



**United States
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Agriculture**

**Agricultural
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Service**

**Fruit and
Vegetable
Division**

**Processed
Products
Branch**

United States Standards for Grades of Frozen Broccoli

Effective date January 22, 1980

This is the sixth issue, as amended, of the United States Standards for Grades of Frozen Broccoli, published in the **FEDERAL REGISTER** of January 22, 1980, to become effective February 22, 1980. This issue supersedes the fifth issue, which has been in effect since July 1, 1975.

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:

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United States Standards for Grades of Frozen Broccoli

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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.

§52.631 Product description.

Frozen broccoli is the product prepared from the fresh, clean, sound stalks or shoots of the broccoli plant (*Brassica oleracea* (Italica group)) by trimming, washing, blanching, sorting, and properly draining. The product is frozen in accordance with good commercial practice and maintained at temperatures necessary for its preservation.

§52.632 Styles of frozen broccoli.

- (a) **Spears or stalks** mean the head and adjoining portions of the stem, with or without attached leaves, which may range in length from 9 cm (3.5 in) to 15 cm (5.9 in). The spears or stalks may be cut longitudinally.
- (b) **Short spears or florets** mean the head and adjoining portions of the stem, with or without attached leaves, which may range in length from 2.5 cm. (1 in) to 9 cm (3.5 in). Each short spear or floret must weigh more than 6 g (0.2 oz). The short spears or florets may be cut longitudinally.
- (c) **Cut** means spears or short spears cut into portions which may range in length from 2 cm (0.8 in) to 5 cm (2 in). Head material should be at least 62.5 g (2.2 oz) per 250 g (8.8 oz) and leaf material should not be more than 62.5 g (2.2 oz) per 250 g (8.8 oz).
- (d) **Chopped** means spears or short spears cut into portions which are less than 2 cm (0.8 in) in length. Head material should be at least 12.5 g (0.4 oz) per 50 g (1.8 oz) and leaf material should not be more than 12.5 g (0.4 oz) per 50 g (1.8 oz).
- (e) **Pieces or random cut pieces** mean cut or chopped portions of spears or short spears or other units which do not meet the requirements for **cut** or **chopped** styles.

§52.633 Classification of style defectives.

For the purposes of determining compliance with style requirements, each nonconforming unit is considered as either a minor or major defective. Each **X** in Table I represents **one (1) defective**.

**Table I
Classification of Style Defectives**

Style	Defectives		Minor	Major
	Longer than:	Shorter than:		
Spears or Stalks (each spear)	15.5 cm (6.1 in)	8.5 cm (3.3 in)	X	
Short Spears or Florets (each spear)	9.5 cm (3.7 in)	2.0 cm (0.8 in)	X	
Cut (each 5 g) 1/	5.0 cm (2.0 in)		X
	1.5 cm (0.6 in)	X	
Chopped (each 2.5 g) 1/	2.0 cm (0.8 in)	X	

1/ Leaf material is not considered in the classification of style defectives.

§52.634 Tolerances for style defectives.

Defective units for style shall not exceed the Acceptable Quality Levels (AQL) in Table II, Table III or Table IV, as applicable for the style. An insignificant weight increment of style defectives, limited to the first weight increment, shall not be considered.

**Table II
Spears (or Stalks) and Short Spears (or Florets)**

AQL 1/	Minor
	10.0

1/ AQL expressed as percent defective.

**Table III
Cut**

	Minor	Major
AQL 2/	10.0	6.5

2/ AQL expressed as percent defective (50-5 g increments in 250 g).

**Table IV
Chopped**

	Minor
AQL 3/	8.5

3/ AQL expressed as percent defective (100-2.5 g increments in 250 g).

§52.635 Definitions of terms.

(a) Terms applicable to all styles of frozen broccoli:

- (1) **Acceptable quality level (AQL).** The maximum percent of defective units, or the maximum number of defects per hundred units of product, that, for the purpose of acceptance sampling can be considered satisfactory as a process average.
- (2) **Blemished.** A unit of broccoli that is blemished by pathological injury, hollow stems, pithy stems, insect injury, discolored, or by other means such as, but not limited to, small orange or yellowish-orange buds and olive-green petiole, to the extent that the appearance or eating quality is affected:
 - (i) Slightly;
 - (ii) Materially; or
 - (iii) Seriously.
- (3) **Defect (or defective).** Any nonconformance of a unit(s) of product from a specified requirement of a single characteristic.
- (4) **Development.**

- (i) **Reasonably well developed.** The individual buds are not more than moderately enlarged and practically none of the individual buds are in the flowering stage.
 - (ii) **Poorly developed.** The individual buds are in the flowering stage or are more than moderately enlarged with or without reaching the flowering stage.
- (5) **Extraneous vegetable material (EVM).**
 - (i) **Edible.** Tender, green blades of grass or weeds or leaves which are harmless.
 - (ii) **Inedible.** Coarse blades of grass or weeds or leaves which may or may not be tender or green and which are harmless.
- (6) **Fiber.** Tough or woody fiber that has developed near the outside portion of the broccoli stem.
- (7) **Flavor and odor.**
 - (i) **Good flavor and odor.** The product has a good characteristic flavor and odor but is free from objectionable flavors or objectionable odors of any kind.
 - (ii) **Fairly good flavor and odor.** The product may be lacking in good flavor and odor but is free from objectionable flavors or objectionable odors of any kind.
- (8) **Sample unit.** The amount of product specified to be used for inspection. It may be:
 - (i) The entire contents of a container; or
 - (ii) A portion of the contents of a container; or
 - (iii) A combination of the entire contents of two or more containers; or
 - (iv) A portion of unpacked product.
- (9) **Unit.** Any individual portion of broccoli other than loose leaves or individual buds.

(b) Terms applicable to spears and short spears only;

- (1) Broken.** Detached portions, other than loose leaves or portions thereof, which weigh more than 6 g (0.2 oz) and are definitely not intact units.
- (2) Color** (individual unit).
 - (i) Good color.** The outside of the stalk is a bright, distinct green. The top of the head is a bright, distinct green and may show a slight purplish cast. The color may also include lighter colored areas on the outside of the head which is typical of young and tender broccoli.
 - (ii) Reasonably good color.** The outside of the stalk may be dull and may possess a slight brownish, yellowish, or grayish cast. The head may be dull and possess a slight brownish, grayish, or yellowish cast and yellow buds due to flowering that do not seriously affect the overall brightness.
 - (iii) Poor color.** The presence of yellow buds due to flowering, or any brownish, grayish, or yellowish casts that seriously affect the overall brightness.
- (3) Damage.** The head of the spear is damaged by mechanical injury, other than **broken**, to the extent that the appearance or eating quality is materially affected.
- (4) Detached fragments.** Any small piece or detached portion other than loose leaves or portions thereof, which weighs 6 g (0.2 oz) or less.
- (5) Development.**
 - (i) Well developed.**
 - (A)** The spreading of the branching bud clusters which comprise the head of the unit does not materially affect the appearance of the unit; and
 - (B)** The broccoli is in the early stage of maturity such that the individual buds and immediate stems supporting the individual buds form a compact bud cluster.

(ii) Reasonably well developed.

- (A)** The spreading of the branching bud clusters which comprise the head of the unit does not seriously affect the appearance of the unit; and
- (B)** The broccoli is in the intermediate stage of maturity such that the individual buds and the immediate stems supporting the individual buds form a reasonably compact bud cluster.

(iii) Poorly developed.

- (A)** The branching bud clusters which comprise the head of the unit may be spread to the extent that the appearance of the unit is seriously affected; and
- (B)** The broccoli is in the advanced stage of maturity such that the individual buds and the immediate stems supporting the individual buds form a loosely structured bud cluster.

(6) Diameter of a spear. The greatest dimension at the right angle to the longitudinal axis 2.5 cm (1 in) from the base end.

(7) Loose leaves or pieces of leaves. Broccoli leaves or pieces of leaves not attached to a unit.

(8) Trim.

- (i) Well trimmed.** The appearance of the unit is not materially affected by the presence of attached leaves or pieces of leaves and not more than slightly affected by ragged or partial removal of leaves or small side shoots, or by cutting of the stem.
- (ii) Reasonably well trimmed.** The appearance of the unit is not seriously affected by the presence of attached leaves or pieces of leaves and not materially affected by ragged or partial removal of leaves or small side shoots, or by cutting of the stem.

- (iii) **Poorly trimmed.** The appearance of the unit is seriously affected by the presence of attached leaves or pieces of leaves, ragged or partial removal of leaves or small side shoots, or by cutting of the stem.

(c) Terms applicable to cut and chopped broccoli only:

(1) Head material. The buds or bud clusters whether or not attached to a portion of a spear and includes the fine stem material by which the buds or bud clusters are attached to the main stem.

(2) Leaf material. Any portion of a leaf not attached to a portion of a spear.

§52.636 Recommended sample unit sizes.

(a) For head material and leaf material.

(1) Cut style - 250 g (8.8 oz).

(2) Chopped style - 50 g (1.8 oz).

(b) For style and quality factors.

(1) Spears and short spears - 50 units.

(2) Cut, chopped, and pieces - 250 g (8.8 oz).

(c) Associated material.

(1) Broken, crushed, or similarly damaged portions of units of product in the styles of spears and short spears are to be reassembled and included in the count as whole units.

(2) Head and leaf material in the styles of cut and chopped, loose leaves or pieces in the styles of spears and short spears, and extraneous vegetable material in all product styles are part of the standard sample unit size. They are not included in the count of spears and short spears but are included in the weight of cut, pieces, and chopped broccoli. Such pieces and extraneous vegetable material are considered part of the sample unit.

(i) When they are in a container whose entire contents are included in the sample unit;

- (ii) When they are in the last of several containers included in the sample units and 50 percent or more of the contents are required for the sample unit. None of the pieces and EVM in the last of several containers is considered part of the sample unit when less than 50 percent of its contents are required for the sample unit; and
- (iii) When they are commingled with the product required for the sample unit and such product is taken from but is not the entire contents of a single container.

§52.637 Grades.

(a) U.S. Grade A is the quality of frozen broccoli that:

- (1) Meets the following prerequisites in which the broccoli:
 - (i) Has similar varietal characteristics;
 - (ii) Has a good flavor and odor;
 - (iii) Is practically free from grit and silt;
 - (iv) Has a good overall brightness; and
 - (v) In the styles of cut, chopped, and pieces, the individual buds are at least reasonably well developed.
- (2) Is within the limits for defects as classified in Table V and specified in Tables VI, VII, or VIII, as applicable for the style.

(b) U.S. Grade B is the quality of frozen broccoli that:

- (1) Meets the following prerequisites in which the broccoli:
 - (i) Has similar varietal characteristics;
 - (ii) Has at least a fairly good flavor and odor;
 - (iii) Has no more than a trace of grit and silt;
 - (iv) Has at least a reasonably good overall brightness which may be slightly dull; and

- (v) In the styles of cut, chopped, and pieces, the individual buds may be poorly developed if they do not materially affect the appearance of the product.
- (2) Is within the limits for defects as classified in Table V and specified in Tables VI, VII, or VIII, as applicable for the style.
- (c) **Substandard** is the quality of frozen broccoli that fails to meet the requirements of U.S. Grade B.

§52.638 Factors of quality.

The grade of frozen broccoli is based on compliance with requirements for the following quality factors:

- (a) **Prerequisite quality factors:**
 - (1) Similar varietal characteristics (all styles);
 - (2) Flavor and odor (all styles);
 - (3) Freedom from grit and silt (all styles);
 - (4) Overall brightness (all styles); and
 - (5) Development (cut, chopped, and pieces only).
- (b) **Classified quality factors:**
 - (1) Spears and short spears:
 - (i) Color (individual unit);
 - (ii) Uniformity of size;
 - (iii) Detached fragments;
 - (iv) Loose leaves or pieces of leaves;
 - (v) Broken;
 - (vi) Damage;
 - (vii) Blemish;

- (viii) Trim;
- (ix) Development;
- (x) Fiber; and
- (xi) Extraneous vegetable material.

(2) Cut, chopped, and pieces:

- (i) Blemish;
- (ii) Fiber; and
- (iii) Extraneous vegetable material.

§52.639 Classification of defects.

Defects are classified as **minor, major, severe, or critical**. Each **X** in Table V represents **one (1) defect**.

TABLE V
Classification of Defects

Quality Factor	Defect	Classification			
		Minor	Major	Severe	Critical
SPEARS:					
Color (Individual unit)	Reasonably good color in grade A only (each spear)		X		
	Poor color in grades A and B (each spear)			X	
Uniformity of Size	Length variation is greater than 2 cm (each spear)		X		
	Diameter variation is greater than 5 cm (each spear)	X			
Detached Fragments	Each 28 g increment		X		
Loose Leaves and Pieces of Leaves	Each 14 g increment	X			

TABLE V (continuation)
Classification of Defects

Quality Factor	Defect	Classification			
		Minor	Major	Severe	Critical
SPEARS:(continuation)					
Damaged Spear	Each Spear	X			
Blemished Spear	Slightly (each spear)	X			
	Materially (each spear)		X		
	Seriously (each spear)			X	
Trim	Reasonably well trimmed in grade A only (each spear) ...	X			
	Poorly trimmed: In grade A only (each spear)		X		
	In grade B only (each spear)	X			

TABLE V (continuation)
Classification of Defects

Quality Factor	Defect	Classification			
		Minor	Major	Severe	Critical
SPEARS:(continuation)					
Development	Reasonably well developed in grade A only (each spear) ...	X			
	Poorly developed in grades A and B (each spear)		X		
Fiber	Nonwoody (each spear)		X		
	Woody (each spear)			X	
Extraneous Vegetable Material	Edible (each piece)			X	
	Inedible (each piece)				X

TABLE V (continuation)
Classification of Defects

Quality Factor	Defect	Classification			
		Minor	Major	Severe	Critical
SHORT SPEARS:					
Color (Individual unit)	Reasonably good color in grade A only (each spear) . . .		X		
	Poor color in grades A and B (each spear)			X	
Uniformity of Size	Largest unit is more than 4 times heavier than the smallest unit (each spear)	X			
Detached Fragments	Each 28 g increment		X		
Loose Leaves and Pieces of Leaves	Each 14 g increment	X			
Broken Spear	Each spear	X			
Damaged Spear	Each spear	X			

TABLE V (continuation)
Classification of Defects

Quality Factor	Defect	Classification				
		Minor	Major	Severe	Critical	
SHORT SPEARS: (continuation)	Blemished Spear	Slightly (each spear)	X			
		Materially (each spear)		X		
		Seriously (each spear)			X	
	Trim	Reasonably well trimmed in grade A only (each spear) . . .	X			
		Poorly trimmed: In grade A Only (each spear)		X		
		In grade B only (each spear)	X			
	Development	Reasonably well developed in grade A only (each spear) . . .	X			
		Poorly developed in grades A and B (each spear)		X		

TABLE V (continuation)
Classification of Defects

Quality Factor	Defect	Classification			
		Minor	Major	Severe	Critical
SHORT SPEARS: (continuation)					
Fiber	Nonwoody (each spear)		X		
	Woody (each spear)			X	
Extraneous Vegetable Material	Edible (each piece)			X	
	Inedible (each piece)				X
CUTS AND PIECES:					
Blemished	Slightly (each 5 g increment)	X			
	Materially (each 5 g increment)		X		
	Seriously (each 5 g increment)			X	
Fiber	Nonwoody (each 5 g increment)		X		
	Woody (each 5 g increment)			X	

**TABLE V (continuation)
Classification of Defects**

Quality Factor	Defect	Classification			
		Minor	Major	Severe	Critical
CUTS AND PIECES:(cont.)					
Extraneous Vegetable Material	Edible (each 2.5 cm increment)			X	
	Inedible (each 2.5 cm increment)				X
CHOPPED:					
Blemished	Slightly (each 2.5 g increment)	X			
	Materially (each 2.5 g increment)		X		
	Seriously (each 2.5 g increment)			X	
Fiber	Nonwoody (each 2.5 g increment)		X		
	Woody (each 2.5 increment)			X	
Extraneous Vegetable Material	Edible (each 2.5 g increment)			X	
	Inedible (each 2.5 g increment)				X

§52.640 Tolerances for defects.

An insignificant weight increment of defects limited to the first weight increment shall not be considered.

**TABLE VI
Spears and Short Spears**

	Grade A				Grade B			
	Total 1/	Major	Severe	Critical	Total 1/	Major	Severe	Critical
AQL 2/	20.0	6.5	0.65	0.25	25.0	10.0	2.5	0.65

1/ Total = Minor + Major + Severe + Critical.

2/ AQL expressed as defects per 100 units.

**TABLE VII
Cuts and Pieces**

	Grade A				Grade B			
	Total 1/	Major	Severe	Critical	Total 1/	Major	Severe	Critical
AQL 3/	6.5	2.5	1.0	0.4	15.0	5.0	1.5	1.0

1/ Total = Minor + Major + Severe + Critical.

3/ AQL expressed as defects per 100 units (50-5 g increments in 250 g).

**TABLE VIII
Chopped**

	Grade A				Grade B			
	Total 1/	Major	Severe	Critical	Total 1/	Major	Severe	Critical
AQL 4/	6.5	2.5	1.0	0.25	15.0	5.0	1.5	0.65

1/ Total = Minor + Major + Severe + Critical.

4/ AQL expressed as Defects per 100 units (100-2.5 g increments in 250 g).

§52.641 Sample size.

The sample size to determine compliance with 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), for lot inspection and on-line inspection, as applicable.

§52.642 Determining proportions of head material and leaf material.

(a) **Method.** The proportions of head material and leaf material in cut and chopped broccoli may be determined as follows:

(1) **Equipment needed.**

- (i) 250 mL beaker;
- (ii) Gram scale, or other suitable balance;
- (iii) Laboratory tweezers, scalpel, or other suitable instrument for separating the stem material, leaf material, and head material; and
- (iv) Flat grading tray.

(2) **Procedure.**

- (i) Thoroughly mix the sample unit to be tested if it is not the entire contents of a container;
- (ii) Weigh 50 g (1.8 oz) in the case of chopped broccoli into a previously tared 250 mL beaker;
- (iii) Weigh 250 g (8.8 oz) in the case of cut broccoli into a previously tared container;
- (iv) Spread the weighed product out on a flat grading tray;
- (v) Separate the stem material from the head and leaf material; and
- (vi) Separate the leaf material from the head material. Weigh each separately and record the weight.

§52.643 Compliance with style requirements.

(a) Lot inspection.

- (1) Spears and short spears.** A lot of frozen broccoli spears or short spears is considered as meeting the requirements for style if the Acceptable Quality Levels (AQL) in Table II are not exceeded.
- (2) Cut and chopped.** A lot of cut or chopped frozen broccoli is considered as meeting the style requirements for cut or chopped if:
 - (i)** The requirements with respect to leaf material and head material in §52.632 are met;
 - (ii)** No individual sample unit of cut broccoli contains less than 37.5 g (1.3 oz) of head material or more than 87.5 g (3.1 oz) of leaf material;
 - (iii)** No individual sample unit of chopped broccoli contains less than 8.5 g (0.3 oz) of head material or more than 17.5 g (0.6 oz) of leaf material; and
 - (iv)** The Acceptable Quality Levels (AQL) specified in Table III or Table IV, as applicable, are not exceeded.

(b) On-line inspection.

- (1) Spears and short spears.** A portion of production of frozen broccoli spears or short spears is considered as meeting the requirements for style if the Acceptable Quality Levels (AQL) in Table II are not exceeded.
- (2) Cut and chopped.** A portion of production of frozen broccoli is considered as meeting the style requirements for cut or chopped if:
 - (i)** The requirements with respect to leaf material and head material in §52.632 are met;
 - (ii)** No individual sample unit of cut broccoli contains less than 37.5 g (1.3 oz) of head material or more than 87.5 g (3.1 oz) of leaf material;

(iii) No individual sample unit of chopped broccoli contains less than 8.5 g (0.3 oz) of head material or more than 17.5 g (0.6 oz) of leaf material; and

(iv) The Acceptable Quality Levels (AQL) specified in Table III or Table IV, as applicable, are not exceeded.

(c) **Single sample unit.**

(1) **Spears and short spears.** Each unofficial sample unit of spears or short spears submitted for quality evaluation will be treated individually and is considered as meeting the requirements for style if the Acceptable Quality Levels (AQL) in Table II are not exceeded.

(2) **Cut and chopped.** Each unofficial sample unit of frozen broccoli is considered as meeting the style requirements for cut or chopped if:

(i) The requirements with respect to leaf material and head material in §52.632 are met; and

(ii) The Acceptable Quality Levels (AQL) specified in Table III or Table IV, as applicable, are not exceeded.

§52.644 Compliance with quality requirements.

(a) **Lot inspection.** A lot of frozen broccoli is considered as meeting the requirements for quality if:

(1) The prerequisite requirements specified in §52.637 are met; and

(2) The Acceptable Quality Levels (AQL) in Tables VI, VII, or VIII, as applicable for the style, are not exceeded.

(b) **On-line inspection.** A portion of production is considered as meeting requirements for quality if:

(1) The prerequisite requirements specified in §52.637 are met; and

(2) The Acceptable Quality Levels (AQL) in Tables VI, VII, or VIII, as applicable for the style, are not exceeded.

(c) **Single sample unit.** Each unofficial sample unit submitted for quality evaluation will be treated individually and is considered as meeting the requirements for quality if:

- (1) The prerequisite requirements specified in §52.637 are met; and
- (2) The Acceptable Quality Levels (AQL) in Tables VI, VII, or VIII, as applicable for the style, are not exceeded.

Done at Washington, D.C., on: January 17, 1980.

/s/
Donald L. Houston
Administrator
Food Safety and Quality Service