division
Specialty Crops Program,
USDA, Agricultural Marketing Service
1400 Independence Avenue, SW, STOP 0240
Washington, D.C. 20250

Authority: 7 U.S.C. 1621-1627.

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.

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United States Standards for Grades of Canned Lemon Juice

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Product Description, Grades, Fill of Container
§52.5481 Product description.

Canned lemon juice is the undiluted, unconcentrated, unfermented juice obtained from sound, mature lemons of one or more of the high acid varieties, which fruit is prepared by sorting, and by washing prior to extraction of the juice to assure a clean and sanitary product. The product is sufficiently processed with heat to assure preservation in hermetically sealed containers.

§52.5482 Grades of canned lemon juice.

- (a) **U.S. Grade A (or U.S. Fancy)** is the quality of canned lemon juice that:
- (1) Has good color;
 - (2) is practically free of defects;
 - (3) has good flavor; and
 - (4) scores not less than 90 points when scored in accordance with the scoring system outlined in this subpart.
- (b) **U.S. Grade C (or U.S. Standard)** is the quality of canned lemon juice that:
- (1) Has fairly good color;
 - (2) is fairly free of defects;
 - (3) has fairly good flavor; and
 - (4) scores not less than 80 points when scored in accordance with the scoring system outlined in this subpart.
- (c) **Substandard** is the quality of canned lemon juice that fails to meet the requirements of U.S. Grade C.

Fill of Container

§52.5483 Recommended fill of container.

The recommended fill of container is not incorporated in the grades of the finished product since fill of container, as such, is not a factor of quality. It is recommended that the container be as full of lemon juice as practicable and that the product occupy not less than 90 percent of the water capacity of the container.

Factors of Quality

§52.5484 **Ascertaining the grade of a sample unit.**

The grade of canned lemon juice is ascertained by considering the respective ratings for the factors of color, defects, and flavor (and aroma). The relative importance of each factor is expressed, numerically, on the scale of 100. The maximum number of points that may be given each factor are:

Factors	Points
Color	40
Defects	30
Flavor	30
Total Score	100

§52.5485 **Ascertaining the rating for the factors which are scored.**

The essential variations within each factor which is scored are so described that the value may be ascertained for each factor and expressed numerically. The numerical range within each factor is inclusive (for example, **27 to 30 points** means 27, 28, 29, or 30 points).

§52.5486 **Color.**

- (a) **“A” classification.** Canned lemon juice that has good color may be given a score of 36 to 40 points. **Good color** means that the color is bright and typical of fresh, properly processed lemon juice that is practically free of browning caused by scorching, oxidation, storage conditions, or any other causes.
- (b) **“C” classification.** Canned lemon juice that has fairly good color may be given a score of 32 to 35 points. Canned lemon juice that is scored into this classification shall not be graded above U.S. Grade C, regardless of the total score for the product (this is a limiting rule). **Fairly good color** means that the color may be only fairly bright, but is not off-color, and is typical of properly processed lemon juice that is reasonably free of browning due to scorching, oxidation, improper storage, or any other causes.
- (c) **“SStd” classification.** Canned lemon juice that fails to meet the requirements of paragraph (b) of this section may be given a score of 0 to 31 points and shall not be graded above Substandard regardless of the total score for the product (this is a limiting rule).

§52.5487 Defects.

- (a) **General.** The factor of defects refers to the degree of freedom from particles of membrane, core or skin; from seeds or seed particles; and any other defects that affect the wholesomeness or detract from the appearance or utility of the product.
- (b) **“A” classification.** Canned lemon juice that is practically free of defects may be given a score of 27 to 30 points. **Practically free of defects** means that there may be present:
 - (1) Small seeds or portions thereof that are of such size that they could pass through round perforations not exceeding 1/8 inch in diameter, provided such seeds or portions thereof do not affect the appearance or drinking quality of the juice;
 - (2) not more than 13 percent, by volume, of fine centrifuged pulp calculated as outlined in §52.5490;
 - (3) no coagulated pulp;
 - (4) and that the juice does not contain peel, core, seeds, seed particles or other defects that detract from the appearance or utility of the product.
- (c) **“C” classification.** Canned lemon juice that is fairly free of defects may be given a score of 24 to 26 points. Canned lemon juice that is scored into this classification shall not be graded above U.S. Grade C regardless of the total score for the product (this is a limiting rule). **Fairly free of defects** means that there may be present:
 - (1) Small seeds or portions thereof that are of such size that they could pass through round perforations not exceeding 1/8 inch in diameter, provided such seeds or portions thereof do not affect the appearance or drinking quality of the juice;
 - (2) not more than 16 percent, by volume, of fine centrifuged pulp calculated as outlined in §52.5490;
 - (3) and that the juice does not contain coagulated pulp, peel, core, seeds, seed particles, or other defects that more than slightly detract from the appearance or utility of the product.
- (d) **“SStd” classification.** Canned lemon juice that fails to meet the requirements of paragraph (c) of this section may be given a score of 0 to 23 points and shall not be graded above Substandard regardless of the total score for the product (this is a limiting rule).

§52.5488 Flavor.

- (a) The flavor of the product is evaluated after preparing as follows:

Lemon juice	30 ml.
Sugar	26 gm.
Water	160 ml.

- (b) **“A” classification.** Canned lemon juice that has good flavor may be given a score of 27 to 30 points. **Good flavor** means that the product has the distinct flavor of properly prepared, freshly extracted canned lemon juice that is free of any trace of terpenic, oxidized, scorched, or caramelized flavors and is free of any other abnormal flavors. In addition, there is not less than 5.0 grams nor more than 7.0 grams of acid per 100 ml. of juice.
- (c) **“C” classification.** Canned lemon juice that has fairly good flavor may be given a score of 24 to 26 points. Canned lemon juice that is scored into this classification shall not be graded above U.S. Grade C regardless of the total score for the product (this is a limiting rule). **Fairly good flavor** means that the product has a normal flavor which may have a slightly caramelized or slightly oxidized flavor, but is free of off-flavors of any kind. In addition, there is not less than 4.5 grams nor more than 7.5 grams of acid per 100 ml. of juice.
- (d) **“Sstd” classification.** Canned lemon juice that fails to meet the requirements of the paragraph (c) of this section may be given the score of 0 to 23 points and shall not be graded above Substandard regardless of the total score of the product (this is a limiting rule).

Explanations and Methods of Analysis

§52.5489 Definition of terms.

- (a) **Acid.** **Acid** means the number of grams of total acidity, calculated as anhydrous citric acid, per 100 ml. of canned lemon juice. Total acidity is determined by titration with standard sodium hydroxide solution, using phenolphthalein indicator.
- (b) **Fine centrifuged pulp.** **Fine centrifuged pulp** means pulp, referred to in §52.5487 Defects, that settles on centrifuging by the method outlined in §52.5490.
- (c) **Light membranous materials.** **Light membranous materials** means pulp including juice sacs but exclusive of peel particles, that is recoverable as outlined in §52.5490. This material, in normal amounts, is not a defect for the purposes of these Standards. The amount of such pulp in the juice may be determined by the method outlined in this subpart.

§52.5490 Methods of analysis.

(a) Fine centrifuged pulp is calculated by:

- (1) Removing the light membranous material from the sample by pouring it through a No. 20 sieve, and
- (2) fill graduated centrifuge tubes of 50 ml. capacity with sieved lemon juice, and place in a suitable centrifuge. Adjust the speed as nearly as possible, according to diameter, as indicated in Table I and centrifuge as indicated in Table I for exactly 10 minutes. As used in this part, **diameter** means the overall distance between the bottoms of opposing centrifuge tubes in operating position. After centrifuging, the milliliter reading at the top of the layer of pulp in the tube is multiplied by two to give the percentage of pulp.

(b) Light membranous materials are recoverable by:

- (1) Pouring one liter of product through a U.S. Standard No. 20 circular sieve 8 inches in diameter with 20 meshes to the inch (0.0331 inch $\pm$ 5 percent square openings) with the aid of a gentle stream of tap water;
- (2) Rinse the retained pulp with a gentle stream of tap water only until all of the product is removed from the pulp;
- (3) Dry and gather the pulp into a ball by shaking the sieve back and forth;
- (4) As soon as the pulp has been gathered into a ball, place it into a suitable dry graduated cylinder or centrifuge tube and settle by tapping lightly in the palm of one's hand. If air pockets remain a thin spatula may be used to effect their removal;
- (5) The number of milliliters of pulp divided by ten is the percent by volume of **light membranous material**;
- (6) If the light membranous material so recovered exceeds 100 milliliters or will not dry and gather into a small ball, discard results and repeat the test using sample so reduced in size as to yield less than 100 milliliters of such material which will so dry and gather. Calculate the percent of light membranous materials as follows:

$$\text{Percent of light membranous materials by volume} = \frac{\text{ml. recovered} \times 100}{\text{ml. of sample}}$$

TABLE 1¹

Diameter (inches)	Revolutions per Minute
10	1,609
10-1/2	1,570
11	1,534
11-1/2	1,500
12	1,468
12-1/2	1,438
13	1,410
13-1/2	1,384
14	1,359
14-1/2	1,336
15	1,313
15-1/2	1,292
16	1,271
16-1/2	1,252
17	1,234
17-1/2	1,216
18	1,199
18-1/2	1,182
19	1,167
19-1/2	1,152
20	1,137

¹ This table, calculated from the formula $R.C.F. = 0.0001118 N^2 r$, provides a Relative Centrifugal Force of 364.6 times gravity.

Lot Inspection and Certification

§52.5491 Ascertaining the grade of a lot.

The grade of a lot of canned lemon juice covered by these standards is determined by the procedures set forth in the **Regulations Governing Inspection and Certification of Processed Fruit and Vegetables, Processed Products Thereof, and Certain other Processed Food Products** (§§ 52.1 to 52.87).

Score Sheet

§52.5492 Score sheet for canned lemon juice.

Size and kind of container			
Container mark or identification:			
Cans			
Cases			
Label			
Liquid measure (fluid ounces)			
Vacuum (inches)			
Acid (grams/100ml.: calculated as anhydrous citric acid)			
Factors		Score points	
Color	40	"A" 36-40 "C" 32-35 <u>1/</u> "SStd" 0-31 <u>1/</u>	
Defects	30	"A" 27-30 "C" 24-26 <u>1/</u> "SStd" 0-23 <u>1/</u>	
Flavor	<u>30</u>	"A" 27-30 "C" 24-26 <u>1/</u> "SStd" 0-23 <u>1/</u>	
Total score	100		
U.S. Grade			

1/ Indicated limiting rule.