



**United States
Department of
Agriculture**

**Agricultural
Marketing
Service**

**Fruit and
Vegetable
Division**

**Processed
Products
Branch**

United States Standards for Grades of Canned Spinach

Effective date May 8, 1971

This is the fourth issue, as amended, of the United States Standards for Grades of Canned Spinach.

These standards were published in the Federal Register of April 11, 1950 (15 F.R. 2034). They were subsequently amended to include the style of **Cutleaf** or **Sliced** in addition to **Whole Leaf**. The method for ascertaining drained weights was modified and the drained weight values lowered. The amendments were published in the Federal Register of March 23, 1967 (32 F.R. 4397). A supplemental amendment was published in the Federal Register of April 14, 1967 (32 F.R. 5979) which added the style of **chopped** to the standards. These standards were revised to incorporate allowances based on a statistical attributes principle as published in the Federal Register of february 26, 1970 (35 F.R. 3745).

The amendment contained in this issue, revising the format of Tables III and IV, became effective May 8, 1971 (36 F.R. 8557).

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 Department after careful consideration of all data and views submitted, and the Department 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
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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.

§52.1901 Product description.

Canned Spinach as defined in the definitions and standards of identity for canned vegetables (21 CFR 51.990) issued pursuant to the Federal Food, Drug, and Cosmetic Act, means the product properly prepared from the succulent leaves of the spinach plant and is packed with the addition of water in hermetically sealed containers and sufficiently processed by heat to prevent spoilage. Citric acid or a vinegar may be added in a quantity not more than sufficient to permit effective processing by heat without discoloration or other impairment of the product. One or more of the optional seasoning ingredients specified in the aforesaid standards of identity may be added.

§52.1902 Styles of canned spinach.

- (a) **Whole leaf** spinach consists substantially of the leaf and adjoining portion of the stem.
- (b) **Cut leaf or Sliced** spinach consists of the leaf and adjoining portion of stem that has been cut predominantly into large pieces approximating three-fourths inch or more in the longest dimension or cut predominantly into approximate strips.
- (c) **Chopped** spinach consists of the leaf and adjoining portion of stem that has been cut predominantly into small pieces less than approximately three-fourths inch in the longest dimension.

§52.1903 Grades of canned spinach.

- (a) **U.S. Grade A or U.S. Fancy** is the quality of canned spinach that has a good flavor and odor and is attractive in appearance and eating quality within the limitations set forth in this subpart as to:
 - (1) **Color,**
 - (2) **Character,**
 - (3) **Stem material,**
 - (4) **Damage, and**
 - (5) **Harmless extraneous material.**
- (b) **U.S. Grade B or U.S. Extra Standard** is the quality of canned spinach that has a good flavor and odor and is reasonably attractive in appearance and eating quality within the limitations set forth in this subpart as to:

- (1) **Color,**
- (2) **Character,**
- (3) **Stem material,**
- (4) **Damage, and**
- (5) **Harmless extraneous material.**

(c) **Substandard** is the quality of canned spinach that fails to meet the requirements for U.S. Grade B.

§52.1904 **Definitions of terms and symbols.**

(a) **Terms.**

Defect. Any specifically defined variation from a particular requirement.

Deviant. A sample unit that exceeds an upper limit (such as for stem material or various defect classifications) or fails to meet a lower limit (such as drained weights).

Sample. Any number of sample units to be used for inspection of a lot.

Sample unit. The entire contents of a container, a portion of the contents of a container, or a combination of the contents of two or more containers as specified to be used for inspection.

Sample average value. The numerical value calculated by dividing the total number of applicable defects in a sample by the total number of sample units in that sample.

(b) **Symbols.**

\bar{X}_d . Minimum sample average drained weight.

LL. Lower limit for individual drained weights.

UL. Upper limit is the value which represents the maximum amount of stem material or the maximum number of defects a sample unit may have for a grade classification.

§52.1905 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 for the purpose of these grades. The recommended fill of container for canned spinach is the maximum amount of spinach that can be sealed in a container and processed by heat without impairment of quality. It is recommended that the product and packing medium occupy not less than 90 percent of the water capacity of the container.

§52.1906 Recommended drained weights.

(a) **General.** The recommended drained weight values in Table I of the subpart are not incorporated in the grades of the finished product, since drained weight, as such, is not a factor of quality for the purpose of these grades.

(b) **Method for ascertaining drained weight.**

(1) The drained weight of canned spinach is determined when the product is at approximately room temperature (68° F.). The contents of the container is emptied upon a dry, previously weighed, U.S. Standard No. 8 circular sieve of proper diameter containing 8 meshes to the inch (0.0937 inch, ± 3 percent, square openings). With the sieve flat on the tray, the container of spinach is placed open end down in the sieve in an upright position. The container is lifted off the spinach without spreading the spinach out on the sieve. The spinach is allowed to drain for exactly 2 minutes. The weight of the spinach and sieve minus the weight of the dry sieve is the drained weight of the spinach.

(2) A sieve 8 inches in diameter is used for the equivalent of a No. 3 size can (404 x 700) and smaller and a sieve 12 inches in diameter is used for containers larger than the equivalent of a No. 3 size can.

Table I - Recommended Minimum Drained Weights for Canned Spinach

Container designation (metal, unless otherwise stated)	Container size overall dimensions		Capacity - weight H ₂ O at 68° F. (avoirdupois ounces)	Minimum drained weight (avoirdupois ounces)	
	Diameter (inches)	Height (inches)		LL	X
8Z tall	2 11/16	3 4/16	8.65	4.8	5.2
No. 1 picnic	2 11/16	4	10.90	6.3	6.8
No. 300	3	4 7/16	15.20	8.6	9.1
No. 1 tall	3 1/16	4 11/16	16.60	9.4	10.0
No. 303	3 3/16	4 6/16	16.85	9.6	10.2
No. 303 glass .....	.....	.....	17.70	9.4	10.0
No. 2	3 7/16	4 9/16	20.50	11.9	12.6
No. 2 1/2	4 1/16	4 11/16	29.75	17.6	18.6
No. 2 1/2 glass .....	.....	.....	29.50	15.8	16.6
No. 10	6 3/16	7	109.45	54.7	58.4

§52.1907 Factors of quality.

The grade of a lot of canned spinach is based on requirements for product characteristics with respect to the following quality factors:

- (a) **Flavor and odor.**
- (b) **Color.**
- (c) **Character.**
- (d) **Stem material.**
- (e) **Damage.**
- (f) **Harmless extraneous material.**

§52.1908 Sample unit size.

- (a) Compliance with the factors of flavor and odor, color, and character may be determined on:
 - (1) The contents of an entire container, or
 - (2) A representative subsample from containers yielding more than 10 ounces of drained weight.
- (b) Compliance with requirements for harmless extraneous material other than plant material is determined on the contents of an entire container.
- (c) Compliance with requirements for the factors of stem material, damage, and extraneous plant material shall be determined on subsamples as specified in Table II of this subpart.

Table II - Sample Unit Size-Drained Spinach

Style	Containers smaller than No. 2 1/2	No. 2 1/2 Containers	No. 10 Containers
Whole leaf; cut leaf	10 ounces	15 ounces	30 ounces
Chopped	2 ounces	3 ounces	6 ounces

§52.1909 Classification of defects.

- (a) **General.** Scoreable defects in the factors of color, character, extraneous plant material, other extraneous material, and damaged spinach are outlined in Tables III, IV, and V.
- (b) **Extraneous plant material.** Extraneous plant material includes root crowns, root stubs, and seed heads of the spinach plant and harmless grass and weeds of various kinds and texture.
- (c) **Other extraneous material.** Other harmless extraneous material includes grit, sand, silt, or other earthy material.
- (d) **Damage.** Damage includes discoloration or other similar injury on a leaf or stem or portion thereof which damage affects, materially affects, or seriously affects the appearance or eating quality of the portion of spinach and/or entire product.
- (e) **Degrees of defect classes.** Defects are classified as to minor, major, or severe. Each **X** mark in Tables III, IV, and V represents **one (1) defect**.

Table III - Whole Leaf; Cut Leaf; Chopped Styles

Quality Factors	Defects	Minor	Major	Severe
Color	Color appearance is: Adversely affected to a degree that is noticeable Adversely affected to a degree that is objectionable		X	X
Character	Appearance or eating quality, due to a mushy texture, disintegration, ragged cutting, or shredded leaves and shredded stems, or portions thereof, as applicable for the style, is Adversely, but not seriously, affected Seriously affected		X	X
Extraneous Plant Material	<u>Root crown:</u> Any significant portion of the solid area of the plant between the root and attached leaves <u>Root stub:</u> Any portion of the root whether or not leaves are attached <u>Seed head - Whole Leaf; Cut Leaf Styles:</u> Longer than one (1) inch or objectionable regardless of length <u>Seed head - Chopped Style:</u> Pieces affecting appearance or eating quality -- More than slightly but not materially Materially Seriously		X X	X X
Other Extraneous Material	<u>Grit, sand, silt, or other earthy material:</u> A trace that no more than slightly affects appearance or eating quality Presence materially affects appearance or eating quality			X

Table IV

Quality factors	Defects	Minor	Major	Severe
Extraneous plant material.	<p>Whole Leaf; Cut Leaf Styles Grass and Weeds (Aggregate Measurement)</p> <p>(1) Green, fine, tender, string like blades, and stems: 3 inches or less X More than 3 inches but not more than 8 inches X More than 8 inches X</p> <p>(2) Green and coarse: 1/2 inch or less X More than 1/2 inch but not more than 2 inches X More than 2 inches X</p> <p>(3) Other than green - of any texture or kind: 1/2 inch or less X More than 1/2 inch X</p>			
	<p>Chopped Style Grass and Weeds (Aggregate Measurement)</p> <p>(1) Green, fine, tender, stringlike blades, and stems: 3/4 inch or less X More than 3/4 inch but not more than 2 inches X More than 2 inches X</p> <p>(2) Green and coarse: 3/4 inch or less X More than 3/4 inch X</p> <p>(3) Other than green - of any texture or kind: Any amount X</p>			

Table V

Quality factors	Defects	Minor	Major	Severe
Damage	<p>Whole Leaf; Cut Leaf Styles Discoloration or other injury (affecting the appearance or eating quality)</p> <p>Less than 1 square inch that more than slightly but not materially affects. . . X</p> <p>Less than 1 square inch that materially affects X</p> <p>1 square inch or more but less than 4 square inches that affects to any degree. X</p> <p>More than 4 square inches that affects to any degree. X</p>			
	<p>Chopped Style Discoloration or other injury (affecting the appearance or eating quality)</p> <p>Any area that materially affects X</p>			

§52.1910 Tolerances for stem material.

Stem material is that portion of the spinach plant below the point of attachment to the leaf. Allowances for stem material for the respective grade are shown in Table VI, based on the method for ascertaining the amount of stem material outlined in this subpart (See §52.1912).

Table VI
Tolerances for Stem Material (All styles)

Grade classification	Upper Limit (UL) for the sample unit
U.S. Grade A	25 percent by weight.
U.S. Grade B	30 percent by weight.

§52.1911 Tolerances for color, character, damage, harmless extraneous material.

Table VII(a) - Whole Leaf; Cut Leaf Styles

For container sizes: less than No. 2 1/2; sample unit size - 10 ozs.		Number of defects permitted in a sample unit		
Grade classification	Defect classification	Upper limit (UL)	Maximum allowed for deviants	Sample average value
U.S. Grade A	Severe	1	2	0.25
	Major	4	6	1.50
	Total ²	8	11	4.0
U.S. Grade B	Severe	2	3	0.50
	Major	8	11	4.0
	Total ²	18	23	12.0

²**Total** - the sum of severe, major, and minor defects.

Table VII(b) - Whole Leaf; Cut Leaf Styles

For container sizes: No. 2 1/2; sample unit size - 15 ozs.		Number of defects permitted in a sample unit		
Grade classification	Defect classification	Upper limit (UL)	Maximum allowed for deviants	Sample average value
U.S. Grade A	Severe	1	3	0.375
	Major	5	8	2.25
	Total ²	10	14	6.0
U.S. Grade B	Severe	2	4	0.75
	Major	10	14	6.0
	Total ²	26	32	18.0

²**Total** - the sum of severe, major, and minor defects.

Table VII(c) - Whole Leaf; Cut Leaf Styles

For container size: No. 10; sample unit size - 30 ozs.		Number of defects permitted in a sample unit		
Grade classification	Defect classification	Upper limit (UL)	Maximum allowed for deviants	Sample average value
U.S. Grade A	Severe	2	4	0.75
	Major	8	12	4.5
	Total ²	18	23	12.0
U.S. Grade B	Severe	4	6	1.5
	Major	18	23	12.0
	Total ²	47	55	36.0

²**Total** - the sum of severe, major, and minor defects.

Table VIII(a) - Chopped Style

For container sizes: Less than No. 2 1/2; sample unit size - 2 ozs.		Number of defects permitted in a sample unit		
Grade classification	Defect classification	Upper limit (UL)	Maximum allowed for deviants	Sample average value
U.S. Grade A	Severe	1	2	0.25
	Major	4	6	1.50
	Minor (grass and weeds)	4	7	2.0
	Total ³	22	27	15.0
U.S. Grade B	Severe	2	3	0.50
	Major	8	11	4.0
	Minor (grass and weeds)	10	14	6.0
	Total ³	51	59	40.0

³**Total** - the sum of severe, major, and minor defects including minor grass and weeds.

Table VIII(b) - Chopped Style

For container size: No. 2 1/2; sample unit size - 3 ozs.		Number of defects permitted in a sample unit		
Grade classification	Defect classification	Upper limit (UL)	Maximum allowed for deviants	Sample average value
U.S. Grade A	Severe	1	3	0.375
	Major	5	8	2.25
	Minor (grass and weeds)	6	9	3.0
	Total ³	31	38	22.5
U.S. Grade B	Severe	2	4	0.75
	Major	10	14	6.0
	Minor (grass and weeds)	14	19	9.0
	Total ³	74	85	60.0

³**Total** - the sum of severe, major, and minor defects including minor grass and weeds.

Table VIII(c)-Chopped Style

For container size: No. 10; sample unit size - 6 ozs.		Number of defects permitted in a sample unit		
Grade classification	Defect classification	Upper limit (UL)	Maximum allowed for deviants	Sample average value
U.S. Grade A	Severe	2	4	0.75
	Major	8	12	4.5
	Minor (grass and weeds)	10	14	6.0
	Total ³	57	66	45.0
U.S. Grade B	Severe	4	6	1.50
	Major	18	23	12.0
	Minor (grass and weeds)	26	32	18.0
	Total ³	140	153	120.0

³**Total** - the sum of severe, major, and minor defects including minor grass and weeds.

§52.1912 Method for ascertaining percentage of stem material.

(a) Method for separation.

(1) Whole leaf; cut leaf styles.

- (i)** Have available two dry, previously weighed U.S. standard No. 8 circular sieves containing 8-meshes to the inch (0.0937, ±3 percent, square openings), not to exceed 8 inches in diameter.
- (ii)** Place the sample unit of spinach in water in a deep grading tray. With gently agitation, separate the leaves. Remove the individual leaves from the water and cut the attached stem off just below the last point of attachment of leaf material.
- (iii)** Place the stem material on one sieve and the leaf material on another sieve. Remove all detached stems and pieces of stem and detached leaves and pieces of leaves from the water and place on their respective screen.

(2) Chopped style. Place the sample unit, approximately one ounce at a time, in water in a deep grading tray. Remove the loose stem material and place on a dry sieve as mentioned under (a) (1) of this section. Pour the remaining leaf material on another sieve. Repeat until the stem material has been removed from the entire sample unit.

(b) Drained weight of separated material.

- (1)** Allow the leaf material and stem material to drain for 2 minutes from the time the separation has been completed.
- (2)** Weigh separately:
 - (i)** The screen and leaf material, and
 - (ii)** The screen and stem material. The weight of the screen and leaf material minus the weight of the screen is the weight of the leaf material. The weight of the screen and stem material minus the weight of the screen is the weight of stem material.

(c) Calculations. The percent of stem material is the weight of drained stem material divided by the sum of the weights of drained stem material and drained leaf material.

$$\frac{\text{Weight of stem material}}{\text{Weight of stem material} + \text{weight of leaf material}} = \frac{\text{Percent of stem material}}{\text{material}}$$

§52.1913 Lot acceptance for drained weights.

A lot of canned spinach is considered as meeting the minimum drained weights when the following criteria are met:

- (a)** The average of the drained weights from all the containers in the sample meets the average drained weight in Table I of this subpart (designated as X_d); and
- (b)** The number of deviants for drained weight do not exceed the applicable acceptance number specified in the single sampling plan in the Regulations Governing Inspection of Processed Fruits, Vegetables, and Related Products (§52.1 to §52.83).

§52.1914 Lot acceptance for quality.

A lot of canned spinach shall be considered as meeting the quality requirements for the applicable grade when the following criteria are met:

- (a) **Flavor and odor.** All sample units meet the requirements for flavor and odor.
- (b) **Stem material.**
 - (1) The number of sample units which exceed the upper limits (UL) for stem material as applicable for the grade (deviants), specified in Table VI, does not exceed the acceptance number specified for the sample size in the Single Sampling Plan of the Regulations Governing Inspection of Processed Fruits, Vegetables, and Related Products (§52.1 to §52.83).
 - (2) Deviants for stem material are permitted in addition to the deviant allowed for other quality factors.
- (c) **Color, character, damage, harmless extraneous material.**
 - (1) The number of sample units which exceed the upper limit (UL) for these defects for the applicable grade (deviants), specified in Tables VII(a), VII(b), VII(c), VIII(a), VIII(b), and VIII(c), does not exceed the acceptance number specified for the sample size in the Single Sampling Plan of the regulations Governing Inspection of Processed Fruits, Vegetables, and Related Products (§52.1 to §52.83); and
 - (2) The sample average values for the various defect classifications specified in Tables VII(a), VII(b), VII(c), VIII(a), VIII(b), and VIII(c) are not exceeded; and
 - (3) No sample unit exceeds the maximum number of defects allowed for deviants as specified in Tables VII(a), VII(b), VII(c), VIII(a), VIII(b), and VIII(c).

§52.1915

Tally sheet for canned spinach.

No., size, kind of container											
Label statements											
Container mark or identification											
Cans											
Glass											
Cases											
Net weight (ounces)											
Vacuum (inches)											
Drained weight (ounces)								Average			
Style											
Quality factors			Defects								
			Sample unit			Sample unit			Sample Average Value		
Minor	Major	Severe	Minor	Major	Severe						
Color											
Character											
Damage											
Harmless extraneous material ...									Minor	Major	Severe
Total (each class)											
Total Minor											
Total Major											
Total Severe											
Stem material A-UL=25%		 %		 %					
B-UL=30% ...											
Flavor and odor:											
Good											
Objectionable											

The U.S. Standards for Grades of Canned Spinach (which is the fourth issue) contained in this subpart shall become effective 30 days after publication hereof in the Federal Register.

Dated: February 17, 1970.

G.R. Grange,
Deputy Administrator,
Marketing Services.

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