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Marketing and
Regulatory
Programs

Frozen Broccoli

Agricultural
Marketing
Service

Inspection Instructions

Specialty
Crops
Program

May 2026

Specialty
Crops
Inspection
Division

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These instructions contain information and guidelines to help personnel of the U.S. Department of Agriculture's (USDA) Specialty Crops Inspection (SCI) Division uniformly apply and interpret U.S. grade standards, other similar specifications, and special procedures.

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Inspection instructions are issued by USDA after careful consideration of all data and views submitted. The Department welcomes suggestions for improving the inspection instructions in future revisions.

Comments may be submitted to:

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

These instructions replace the Grading Manual for Frozen Broccoli dated July 1980, and include, but not limited to, all previous correspondence, memos (A-490 Interpretive Guide for the Determination of Detached Fragments in Frozen Broccoli), inspection instructions, or procedures.

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PART I – GENERAL FROZEN BROCCOLI INFORMATION

GENERAL

The [U.S. Standards for Grades of Frozen Broccoli](#) is a statistically based individual attribute standard. Statistically based individual attribute standards do not assign grades to individual sample units. The grade is assigned at the end of the production period (or completion of lot grading). Statistically based individual attribute standards describe requirements for quality of products using Acceptable Quality Levels (AQLs) for lists of defects characteristic of the product. The defects described in the standards are accompanied by AQLs. Acceptance numbers at the AQLs given in the standards are found in sampling plan tables in the regulations 7 CFR [52.38b](#) and [52.38c](#) (or in the [Lot Single Sampling Plan \(Attributes\)](#)).

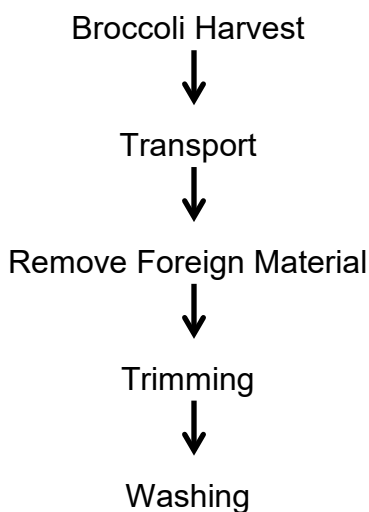
Any portion of these instructions beginning with §52 and followed with **bold** print is material copied directly from the U.S. Standards for Grades of Frozen Broccoli.

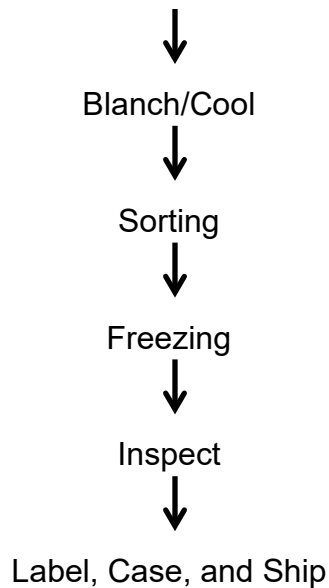
PRODUCT DESCRIPTION

§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.

PRODUCTION FLOW





SAMPLING

Uniformity in the preparation and performance of sampling procedures is a fundamental part of Division services. See the [Sampling Manual](#) for general sampling procedures.

ON-LINE INSPECTION

Statistical sampling procedures for on-line inspection by attributes of processed fruits and vegetables are found in [7 CFR 52.38b](#).

The [Cumulative Sum Sampling Plan](#), referred to as “CUSUM,” is used as the online sampling plan for attributes standards under the following conditions:

- The producer has designated the intended grade for the basic inspection period prior to the start of production.
- Inspection of the product is to be made during the basic inspection period at a point after which all product characteristics, subject to inspection, are fixed and will not be subject to change during final packaging.
- A shift to CUSUM sampling plans from lot sampling plans during a basic inspection period is not permitted (or vice versa).

Tables VI through X in [7 CFR 52.38b](#) contain the CUSUM sampling plans for each of five different standard sample unit sizes. The plans within each table are listed according to increasing values of Acceptable Quality Levels (AQLs).

LOT INSPECTION

Statistical sampling procedures for lot inspections of processed fruits and vegetables by attributes are found in [7 CFR 52.38c](#). The [Lot Single Sampling Plan \(Attributes\)](#) must be used for lot inspection under either of the following conditions:

- Sampling of the product during the production period. No grade will be assigned to individual sample units. One grade will be made at the end of the production period for the inspection lot.
- Sampling of the product when the inspection lot is located in a warehouse, truck, railroad car, or other similar conveyance.

The lot sampling rates required under [7 CFR 52.38c statistical sampling procedures for lot inspection of processed fruits and vegetables by attributes](#) differ slightly from those found in the [Sampling Manual](#) as the CFR does not allow 3-sample lots in lot inspections of attribute standards. However, if existing Division guidance permits the use of 3-sample lots in certain grading situations of these commodities, inspectors may continue to follow that guidance.

Table XII in [7 CFR 52.38c](#) shows the minimum amount of samples allowable for lot inspection of an attribute standard is 6 samples:

MINIMUM SAMPLING RATES FOR LOT INSPECTION OF FROZEN BROCCOLI

Container size group	Lot size (number of containers)			
Group 1: Any type of container 1 lb or less new weight	9,600 or less	9,601 – 31,200	31,201 – 67,200	67,201 – 116,000
Group 2: Any type of container over 1 lb but not over 2 ½ lb net weight	4,800 or less	4,801 – 15,600	15,601 – 33,600	33,601 – 58,000
Group 3: Any type of container over 2 ½ lbs.	Convert to equivalent number of 2 ½ lb containers and use group 2			
Lot inspection: Sample size (number of sample units)	6	13	21	29

INSPECTION OF SMALL CARTONS (8 OZ OR 10 OZ) OR LARGE UNITS (SPEARS) PACKED IN SMALL CARTONS

If lot inspection covers small cartons or large units packed in small cartons, it may be necessary to increase the number of cartons that are to be drawn from the lot. Without

the increase in sample size, inspectors would not have enough product to meet the minimum sample size, such as 36 broccoli spears. If the approximate number of broccoli units in each carton is unknown, open one carton at the sampling point to get this information.

INSPECTION AND GRADING

EQUIPMENT, INSPECTION AIDS, AND INSTRUCTIONS

- [U.S. Standards for Grades of Frozen Broccoli](#)
- [Inspection Aid No. 30 – Area Measurement Guide](#)
- [Photo Guide PG-1 Illustrating Defects – Blemishes, Development, and Trimming in Frozen Broccoli](#)
- AIM Inspection Series Manuals
 - [Foreign Material Manual](#)
 - [General Processed Procedures Manual](#)
 - [Sampling Manual](#)
 - [Technical Procedures Manual](#)
 - [Cumulative Sum Sampling Plan \(CUSUM\) Attributes Standards Only](#)
 - [Lot Single Sampling Plan \(Attributes\)](#)
- [FDA Food Defect Action Levels](#)
- Tally Sheet
 - [SC-364-164-1E Tally Sheet for: Frozen Broccoli Pieces](#) (intranet link)
 - [SC-364-164-2E Tally Sheet for: Frozen Broccoli Cut](#) (intranet link)
 - [SC-364-164-3E Tally Sheet for: Frozen Broccoli Chopped](#) (intranet link)
 - [SC-364-164-4 Tally Sheet for: Frozen Broccoli Short Spears or Florets](#) (intranet link)
 - [SC-364-164-5E Tally Sheet for: Frozen Broccoli Spears](#) (intranet link)
- Ruler

RECOMMENDED SAMPLE UNIT SIZE

§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.

NET WEIGHT

Processed foods are commonly packed to meet a prescribed net weight and are labeled accordingly. This net weight may be specified in a purchase specification or contract. In-depth instructions on performing net weights may be found in the *Determining Net Contents* section of the [General Processed Procedures Manual](#).

ENZYME INACTIVATION

See the [Technical Procedures Manual](#) section *Enzyme Inactivation* for testing frequency and instructions for both lot inspection and on-line inspection.

TEMPERATURE

As a prerequisite to assigning the grade, the [U.S. Standards for Grades of Frozen Broccoli](#) states: “frozen in accordance with good commercial practice and maintained at temperatures necessary for the preservation of the product.”

Interpretive guidance on this statement is found in the *Verification of Frozen Sample Units* section of the [Technical Procedures Manual](#).

STYLES

§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.

CLASSIFICATION OF STYLE DEFECTIVES

§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 grams) ¹	5.0 cm (2.0 in)	-----		X
	-----	1.5 cm (0.6 in)	X	
Chopped (each 2.5 grams) ¹	2.0 cm (0.8 in)	-----	X	

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

PART II – ON-LINE INSPECTION OF FROZEN BROCCOLI

SUGGESTED ORDER OF GRADING UNDER ON-LINE INSPECTION

SPEARS

1. Select 50 spears from the processing line at random (either before freezing or after freezing). Twenty-five spears may be used as an optional sample unit size. Unless the quality is borderline, 25 spears is adequate. This can also speed up the grading process when several other products are being graded at the same time. In either case, when sampling 25 or 50 spears, inspectors must keep the sample unit size consistent for each sample in the lot.
2. Reassemble any **broken spears**. Count each reassembled spear as a single unit. Ensure there are still a total of 50 spears. See [Appendix I – Interpretative Guide for the Determination of Detached Fragments](#).

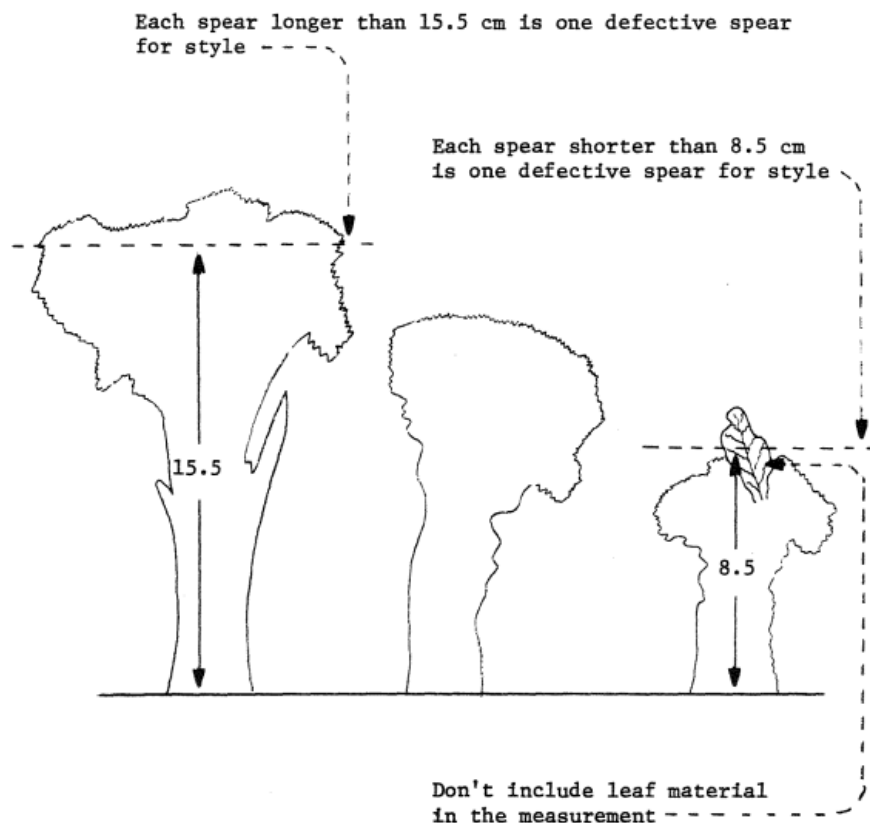
§52.635 Definitions of terms. (b) Terms applicable to spears and short spears only; (1) Broken. Detached portions, other than loose leaves or portions thereof, which weigh more than 6 g (0.2 oz) and are definitely not intact units.

3. Check for **style compliance**. Arrange all the spears in the sample unit in a continuous row with the base end of each spear against the bottom rim of the grading tray. If using 50 spears, butt each spear against a straight edge on top of the grading table. As the spears are being arranged in a row, place them in order of size from the longest to the shortest, or vice versa.
 - a. Disregard loose leaf material, pieces of leaves, EVM, and detached fragments. See [Appendix I – Interpretative Guide for the Determination of Detached Fragments](#);
 - b. Locate the point in the continuous row where the spears are longer than 15.5 cm, if any. Count the number of spears that are longer than 15.5 cm;
 - c. Locate the point in the continuous row where the spears are shorter than 8.5 cm, if any. Count the number of spears that are shorter than 8.5 cm; and
 - d. Record the number of defective spears found (in steps b. and c. above) in the “style” section of the defect tally sheet.

Note: Spears that fail requirements aren’t “pieces.” If a style failure occurs, certify the grade but show: “Fails style compliance for spears.”

Suggested Order of Grading Under On-Line Inspection

Example 1:



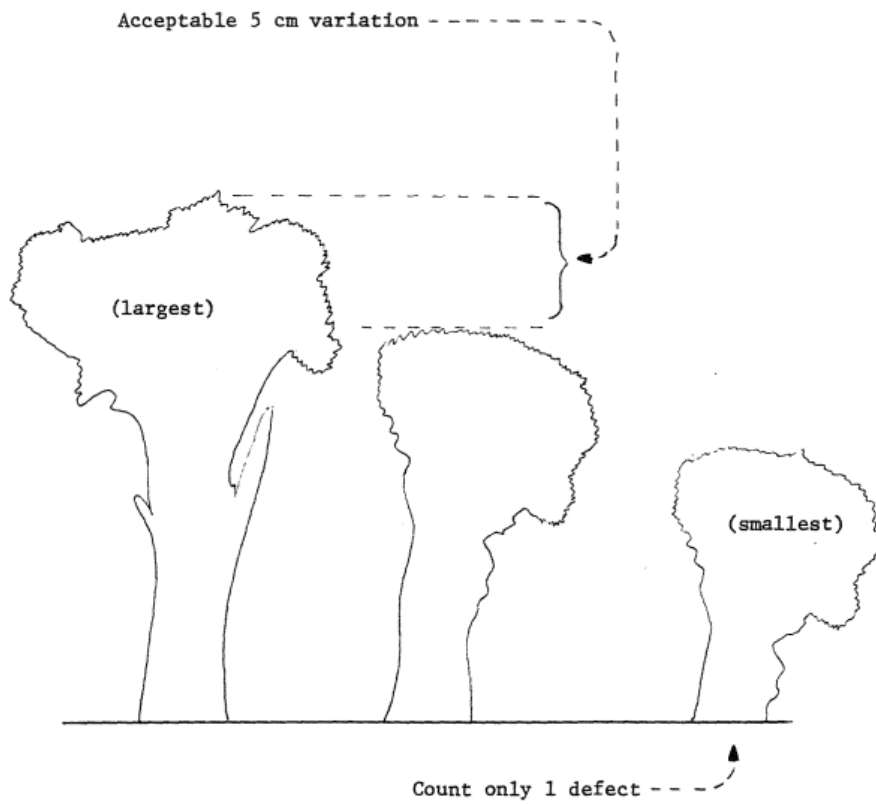
4. While the spears are arranged in a continuous row, check for **uniformity of size**. Uniformity of size is separate from the style defectives done in step 3, previously. Don't be overly critical. If it is apparent the spears are reasonably similar in length, accept them as meeting requirements.

If some spears are obviously shorter or longer than others, do the following:

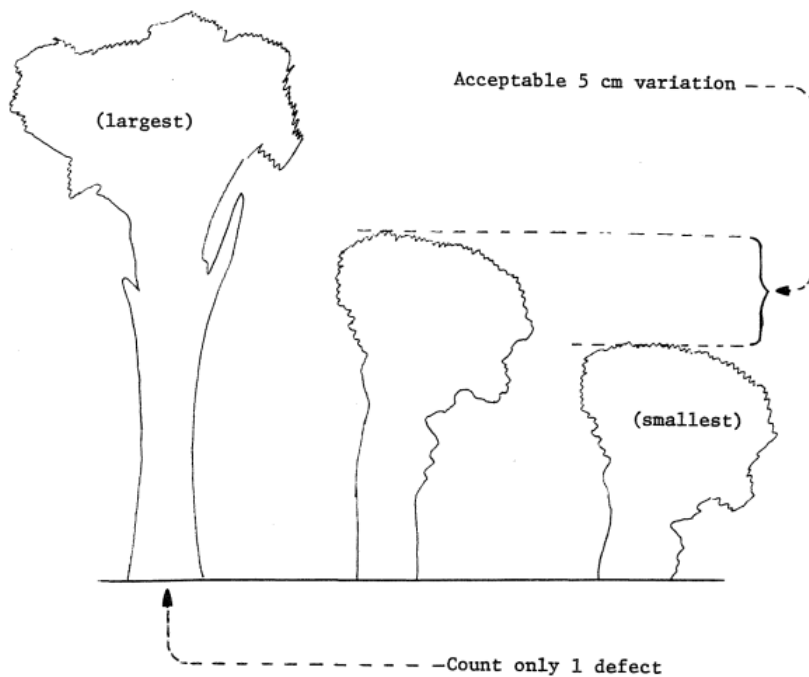
- Locate the point in the row where the spears vary more than 5 cm from the predominant length;
- Determine size variation so that only the least number of defects are tallied against size. This may be only the short spears, only the long spears, or both the long spears and the short spears; and
- Record the number of size defects on the tally sheet as major defects.

Suggested Order of Grading Under On-Line Inspection

Example 2:



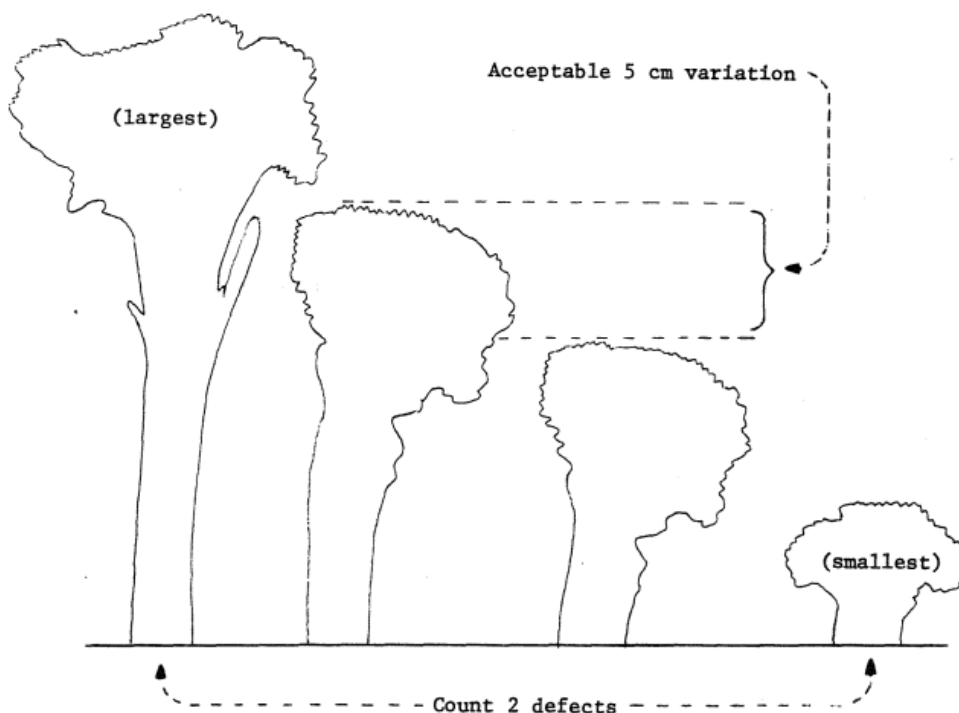
Example 3:



Inspection Instructions for Frozen Broccoli (May 2026)

Suggested Order of Grading Under On-Line Inspection

Example 4:



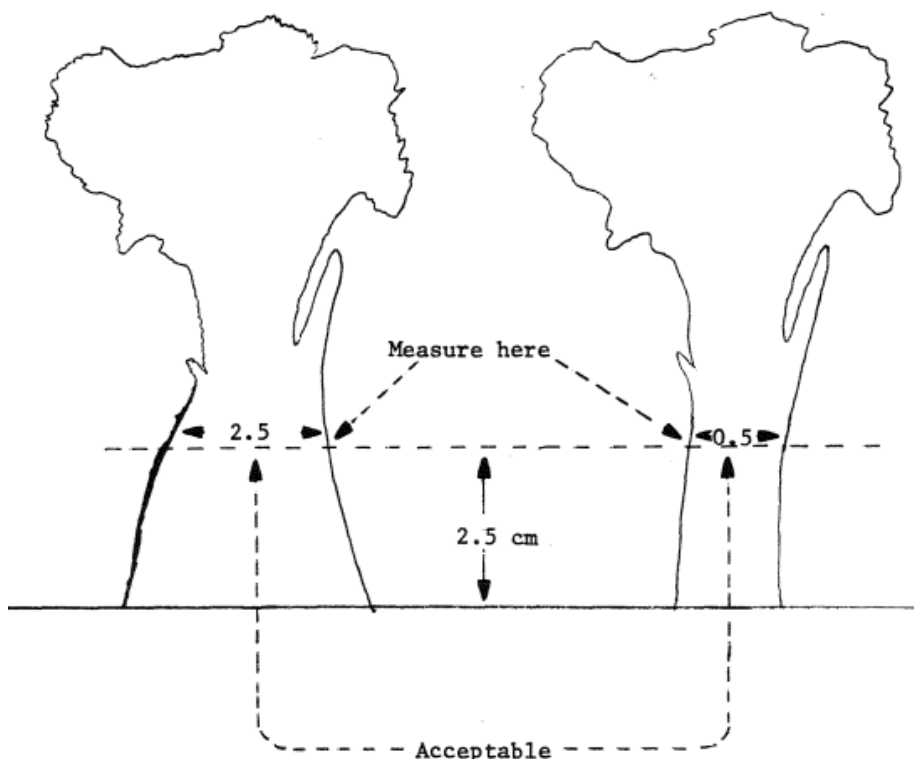
5. While the spears are arranged in a continuous row, check for **uniformity of diameter**. Uniformity of diameter is separate from the style defectives evaluated in step 3, and uniformity of length evaluated in step 4. Don't be overly critical. If it is apparent that the spears are reasonably similar in diameter, accept them as meeting requirements.

If some spears are obviously larger or smaller than others, do the following:

- a. Locate the apparent spears that are outside an acceptable 2 cm range in diameter between the large diameters and the small diameters;
- b. Determine diameter variation so that only the least number of defects are tallied against size. This may be only the small diameter spears, only the large diameter spears, or both the small spears and the large spears; and
- c. Record the number of diameter defects on the tally sheet as minor defects.

Suggested Order of Grading Under On-Line Inspection

Example 5:



6. Evaluate “**brightness**” and record the letter grade (A, B, or SSTD) in the “prerequisites” section of the defect tally sheet. The overall brightness may be slightly dull in grade B. Count “off-color” (yellowish or brownish discoloration) as Substandard.
7. At the same time that brightness is evaluated, record the letter grade (A or SSTD) for **similar varietal characteristics** in the “prerequisites” section of the defect tally sheet.
8. Evaluate the **color** of the individual broccoli spears. The color classification of each broccoli spear is one of the following:
 - **Good color (grade A color)** – not a defect in any grade;
 - **Reasonably good color (grade B color)** – a defect only in grade A; or
 - **Poor color (Substandard color)** – a defect in grade A and grade B.

If a spear is blemished because of orange buds, olive-green leaf stem (petiole), etc., ignore the blemished areas for purposes of color evaluation. In other words, don't count a spear as “reasonably good” color or “poor” color because it is

Suggested Order of Grading Under On-Line Inspection

blemished. Record on the defect tally sheet the number of spears that are either “reasonably good” or “poor” color. If the sample unit fails requirements for grade A, adjust the tally sheet by dropping the number of “reasonably good” spears from the grade B defects. Reasonably good color (grade B color) is not a defect in a grade B sample unit. Count only “poor” color spears as defects in a grade B sample unit.

Note: The white or creamy-white color on the underside of head material is a characteristic of young compact heads and has no bearing on the grade.

If the frozen broccoli is designated as grade B by the processor, it would be necessary to count only the number of “poor” color spears. Remember, however, the tally sheet could never be reevaluated for grade A.

Example 6: Designated grade A production.

S E V E R E	Color (Poor)						1
	Blemished (Seriously)						
	Fiber (Woody)						
	EVM (Edible)						
	TOTAL SEVERE					0	1
	CUSUM	Grade A	0.5	0.5	1.5	0	0.5
		Grade B	1.5	1.5	3		

M A J O R	Color (Reas. Good) in A					1	2
	Size (Length)					1	2
	Detached Fragments						
	Blemished (Materially)					1	2
	Trim (Poor) in A						
	Development (Poor)						
	Fiber (Non woody)					1	2
	TOTAL MAJOR					4	6
	CUSUM	Grade A	1	4	3	1	③
		Grade B	1	6	4		B

T O T A L	TOTAL ALL CLASSES					11	12
	CUSUM	Grade A	2	12	5	1	1
		Grade B	2	14	7		

SAMPLE UNIT GRADE						A	B
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Drop the defects that are counted only against grade A, before checking for compliance with grade B

Suggested Order of Grading Under On-Line Inspection

Example 7: Designated grade B production.

S E V E R E	Color (Poor)					1	
	Blemished (Seriously)					1	
	Fiber (Woody)						
	EVM (Edible)						
	TOTAL SEVERE					2	
	CUSUM	Grade A	0.5	0.5	1.5		
		Grade B	1.5	1.5	3	2	

M A J O R	Color (Reas. Good) in A					←	
	Size (Length)					1	
	Detached Fragments					1	
	Blemished (Materially)					1	
	Trim (Poor) in A						
	Development (Poor)					2	
	Fiber (Non woody)						
	TOTAL MAJOR					5	
	CUSUM	Grade A	1	4	3		
		Grade B	1	6	4	0	

T O T A L	TOTAL ALL CLASSES					12	
	CUSUM	Grade A	2	12	5		
		Grade B	2	14	7	0	

SAMPLE UNIT GRADE						B	
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Don't count defects that are counted only against grade A

9. Weigh the **detached fragments**, if any, in the sample unit. Don't include loose leaves or pieces of leaves in the weight; these are minor defects. Ignore any chaff. Don't be overly critical, but count each 28 g increment of detached fragments as 1 major defect. See [Appendix I – Interpretative Guide for the Determination of Detached Fragments](#). Record the number of detached fragments on the tally sheet as follows:

- 0 – 28 grams = 1 defect;
- 29 – 56 grams = 2 defects; or
- 57 – 84 grams = 3 defects, etc.

Suggested Order of Grading Under On-Line Inspection

Example 8:

M A J O R	Color (Reas. Good) in A						
	Size (Length)						
	Detached Fragments					2	
	Blemished (Materially)					↑	
	Trim (Poor) in A						
	Development (Poor)						
	Fiber (Non woody)						
	TOTAL MAJOR						
	CUSUM	Grade A	1	4	3		
Grade B		1	6	4			

$$\text{Detached fragments} = \frac{35 \text{ g}}{28}$$

10. Weigh the **loose leaves** and **pieces of leaves**, if any, in the sample unit. Count each 14 g increment of loose leaf material as 1 minor defect. Record the number of loose leaf defects on the tally sheet as follows:

- 0 – 14 grams = 1 defect;
- 15 – 28 grams = 2 defects; or
- 29 – 42 grams = 3 defects.

Example 9:

M I N O R	Size (Diameter)			
	Loose Leaves		4	
	Broken		▲	
	Damaged			
	Blemished (Slightly)			
	Trim (Reas. Well) in A			
	Trim (Poor) in grade B			
	Development (Reas. Well) in A			
	TOTAL MINOR			

$$\text{Loose Leaves} = \frac{50 \text{ g}}{14}$$

11. Count the number of **broken spears**. These need to be the same spears that were reassembled in step 2, if any. Record on the defect tally sheet as minor

Suggested Order of Grading Under On-Line Inspection

defects the number of broken spears (each reassembled spear is counted as only 1 defect).

12. Count any **mechanical damage** to the head material of the spears as a defect. Don't be overly critical -- only materially damaged, or worse, are counted. Don't count broken spears (step 11) or trimmed spears (step 14) as damaged, or vice versa. Record on the defect tally sheet as minor defects the number of damaged spears.
13. Count the number of spears that are **blemished**. Blemished broccoli is the most common defect. Usually, blemishes are:
- Discolored hollow or pithy stalks (don't count hollow or pithy stalks unless they're associated with discoloration);
 - Yellow leaves;
 - Orange buds (6 or more orange buds in a single area of the head is the cut-off point between blemished and non-blemished); and
 - Olive-green leaf stem (petiole).

Record the number of blemished spears on the defect tally sheet as follows:

- Minor;
 - Major; or
 - Severe.
- } Use photo guides, if available.

14. Count the number of spears that are adversely affected by **trimming**. Use the USDA photo guides, if available. The trim classification of each broccoli spear is one of the following:
- **Well-trimmed (grade A trim)** – not a defect in any grade;
 - **Reasonably well-trimmed (grade B trim)** – a defect only in grade A; or
 - **Poorly trimmed (Substandard trim)** – a major defect in grade A and a minor defect in grade B.

Record the number of spears that are either “reasonably well trimmed” or “poorly trimmed” on the defect tally sheet. If the sample unit fails requirements for grade A, adjust the defect tally sheet by:

Suggested Order of Grading Under On-Line Inspection

- Dropping all “reasonably well trimmed” spears from the defects counted against grade B; and
- Striking out the number of “poorly trimmed” spears counted as major defects against grade A and moving them to minor defects to be counted against grade B.

If the broccoli is designated as grade B by the processor, it would be necessary to count only the “poorly trimmed” spears in each sample unit. Place the number of “poorly trimmed” spears directly in the minor defect category. Remember, however, the tally sheet could never be reevaluated for grade A.

Example 10: Designated grade A production.

M A J O R	Color (Reas. Good) in A					
	Size (Length)					1
	Detached Fragments				1	
	Blemished (Materially)				2	2
	Trim (Poor) in A				1	2
	Development (Poor)					
	Fiber (Non woody)					2
	TOTAL MAJOR				4	5
	CUSUM					
	Grade A	1	4	3	1	③
	Grade B	1	6	4		B

M I N O R	Size (Diameter)				1	
	Loose Leaves					1
	Broken				1	
	Damaged					
	Blemished (Slightly)				2	1
	Trim (Reas. Well) in A				1	1
	Trim (Poor) in B					
	Development (Reas. Well) in A					
	TOTAL MINOR				5	3

T O T A L	TOTAL ALL CLASSES				12	13
	CUSUM					
	Grade A	2	12	5	2	3
	Grade B	2	14	7		

SAMPLE UNIT GRADE	A	B
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Drop the defects that are counted only against grade A before checking for compliance with grade B

Suggested Order of Grading Under On-Line Inspection

Example 11: Designated grade B production.

M A J O R	Color (Reas. Good) in A						
	Size (Length)						
	Detached Fragments					1	
	Blemished (Materially)					2	
	Trim (Poor) in A						
	Development (Poor)						
	Fiber (Non woody)					1	
	TOTAL MAJOR					4	
	CUSUM	Grade A	1	4	3		
Grade B		1	6	4	0		

M I N O R	Size (Diameter)						
	Loose Leaves					1	
	Broken					1	
	Damaged						
	Blemished (Slightly)					2	
	Trim (Reas. Well) in A						
	Trim (Poor) in B					1	
	Development (Reas. Well) in A						
	TOTAL MINOR		5				

T O T A L	TOTAL ALL CLASSES					15	
	CUSUM	Grade A	2	12	5		
		Grade B	2	14	7	3	

SAMPLE UNIT GRADE					B	
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Don't tally defects that are counted only against grade A

15. Count the number of spears that are adversely affected by **development** (head and bud cluster stages of maturity). Use the USDA photo guides, if available. The development classification of each broccoli spear is one of the following:
- **Well developed (grade A development)** – not a defect in any grade;
 - **Reasonably well developed (grade B development)** – a defect only in grade A; or
 - **Poorly developed (Substandard development)** – a defect in grade A and grade B.

Suggested Order of Grading Under On-Line Inspection

Record the number of spears that are either “reasonably well developed” or “poorly developed” on the defect tally sheet. If the sample unit fails requirements for grade A, adjust the tally sheet by dropping all “reasonably well developed” spears from the number of defects counted against grade B. Reasonably well developed (grade B development) isn't a defect in a grade B sample unit. Count only “poorly developed” spears as defects in a grade B sample unit. If the frozen broccoli is designated as grade B by the processor, it would be necessary to count only the number of “poorly developed” spears. Remember, however, the tally sheet could never be reevaluated for grade A.

Example 12: Designated grade A production.

M A J O R	Color (Reas. Good) in A						
	Size (Length)					2	
	Detached Fragments					1	
	Blemished (Materially)					1	2
	Trim (Poor) in A						
	Development (Poor)					1	1
	Fiber (Non woody)						
	TOTAL MAJOR					5	3
C U S U M	Grade A	1	4	3	2	1	
	Grade B	1	6	4			

M I N O R	Size (Diameter)						
	Loose Leaves					1	1
	Broken						1
	Damaged					1	
	Blemished (Slightly)					1	2
	Trim (Reas. Well) in A						
	Trim (Poor) in B						
	Development (Reas. Well) in A					1	2
TOTAL MINOR					4	4	

T O T A L	TOTAL ALL CLASSES					14	12.14
	C U S U M	Grade A	2	12	5	4	⑤
		Grade B	2	14	7		B

SAMPLE UNIT GRADE					A	B
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Drop the defects that are counted only against grade A, before checking for compliance with grade B

Suggested Order of Grading Under On-Line Inspection

Example 13: Designated grade B production.

M A J O R	Color (Reas. Good) in A						
	Size (Length)						
	Detached Fragments					1	
	Blemished (Materially)					1	
	Trim (Poor) in A						
	Development (Poor)					1	
	Fiber (Non woody)						
	TOTAL MAJOR					3	
CUSUM	Grade A	1	4	3			
	Grade B	1	6	4	0		

M I N O R	Size (Diameter)						
	Loose Leaves					1	
	Broken					1	
	Damaged						
	Blemished (Slightly)					1	
	Trim (Reas. Well) in A						
	Trim (Poor) in B						
	Development (Reas. Well) in A						
	TOTAL MINOR					3	

T O T A L	TOTAL ALL CLASSES					10	
	CUSUM	Grade A	2	12	5		
		Grade B	2	14	7	0	

SAMPLE UNIT GRADE					B	
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Don't tally defects that are counted only against grade A

16. Count the number of pieces of **extraneous vegetable material (EVM)**. The frequency of occurrence for EVM is expected to be low. Count pieces of other similar plants, such as cauliflower or brussels sprouts, as edible EVM. Record on the defect tally sheet the number of pieces of EVM as follows:

- Severe (edible) – Tender, green blades of grass or weeds or leaves which are harmless; or
- Critical (inedible) – Course blades of grass or weeds or leaves which may or may not be tender or green and which are harmless.

Suggested Order of Grading Under On-Line Inspection

If 25 broccoli spears are being used for inspection, rather than 50 spears, 0.4 AQL is the smallest AQL in the 25 plan. This doesn't cover grade A critical defects (inedible EVM) which have an AQL of 0.25; thus, the inspector is left without S, T, and L values for critical defects in grade A if the 25 plan is being used. This typically doesn't cause a problem given the small chance of inedible EVM occurring in the sample unit. However, if inedible EVM is found in a sample unit of 25 spears, it fails grade A (S=O; T=O; L=O).

17. Cook a representative portion of the spears as outlined in the *Cooking Procedures* section of the [Technical Procedures Manual](#). Inspectors may wish to select only "suspect" spears for the cooking test. It isn't necessary to cook each sample unit unless a problem develops, such as fibrous spears.
18. Evaluate the cooked broccoli for **flavor and odor**. Assign the letter grade (A, B, or SSTO) for flavor and odor in the section for "prerequisites." Consider any objectionable "off-flavor" ("hay-like," "straw-like," "smoke," "chemical," or "sour"), but edible sample unit, as Substandard. Permit a slight "hay-like" or "straw-like" odor in grade B.
19. Evaluate the cooked broccoli for **grit or silt**. Assign the letter grade (A, B, or SSTO) for freedom from grit in the section for "prerequisites."
20. Evaluate the cooked broccoli for **fiber**. Be alert for fiber located at the base end of the spear. Any detectable fiber should be classified as follows:
 - Major (nonwoody – noticeable fiber but can be eaten without difficulty); or
 - Severe (woody).
21. Total the classes of defects on the defect tally sheet and compute the CUSUM values outlined in the [Cumulative Sum Sampling Plan \(CUSUM\) Attributes Standards](#).

Suggested Order of Grading Under On-Line Inspection

SHORT SPEARS OR FLORETS

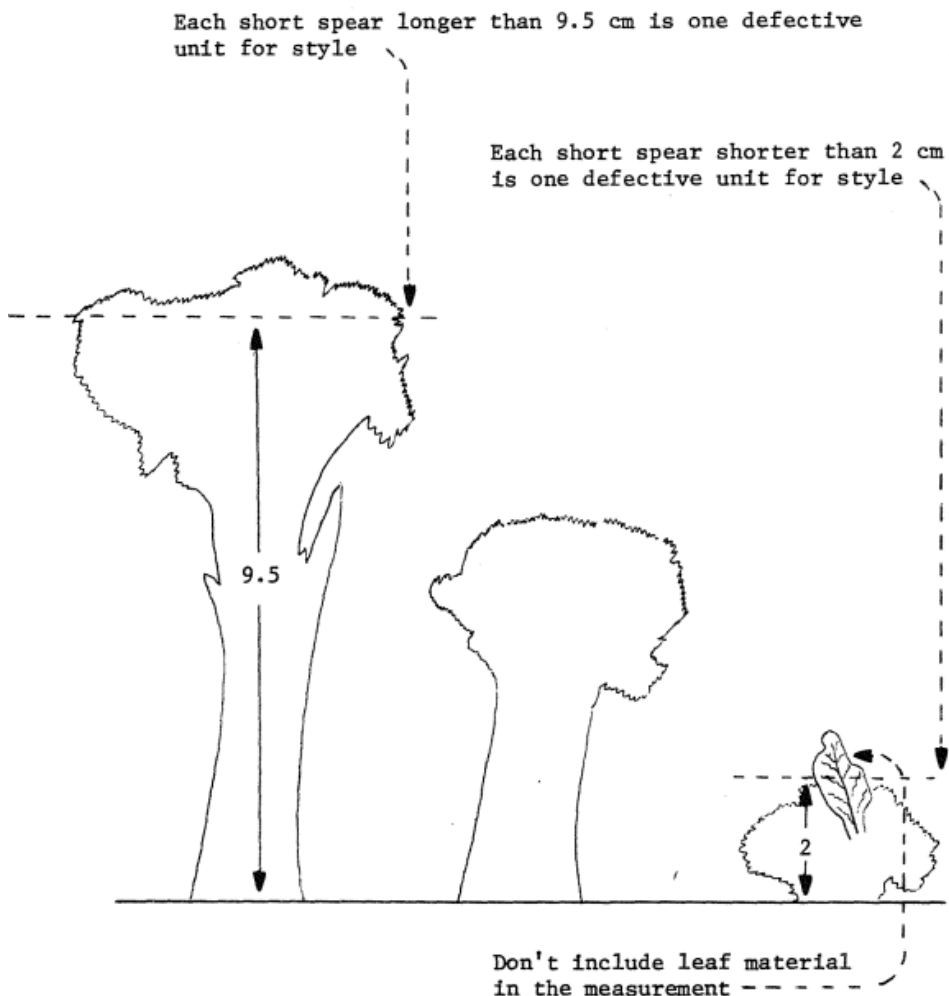
1. Select 50 spears from the processing line at random (either before freezing or after freezing). Inspectors may use 25 short spears as an optional sample unit size. Unless the quality is borderline, 25 short spears is adequate. If the inspector is grading several other products at the same time, 25 short spears would save time in grading. In either case, 25 short spears or 50 short spears, inspectors must keep the sample unit size constant during each basic grading period.
2. Reassemble any **broken short spear**. Count each reassembled short spear as a single unit. Ensure there are still a total of 50 spears. See [Appendix I – Interpretative Guide for the Determination of Detached Fragments](#).

§52.635 Definitions of terms. (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.

3. Check for **style compliance**. Arrange all the short spears in the sample unit in a continuous row with the base end of each short spear against the bottom rim of the grading tray. If using 50 short spears, butt each unit against a straight edge on top of the grading table. As the short spears are being arranged in a row, place them in order of size from the longest to the shortest, or vice versa
 - a. Disregard loose leaf material, pieces of leaves, extraneous vegetable material (EVM), and detached fragments. See [Appendix I – Interpretative Guide for the Determination of Detached Fragments](#);
 - b. Locate the point in the continuous row where the short spears are longer than 9.5 cm, if any. Count the number of short spears that are longer than 9.5 cm;
 - c. Locate the point in the continuous row where the spears are shorter than 2 cm, if any. Count the number of short spears that are shorter than 2 cm;
 - d. The standards require that each short spear weigh more than 6 g but don't provide acceptance criteria for these small units. Do this: If any floret weighs 6 g or less and is not counted in the less than 2 cm defectives, count it as a "minor" style defective, regardless of the length; and
 - e. Record the number of defective spears found (in steps b, c, and d above) in the style section of the defect tally sheet. Short spears that fail style requirements aren't "pieces." If a style failure occurs, certify the grade but show: "Fails style compliance for short spears."

Suggested Order of Grading Under On-Line Inspection

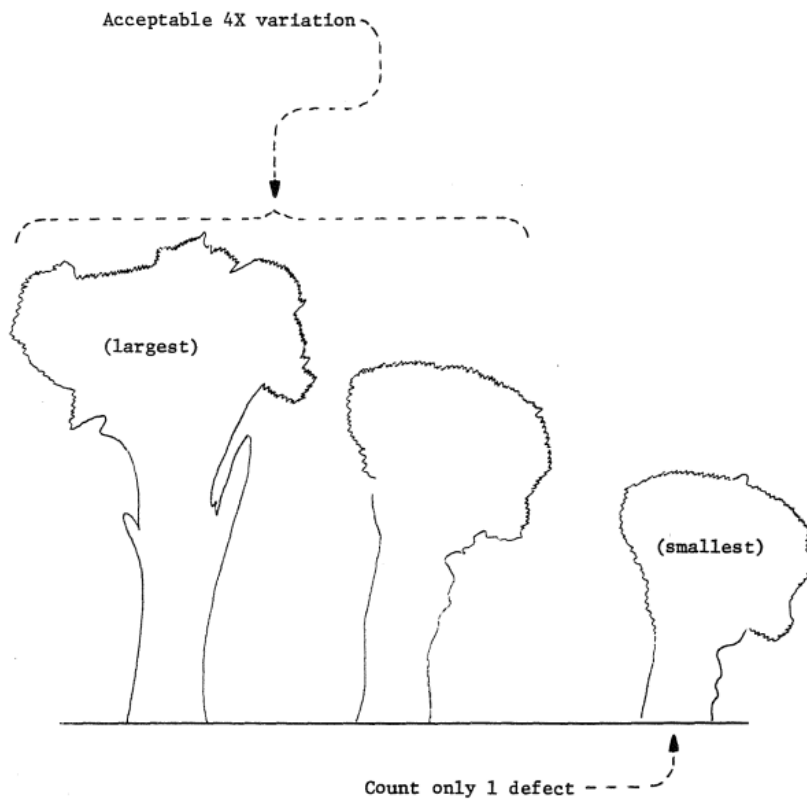
Example 14:



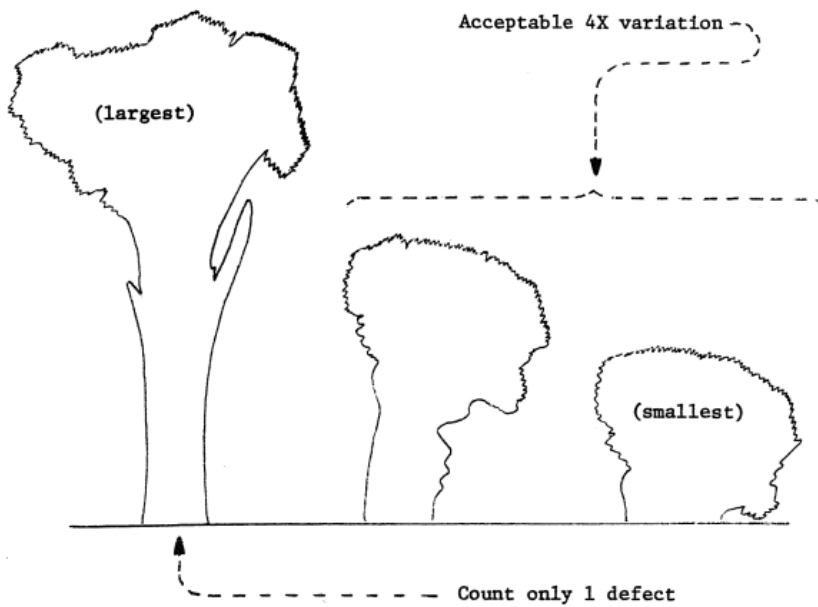
4. While the short spears are arranged in a continuous row, check for **uniformity of size**. Uniformity of size is separate from the style defectives done in step 3, previously. Don't be overly critical. If it is apparent that short spears are reasonably similar in weight, accept them as meeting requirements. If some short spears vary greatly in weight from others, do the following:
- Locate the point in the continuous row where the short spears vary in weight more than 4 times (4X) from the other units;
 - Determine size variation so that only the least number of defects are tallied against size. This may be only the small unit, only the large units, or both the large units and the small units; and
 - Record the number of size defects on the tally sheet as minor defects.

Suggested Order of Grading Under On-Line Inspection

Example 15:

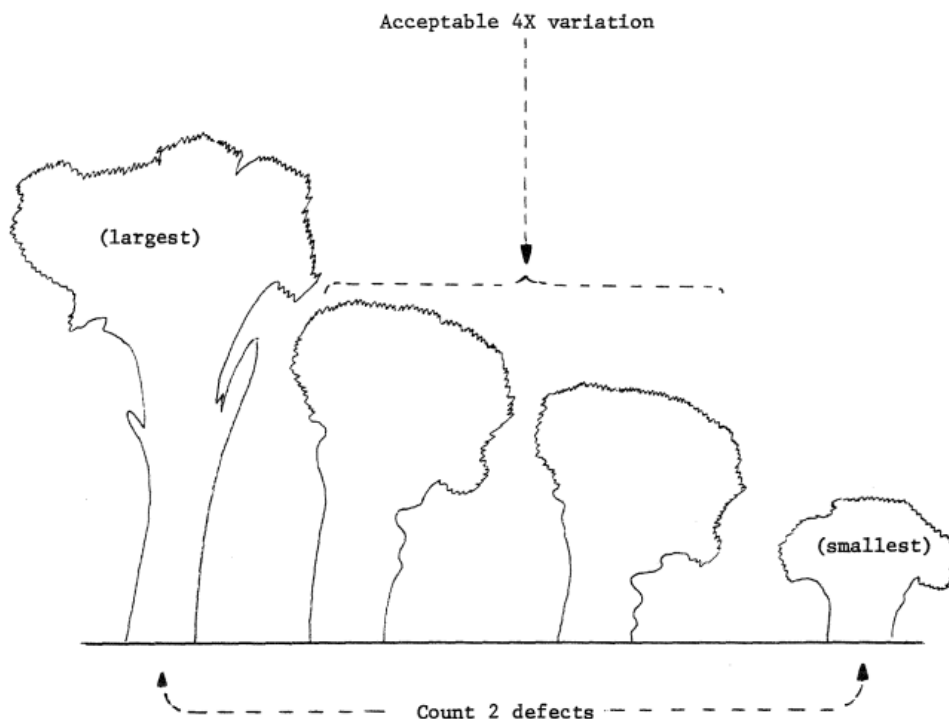


Example 16:



Suggested Order of Grading Under On-Line Inspection

Example 17:



5. Evaluate “**brightness**” and record the letter grade (A, B, or SSTD) in the “prerequisites” section of the defect tally sheet. The overall brightness may be slightly dull in grade B. Count “off-color” (yellowish or brownish discoloration) as Substandard.
6. At the same time that brightness is evaluated, record the letter grade (A or SSTD) for **similar varietal characteristics** in the “prerequisites” section of the defect tally sheet.
7. Evaluate the color of the individual broccoli short spears. The color classification of each short spear is one of the following:
 - **Good color (grade A color)** – not a defect in any grade;
 - **Reasonably good color (grade B color)** – a defect only in grade A; or
 - **Poor color (Substandard color)** – a defect in grade A and grade B.

If a short spear is blemished because of orange buds, olive-green leaf stem (petiole), etc., ignore the blemished areas for purposes of color evaluation. In other words, don't count a short spear as “reasonably good” color or “poor” color because it is blemished. Record the number of short spears that are either

Suggested Order of Grading Under On-Line Inspection

“reasonably good” or “poor” color on the defect tally sheet. If the sample unit fails requirements for grade A, adjust the tally sheet by dropping the number of “reasonably good” short spears from the grade B defects. Reasonably good color (grade B color) is not a defect in a grade B sample unit. Count only “poor” color short spears as defects in a grade B sample unit.

Note: The white or creamy-white color on the underside of head material is a characteristic of young compact heads and has no bearing on the grade.

If the frozen broccoli is designated as grade B by the processor, it would be necessary to count only the number of “poor” color short spears. Remember, however, the tally sheet could never be reevaluated for grade A.

Example 18: Designated grade A production.

S E V E R E	Color (Poor)						1
	Blemished (Seriously)						
	Fiber (Woody)						
	EVM (Edible)						
	TOTAL SEVERE					0	1
	CUSUM	Grade A	0.5	0.5	1.5	0	0.5
Grade B		1.5	1.5	3			

M A J O R	Color (Reas. Good) in A					1	2
	Detached Fragments					1	2
	Blemished (Materially)					1	2
	Trim (Poor) in A						
	Development (Poor)						
	Fiber (Non woody)					1	2
	TOTAL MAJOR		4	6 8			
	CUSUM	Grade A	1	4	3	1	③
Grade B		1	6	4		B	

T O T A L	TOTAL ALL CLASSES					11	12
	CUSUM	Grade A	2	12	5	1	1
		Grade B	2	14	7		

SAMPLE UNIT GRADE						A	B
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Drop the defects that are counted only against grade A before checking for compliance with grade B

Suggested Order of Grading Under On-Line Inspection

Example 19: Designated grade B production.

S E V E R E	Color (Poor)					1	
	Blemished (Seriously)					1	
	Fiber (Woody)						
	EVM (Edible)						
	TOTAL SEVERE					2	
	CUSUM	Grade A	0.5	0.5	1.5		
Grade B		1.5	1.5	3	2		

M A J O R	Color (Reas. Good) in A						
	Detached Fragments					1	
	Blemished (Materially)					1	
	Trim (Poor) in A						
	Development (Poor)					2	
	Fiber (Non woody)					1	
	TOTAL MAJOR					5	
	CUSUM	Grade A	1	4	3		
Grade B		1	6	4	0		

T O T A L	TOTAL ALL CLASSES					12	
	CUSUM	Grade A	2	12	5		
		Grade B	2	14	7	0	

SAMPLE UNIT GRADE						B	
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Don't count defects that are counted only against grade A -----

8. Weigh the **detached fragments**, if any, in the sample unit. Don't include loose leaves or pieces of leaves in the weight; these are minor defects. Ignore any chaff. Don't be overly critical, but count each 28g increment of detached fragments as 1 major defect. See [Appendix I – Interpretative Guide for the Determination of Detached Fragments](#). Record the number of detached fragment defects on the defect tally sheet as follows:

- 0 – 28 grams = 1 defect;
- 29 – 56 grams = 2 defects; or
- 57 – 84 grams = 3 defects, etc.

Suggested Order of Grading Under On-Line Inspection

Example 20:

M A J O R	Color (Reas. Good) in A					
	Detached Fragments				3	
	Blemished (Materially)				▲	
	Trim (Poor) in A					
	Development (Poor)					
	Fiber (Non woody)					
	TOTAL MAJOR					
C U S U M	Grade A	1	4	3		
	Grade B	1	6	4		

$$\text{Detached fragments} = \frac{60 \text{ g}}{28}$$

9. Weigh the **loose leaves and pieces of leaves**, if any, in the sample unit. Count each 14 g increment of loose leaf material as 1 minor defect. Record the number of loose leaf defects on the tally sheet as follows:

- 0 – 14 grams = 1 defect;
- 15 – 28 grams = 2 defects; or
- 29 – 42 grams = 3 defects, etc.

Example 21:

M I N O R	Size (More than 4X)					
	Loose Leaves				2	
	Broken				▲	
	Damaged					
	Blemished (Slightly)					
	Trim (Reas. Well) in A					
	Trim (Poor) in B					
	Development (Reas. Well) in A					
	TOTAL MINOR					

$$\text{Loose Leaves} = \frac{20 \text{ g}}{14}$$

Suggested Order of Grading Under On-Line Inspection

10. Count the number of **broken short spears**. These need to be the same short spears that were reassembled in step 2, if any. Record the number of broken spears as minor defects on the tally sheet (each reassembled short spear is counted as only 1 defect).
11. Count any **mechanical damage** to the head material of the short spear as a defect. Don't be overly critical - only materially damaged, or worse, is counted. Don't count broken short spears (step 10) or trimmed short spears (step 13) as damaged, or vice versa. Record the number of damaged short spears as minor defects on the tally sheet.
12. Count the number of short spears that are **blemished**. Blemished broccoli is the most common defect. Usually, blemishes are:
 - Discolored hollow or pithy stalks (don't count hollow or pithy stalks unless they're associated with discoloration);
 - Yellow leaves;
 - Orange buds (6 or more orange buds in a single area of the head is the cut-off point between blemished and non-blemished); and
 - Olive-green leaf stem (petiole).

Record the number of blemished short spears on the defect tally sheet as follows:

- Minor;
 - Major; or
 - Severe.
- 
- Use photo guides for spears, if available.

13. Count the number of short spears that are adversely affected by **trimming**. Use the USDA photo guides, if available. The trim classification of each broccoli short spear is one of the following:
 - **Well-trimmed (grade A trim)** – not a defect in any grade.
 - **Reasonably well trimmed (grade B trim)** – a defect only in grade A; or
 - **Poorly trimmed (Substandard trim)** – a major defect in grade A and a minor in grade B.

Suggested Order of Grading Under On-Line Inspection

Record the number of short spears on the defect tally sheet that are either “reasonably well trimmed” or “poorly trimmed.” If the sample unit fails requirements for grade A, adjust the defect tally sheet by:

- Dropping all “reasonably well trimmed” short spears from the defects counted against grade B; and
- Striking out the number of “poorly trimmed” short spears counted as major defects against grade A and moving them to minor defects to be counted against grade B. If the broccoli is designated as grade B by the processor, it would be necessary to count only the “poorly trimmed” short spears in each sample unit. Place the number of “poorly trimmed” short spears directly in the minor defect category. Remember, however, the tally sheet could never be reevaluated for grade A.

Example 22: Designated grade A production.

M A J O R	Color (Reas. Good) in A						
	Detached Fragments					1	1
	Blemished (Materially)					2	2
	Trim (Poor) in A					1	2
	Development (Poor)						
	Fiber (Non woody)						2
	TOTAL MAJOR					4	5 7
	CUSUM	Grade A				1	4
Grade B		1	6	4		B	

M I N O R	Size (More than 4X)					1	
	Loose Leaves						1
	Broken					1	
	Damaged						
	Blemished (Slightly)					2	1
	Trim (Reas. Well) in A					1	1
	Trim (Poor) in B						
	Development (Reas. Well) in A						
	TOTAL MINOR					5	3

T O T A L	TOTAL ALL CLASSES					12	13
	CUSUM	Grade A	2	12	5	2	3
		Grade B	2	14	7		

SAMPLE UNIT GRADE						A	B
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Drop the defects that are counted only against grade A before checking for compliance with grade B

Suggested Order of Grading Under On-Line Inspection

Example 23: Designated grade B production.

M A J O R	Color (Reas. Good) in A						
	Detached Fragments					1	
	Blemished (Materially)					2	
	Trim (Poor) in A						
	Development (Poor)						
	Fiber (Non woody)					1	
	TOTAL MAJOR					4	
CUSUM	Grade A	1	4	3			
	Grade B	1	6	4	0		

M I N O R	Size (More than 4X)						
	Loose Leaves					1	
	Broken					1	
	Damaged						
	Blemished (Slightly)					2	
	Trim (Reas. Well) in A						
	Trim (Poor) in B					1	
	Development (Reas. Well) in A						
	TOTAL MINOR					5	

T O T A L	TOTAL ALL CLASSES					15	
	CUSUM	Grade A	2	12	5		
		Grade B	2	14	7	3	

SAMPLE UNIT GRADE					B	
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Don't tally defects that are counted only against grade A

14. Count the number of short spears that are adversely affected by **development** (head and bud cluster stages of maturity). Use the USDA photo guides, if available. The development classification of each short spear is one of the following:

- **Well developed (grade A development)** – not a defect in any grade;
- **Reasonably well developed (grade B development)** – a defect only in grade A; or
- **Poorly developed (Substandard development)** – a defect in grade A and grade B.

Inspection Instructions for Frozen Broccoli (May 2026)

Suggested Order of Grading Under On-Line Inspection

Record the number of short spears on the defect tally sheet that are either “reasonably well developed” or “poorly developed.” If the sample unit fails requirements for grade A, adjust the tally sheet by dropping all “reasonably well developed” spears from the number of defects counted against grade B. Reasonably well developed (grade B development) isn't a defect in a grade B sample unit. Count only “poorly developed” short spears as defects in a grade B sample unit. If the frozen broccoli is designated as grade B by the processor, it would be necessary to count only the number of “poorly developed” short spears. Remember, however, the tally sheet could never be reevaluated for grade A.

Example 24: Designated grade A production.

M A J O R	Color (Reas. Good) in A						
	Detached Fragments					2	
	Blemished (Materially)					2	2
	Trim (Poor) in A						
	Development (Poor)					1	1
	Fiber (Non woody)						
	TOTAL MAJOR					5	3
	CUSUM	Grade A	1	4	3	2	1
Grade B		1	6	4			

M I N O R	Size (More than 4X)						
	Loose Leaves					1	1
	Broken						1
	Damaged					1	
	Blemished (Slightly)					1	2
	Trim (Reas. Well) in A						
	Trim (Poor) in B						
	Development (Reas. Well) in A		1	2			
	TOTAL MINOR		4	4			

T O T A L	TOTAL ALL CLASSES					14	12.14
	CUSUM	Grade A	2	12	5	4	⑤
		Grade B	2	14	7		B

SAMPLE UNIT GRADE						A	B
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Drop the defects that are counted only against grade A before checking for compliance with grade B

Suggested Order of Grading Under On-Line Inspection

Example 25: Designated grade B production.

M A J O R	Color (Reas. Good) in A						
	Detached Fragments					1	
	Blemished (Materially)					1	
	Trim (Poor) in A						
	Development (Poor)					1	
	Fiber (Non woody)						
	TOTAL MAJOR					3	
	CUSUM	Grade A	1	4	3		
		Grade B	1	6	4	0	

M I N O R	Size (More than 4X)						
	Loose Leaves					1	
	Broken					1	
	Damaged						
	Blemished (Slightly)					1	
	Trim (Reas. Well) in A						
	Trim (Poor) in B						
	Development (Reas. Well) in A						
	TOTAL MINOR					3	

T O T A L	TOTAL ALL CLASSES					10	
	CUSUM	Grade A	2	12	5		
		Grade B	2	14	7	0	

SAMPLE UNIT GRADE						B	
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Don't tally defects that are counted only against grade A -----

15. Count the number of pieces of **extraneous vegetable material (EVM)**. The frequency of occurrence for EVM is expected to be low. Count pieces of other similar plants, such as cauliflower or brussels sprouts, as edible EVM. Record the number of pieces of EVM on the defect tally sheet as follows:

- Severe (edible) – Tender, green blades of grass or weeds or leaves which are harmless; or
- Critical (inedible) – Course blades of grass or weeds or leaves which may or may not be tender or green and which are harmless.

Suggested Order of Grading Under On-Line Inspection

If 25 short spears are being used for inspection, rather than 50 short spears, 0.4 AQL is the smallest AQL in the 25 plan. This doesn't cover grade A critical defects (inedible EVM) which has an AQL of 0.25; thus, the inspector is left without S, T, and L values for critical defects in grade A if the 25 plan is being used. This typically doesn't cause a problem given the small chance of inedible EVM occurring in the sample unit. However, if inedible EVM is found in a sample unit of 25 spears, it fails grade A (S=0; T=0; L=0).

16. Cook a representative portion of the short spears as outlined in the *Cooking Procedures* section of the [Technical Procedures Manual](#). Inspectors may wish to select only "suspect" short spears for the cooking test. It isn't necessary to cook each sample unit unless a problem develops, such as fibrous short spears.
17. Evaluate the cooked broccoli for **flavor and odor**. Assign the letter grade (A, B, or SSTD) for flavor and odor in the section for "prerequisites." Consider any objectionable "off-flavor" ("hay-like," "straw-like," "smoke," "chemical," or "sour"), but edible sample unit, as Substandard. Permit a slight "hay-like" or "straw-like" odor in grade B.
18. Evaluate the cooked broccoli for **grit or silt**. Assign the letter grade (A, B, or SSTD) for freedom from grit in the section for "prerequisites."
19. Evaluate the cooked broccoli for **fiber**. Be alert for fiber located at the base end of the short spear. Any detectable fiber should be classified as follows:
 - Major (non-woody – noticeable fiber but can be eaten without difficulty); or
 - Severe (woody).
20. Total the classes of defects on the defect tally sheet and compute CUSUM values as outlined in [Cumulative Sum Sampling Plan \(CUSUM\) Attributes Standards](#).

Suggested Order of Grading Under On-Line Inspection

CUT BROCCOLI

1. Select a 250 g sample unit from the processing line at random (either before freezing or after freezing). Inspectors may also use the following optional sample unit sizes:
 - 500 g (100 - 5 g increments - use the 100 plan in [§52.38b](#)); or
 - 1000 g (200 - 5 g increments - use the 200 plan in [§52.38b](#)).

Note: Larger sample unit sizes require more time to grade. Regardless of the sample unit size chosen, keep it constant for each basic grading period. Inspectors may use different sample unit sizes between style compliance and quality compliance.

Example 26:

Sample Unit Size	Use for Style	Use for Quality
500 g	250 g	500 g
1000 g	250 g	1000 g
1000 g	500 g	1000 g

2. Arrange the sample unit of cut broccoli on a grading tray to make each unit easily visible.
3. Evaluate “**brightness**” and record the letter grade (A, B, or SSTD) in the “prerequisites” section of the defect tally sheet. The overall brightness may be slightly dull in grade B. Count “off-color” (yellowish or brownish discoloration) as Substandard.
4. At the same time that brightness is evaluated, record the letter grade (A or SSTD) for **similar varietal characteristics** in the “prerequisites” section of the defect tally sheet.
5. Evaluate the cut broccoli for **development** (head and bud cluster stages of maturity). Even though the USDA photo guides, which show various stages of development, cover only spears, inspectors may use these photo guides as an indication of the cut-off point between “reasonably well developed” and “poorly developed.”

The development classifications of cut broccoli are as follows:

- **Grade A** – the broccoli may be only “reasonably well developed” (grade B); or

Suggested Order of Grading Under On-Line Inspection

- **Grade B** – the broccoli may be only “poorly developed” (SSTD) if the appearance is not materially affected. Poorly developed means the individual buds are in the flowering stage.

Record the letter grade (A, B, or SSTD) for development in the “prerequisites” section of the defect tally sheet.

6. Separate all the blemished units into 3 categories:

- Slightly;
- Materially; or
- Seriously.

Place each category on a suitable scale. Record the weight. Each 5 g increment of this weight is 1 defect.

Blemished broccoli is the most common defect. Usually blemishes are:

- Discolored hollow or pithy stalks (don't count hollow or pithy stalks unless they're associated with discoloration);
- Yellow leaves;
- Orange buds (3 or more orange buds in a single area is the cut-off point between blemished and non-blemished); and
- Olive-green leaf stem (petiole).

Record the number of blemished defects on the defect tally sheet (each 5 g increment is 1 defect) as follows:

- Minor;
 - Major; or
 - Severe.
- } Use photo guides for spears, if available.

Suggested Order of Grading Under On-Line Inspection

Example 27:

S E V E R E	Blemished (Seriously)					1	
	Fiber (Woody)						
	EVM (edible)						
	TOTAL SEVERE						
	CUSUM	Grade A	0.4	0.8	1.6		
Grade B		1	1	2			

M A J O R	Blemished (Materially)					2	
	Fiber (Nonwoody)						
	TOTAL MAJOR						
	CUSUM	Grade A				1.5	1.5
		Grade B	1	3	3		

M I N	Blemished (Slightly)					4	
	TOTAL MINOR						

T O T A L	TOTAL ALL CLASSES						
	CUSUM	Grade A	1	4	3		
		Grade B	1	9	4		

SAMPLE UNIT GRADE							
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$$\text{Slightly} = \frac{20g}{5}$$

$$\text{Materially} = \frac{10g}{5}$$

$$\text{Seriously} = \frac{3g}{5}$$

7. Separate all the pieces of **extraneous vegetable material (EVM)** into 2 categories as follows:

- Severe (edible) – Tender, green blades of grass or weeds or leaves which are harmless; or
- Critical (inedible) – Course blades of grass or weeds or leaves which may or may not be tender or green and which are harmless.

Count pieces of other similar plants, such as cauliflower or brussels sprouts, as edible EVM. Place each piece of EVM, by category, end-to-end (use the longest dimension) in a continuous row. Measure each category separately. Record the

Suggested Order of Grading Under On-Line Inspection

number of EVM defects on the defect tally sheet (each 2.5 cm increment is 1 defect).

Example 28:

C R I T I C A L	EVM (inedible)					1	←
	TOTAL CRITICAL						
	CUSUM	Grade A	0	0.5	0.5		
		Grade B	0.4	0.8	1.6		

S E V E R E	Blemished (Seriously)						
	Fiber (Woody)						
	EVM (edible)					2	
	TOTAL SEVERE						
	CUSUM	Grade A	0.4	0.8	1.6		
Grade B		1	1	2			

$\frac{3\text{ cm}}{2.5}$

$\frac{1\text{ cm}}{2.5}$

8. At a sampling frequency outlined in [Sampling Manual](#), check the sample unit for **style compliance**. (Note: It isn't necessary to check the style of each sample unit drawn for quality).
 - a. Disregard leaf material, pieces of leaves, and EVM;
 - b. Consider the product for the style that it is offered for even if there is a disagreement with the declaration of style;
 - c. Separate all cuts in the sample unit that are longer than 5 cm and place them on a suitable scale. Record the composite weight. Count each 5 g increment of this weight as 1 major style defective;
 - d. Separate all cuts in the sample unit that are shorter than 1.5 cm (exclusive of chaff) and place them on a suitable scale. Record the composite weight. Count each 5 g increment of this weight as 1 minor style defective;

Suggested Order of Grading Under On-Line Inspection

Example 29:

S T Y L E	Major (Longer than 5 cm)					▶ 3	
	CUSUM	250 g	1	4	3		
	Minor (Shorter than 1.5 cm)					8	
	CUSUM	250 g	1	6	4		
	Head Material						
	Leaf Material						

Longer than 5 cm = $\frac{14\text{ g}}{5\text{ g}}$

Shorter than 1.5 cm = $\frac{28\text{ g}}{5\text{ g}}$

- e. Record the number of minor and major style defectives in the style section of the defect tally sheet. If a style failure occurs, certify the style as “pieces”;
- f. Separate the stalk material and ignore it;
- g. Separate the head material and weigh (“Bald” units completely stripped of flower buds should not be considered as head material);
- h. Separate the leaf material and weigh; and
- i. Allow, regardless of sample unit size, the following:
 - Average
 - Head material not less than 25% (62.5 g /250 g)
 - Leaf material not more than 25% (62.5 g /250 g)
 - Individual Sample Unit
 - Head material not less than 15% (37.5 g /250 g)
 - Leaf material not more than 35% (87.5 g /250 g)

Suggested Order of Grading Under On-Line Inspection

Example 30:

S T Y L E	Major (Longer than 5 cm)						
	CUSUM		1	4	3		
	Minor (Shorter than 1.5 cm)						
	CUSUM		1	6	4		
	Head Material		250 g			30% / 75g	
	Leaf Material		250 g			20% / 50g	

9. After the sample unit has been evaluated for style, or if the sample unit is skipped for style evaluation, cook a representative portion of the cut broccoli as outlined in the *Cooking Procedures* section of the [Technical Procedures Manual](#). Inspectors may wish to select only “suspect” units for the cooking test. It isn't necessary to cook each sample unit unless a problem develops, such as fibrous units or grit.
10. Evaluate the cooked broccoli for **flavor and odor**. Assign the letter grade (A, B, or SSTD) for flavor and odor in the section for “prerequisites.” It isn't necessary to cook each sample unit unless a problem develops. Consider any objectionable “off-flavor” (“hay-like,” “straw-like,” “smoke,” “chemical,” or “sour”), but edible sample unit, as Substandard. Permit a slight “hay-like” or “straw-like” odor in grade B.
11. Evaluate the cooked broccoli for **grit or silt**. Assign the letter grade (A, B, or SSTD) for freedom from grit in the section for “prerequisites.” It isn't necessary to cook each sample unit for the grit evaluation unless a problem develops.
12. Evaluate the cooked broccoli for **fiber**. Be alert for fiber located in the pieces (cuts) that are made from the base end of the stalk. Fiber can be deceptive. It's usually more tender after cooking than would be expected. It isn't necessary to cook each sample unit unless a problem develops. However, cook enough of the “suspect” cuts to determine where the problem units may be.

If any detectable fiber is to be counted against the sample unit, cook the entire sample unit. Follow this procedure:

- a. Separate all the units with major fiber (nonwoody noticeable fiber but can be eaten without difficulty) and place them on a suitable scale. Record the composite weight. Count each 5 g increment of this weight as 1 major defect;

Suggested Order of Grading Under On-Line Inspection

- b. Separate all the units with severe fiber (woody) and place them on a suitable scale. Record the composite weight. Count each 5 g increment of this weight as 1 severe defect; and
- c. Record the number of minor and major fiber defects on the defect tally sheet.

Example 31:

S E V E R E	Blemished (Seriously)						
	Fiber (Woody)					1 ←	
	EVM (edible)						
	TOTAL SEVERE						
	CUSUM	Grade A	0.4	0.8	1.6		
Grade B		1	1	2			

M A J O R	Blemished (Materially)						
	Fiber (Nonwoody)					2 ←	
	TOTAL MAJOR						
	CUSUM	Grade A				1.5	1.5
		Grade B	1	3	3		

Nonwoody fiber = $\frac{10\text{ g}}{5}$ -----

Woody fiber = $\frac{5\text{ g}}{5}$ -----

13. Total the classes of defects on the defect tally sheet and compute the CUSUM values as outlined in [Cumulative Sum Sampling Plan \(CUSUM\) Attributes Standards](#).

Suggested Order of Grading Under On-Line Inspection

CHOPPED BROCCOLI

1. Select a 250 g sample unit from the processing line at random (either before freezing or after freezing).

Inspectors may also use the following optional sample unit size:

- 500 g (200-2.5 g increments – use the 200 plan in [§52.38b](#)).

Note: Larger sample unit sizes require more time to grade. Regardless of the sample unit size chosen, keep it constant for each basic grading period. Inspectors may use different sample unit sizes between style compliance and quality compliance.

Example 32:

Sample Unit Size	Head/Leaf Material	Other Style	Quality
250 g	50 g	250 g	250 g
250 g	100 g	250 g	250 g
500 g	50 g	250 g	500 g
500 g	100 g	250 g	500 g
500 g	250 g	500 g	500 g

2. Arrange the sample unit of chopped broccoli on a grading tray to make each unit easily visible.
3. Evaluate “**brightness**” and record the letter grade (A, B, or SSTD) in the “prerequisites” section of the defect tally sheet. The overall brightness may be slightly dull in grade B. Count “off-color” (yellowish or brownish discoloration) as Substandard.
4. At the same time that brightness is evaluated, record the letter grade (A or SSTD) for **similar varietal characteristics** in the “prerequisites” section of the defect tally sheet.
5. Evaluate the chopped broccoli for **development** (head and bud cluster stages of maturity). Even though the USDA photo guides which show various stages of development, cover only spears, inspectors may use these photo guides as an indication of the cut-off point between “reasonably well developed” and “poorly developed.”

The development classifications of chopped broccoli are as follows:

Suggested Order of Grading Under On-Line Inspection

- **Grade A** – the broccoli may be only “reasonably well developed” (grade B); or
- **Grade B** – the broccoli may be only “poorly developed” (SSTD) if the appearance is not materially affected. Poorly developed means the individual buds are in the flowering stage.

Record the letter grade (A, B, or SSTD) for development in the “prerequisites” section of the defect tally sheet.

6. Separate all the blemished units into 3 categories:

- Slightly;
- Materially; or
- Seriously.

Place each category on a suitable scale. Record the weight. Each 2.5 g increment of this weight is 1 defect.

Blemished broccoli is the most common defect. Usually blemishes are:

- Discolored hollow or pithy stalks (don't count hollow or pithy stalks unless they're associated with discoloration);
- Yellow leaves;
- Orange buds (3 or more orange buds in a single area is the cut-off point between blemished and non-blemished); and
- Olive-green leaf stem (petiole);

Record the number of blemished defects on the defect tally sheet (each 2.5 g increment is 1 defect) as follows:

- Minor;
 - Major; or
 - Severe.
- 
- Use photo guides for spears, if available.

Suggested Order of Grading Under On-Line Inspection

Example 33:

S E V E R E	Blemished (Seriously)					2	
	Fiber (Woody)						
	EVM (edible)						
	TOTAL SEVERE						
	CUSUM	Grade A	0.5	1.5	2		
Grade B		1	2	2			

M A J O R	Blemished (Materially)					5
	Fiber (Nonwoody)					
	TOTAL MAJOR					
	CUSUM	Grade A	1	3	3	
Grade B		1	6	4		

M I N	Blemished (Slightly)					10
	TOTAL MINOR					

T O T A L	TOTAL ALL CLASSES						
	CUSUM	Grade A	1	8	4		
		Grade B	2	17	7		

SAMPLE UNIT GRADE							
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$$\text{Slightly} = \frac{25 \text{ g}}{2.5}$$

$$\text{Materially} = \frac{12 \text{ g}}{2.5}$$

$$\text{Seriously} = \frac{5 \text{ g}}{2.5}$$

7. Separate all the pieces of **extraneous vegetable material (EVM)** into 2 categories as follows:

- Severe (edible) – Tender, green blades of grass or weeds or leaves which are harmless; or
- Critical (inedible) – Course blades of grass or weeds or leaves which may or may not be tender or green and which are harmless.

Count pieces of other similar plants, such as cauliflower or brussels sprouts, as edible EVM. Place each piece of EVM, by category, end-to-end (use the longest dimension) in a continuous row. Measure each category separately. Record the

Suggested Order of Grading Under On-Line Inspection

number of EVM defects on the defect tally sheet (each 2.5 cm increment is 1 defect).

Example 34:

C R I T I C A L	EVM (inedible)					1	
	TOTAL CRITICAL						
	CUSUM	Grade A	0	0.5	0.5		
		Grade B	0	1	1		

S E V E R E	Blemished (Seriously)						
	Fiber (Woody)						
	EVM (edible)					2	
	TOTAL SEVERE						
	CUSUM	Grade A	0.5	1.5	2		
		Grade B	1	2	2		

$\frac{3\text{ cm}}{2.5}$

$\frac{1\text{ cm}}{2.5}$

8. At a sampling frequency outlined in the [Sampling Manual](#), check the sample unit for **style compliance**. (Note: It isn't necessary to check the style of each sample unit drawn for quality).
 - a. Disregard leaf material, pieces of leaves, and EVM;
 - b. Consider the product for the style that it is offered for even if there is a disagreement with the declaration of style;
 - c. Separate all cuts in the sample unit that are longer than 2 cm and place them on a suitable scale. Record the composite weight. Count each 2.5 g increment of this weight as 1 minor style defective;
 - d. Record the number of minor style defectives in the style section of the defect tally sheet. If a style failure occurs, certify the style as "pieces";

Example 35:

Suggested Order of Grading Under On-Line Inspection

S T Y L E	Minor (Longer than 2 cm)					5	
	CUSUM		2	10	5		
	Head Material (50g Sample Size)						
	Leaf Material (50g Sample Size)						

$$\text{Longer than 2 cm} = \frac{12.5 \text{ g}}{2.5 \text{ g}}$$

- e. Separate the stalk material and ignore it;
- f. Separate the head material and weigh ("Bald" units completely stripped of flower buds should not be considered as head material);
- g. Separate the leaf material and weigh; and
- h. Allow, regardless of sample unit size, the following:
 - Average
 - Head material not less than 25% (12.5 g /50 g)
 - Leaf material not more than 25% (12.5 g /50 g)
 - Individual Sample Unit
 - Head material not less than 15% (7.5 g /50 g)
 - Leaf material not more than 35% (17.5 g /50 g)

Example 36:

S T Y L E	Minor (Longer than 2 cm)						
	CUSUM		2	10	5		
	Head Material (50g Sample Size)					30% / 15g	
	Leaf Material (50g Sample Size)					20% / 10g	

9. After the sample unit has been evaluated for style, or if the sample unit is skipped for style evaluation, cook a representative portion of the chopped broccoli as outlined in the *Cooking Procedures* section of the [Technical Procedures Manual](#). Inspectors may wish to select only "suspect" units for the cooking test. It isn't necessary to cook each sample unit unless a problem develops, such as fibrous units or grit.

Suggested Order of Grading Under On-Line Inspection

10. Evaluate the cooked broccoli for **flavor and odor**. Assign the letter grade (A, B, or SSTD) for flavor and odor in the section for “prerequisites.” It isn’t necessary to cook each sample unit unless a problem develops. Consider any objectionable “off-flavor” (“hay-like,” “straw-like,” “smoke,” “chemical,” or “sour”), but edible sample unit, as Substandard. Permit a slight “hay-like” or “straw-like” odor in grade B.
11. Evaluate the cooked broccoli for **grit or silt**. Assign the letter grade (A, B, or SSTD) for freedom from grit in the section for “prerequisites.” It isn’t necessary to cook each sample unit for the grit evaluation unless a problem develops.
12. Evaluate the cooked broccoli for **fiber**. Be alert for fiber located in the pieces (chops) that are made from the base end of the stalk. Fiber can be deceptive. It’s usually more tender after cooking than would be expected. It isn’t necessary to cook each sample unit unless a problem develops. However, cook enough of the “suspect” units to determine where the problem units may be. If any detectable fiber is to be counted against the sample unit, cook the entire sample unit. Follow this procedure:
 - a. Separate all the units with major fiber (nonwoody noticeable fiber but can be eaten without difficulty) and place them on a suitable scale. Record the composite weight. Count each 2.5 g increment of this weight as 1 major defect;
 - b. Separate all the units with severe fiber (woody) and place them on a suitable scale. Record the composite weight. Count each 2.5 g increment of this weight as 1 severe defect; and
 - c. Record the number of major and severe fiber defects on the defect tally sheet.

Example 37:

Suggested Order of Grading Under On-Line Inspection

S E V E R E	Blemished (Seriously)						
	Fiber (Woody)					2 ←	
	EVM (edible)						
	TOTAL SEVERE						
	CUSUM	Grade A	0.5	1.5	2		
Grade B		1	2	2			

M A J O R	Blemished (Materially)						
	Fiber (Nonwoody)					4 ←	
	TOTAL MAJOR						
	CUSUM	Grade A	1	3	3		
		Grade B	1	6	4		

$$\text{Nonwoody fiber} = \frac{8g}{2.5}$$

$$\text{Woody fiber} = \frac{5g}{2.5}$$

13. Total the classes of defects on the defect tally sheet and compute CUSUM values as outlined in [Cumulative Sum Sampling Plan \(CUSUM\) Attributes Standards](#).

Suggested Order of Grading Under On-Line Inspection

BROCCOLI PIECES

1. Select a 250 g sample unit from the processing line at random (either before freezing or after freezing). Inspectors may also use the following optional sample unit sizes:

- 500 g (100 – 5 g increments – use the 100 plan [§52.38b](#)) or
- 1000 g (200 – 5 g increments – use the 200 plan [§52.38b](#)).

Note: Larger sample unit sizes require more time to grade. Regardless of the sample unit size that is chosen, keep it constant for each basic grading period.

2. Arrange the sample unit of broccoli on a grading tray to make each unit easily visible.
3. Evaluate “**brightness**” and record the letter grade (A, B, or SSTD) in the “prerequisites” section of the defect tally sheet. The overall brightness may be slightly dull in grade B. Count “off-color” (yellowish or brownish discoloration) as Substandard.
4. At the same time that brightness is evaluated, record the letter grade (A or SSTD) for **similar varietal characteristics** in the “prerequisites” section of the defect tally sheet.
5. Evaluate the broccoli for **development** (head and bud cluster stages of maturity). Even though the USDA photo guides which show various stages of development, cover only spears, inspectors may use these photo guides as an indication of the cut-off point between “reasonably well developed” and “poorly developed.”

The development classifications of broccoli pieces are as follows:

- **Grade A** – the broccoli may be only “reasonably well developed” (grade B); or
- **Grade B** – the broccoli may be only “poorly developed” (SSTD) if the appearance is not materially affected. Poorly developed means the individual buds are in the flowering stage.

Record the letter grade (A, B, or SSTD) for development in the “prerequisites” section of the defect tally sheet.

6. Separate all the blemished units into 3 categories:
 - Slightly;

Suggested Order of Grading Under On-Line Inspection

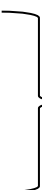
- Materially; or
- Seriously.

Place each category on a suitable scale. Record the weight. Each 5 g increment of this weight is 1 defect.

Blemished broccoli is the most common defect. Usually blemishes are:

- Discolored hollow or pithy stalks (don't count hollow or pithy stalks unless they're associated with discoloration);
- Yellow leaves;
- Orange buds (3 or more orange buds in a single area is the cut-off point between blemished and non-blemished); and
- Olive-green leaf stem (petiole).

Record the number of blemished defects on the defect tally sheet (each 5 g increment is 1 defect) as follows:

- Minor;
 - Major; or
 - Severe.
- 
- Use photo guides for spears, if available.

Suggested Order of Grading Under On-Line Inspection

Example 38:

S E V E R E	Blemished (Seriously)					1	
	Fiber (Woody)						
	EVM (edible)						
	TOTAL SEVERE						
	CUSUM	Grade A	0.4	0.8	1.6		
Grade B		1	1	2			

M A J O R	Blemished (Materially)					2	
	Fiber (Nonwoody)						
	TOTAL MAJOR						
	CUSUM	Grade A	1.5	1.5	3		
		Grade B	1	3	3		

M I N	Blemished (Slightly)					4	
	TOTAL MINOR						

T O T A L	TOTAL ALL CLASSES						
	CUSUM	Grade A	1	4	3		
		Grade B	1	9	4		

SAMPLE UNIT GRADE							
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$$\text{Slightly} = \frac{20g}{5}$$

$$\text{Materially} = \frac{10g}{5}$$

$$\text{Seriously} = \frac{3g}{5}$$

7. Separate all the pieces of **extraneous vegetable material (EVM)** into 2 categories as follows:

- Severe (edible) – Tender, green blades of grass or weeds or leaves which are harmless; or
- Critical (inedible) – Course blades of grass or weeds or leaves which may or may not be tender or green and which are harmless.

Count pieces of other similar plants, such as cauliflower or brussels sprouts, as edible EVM. Place each piece of EVM, by category, end-to-end (use the longest dimension) in a continuous row. Measure each category separately. Record the number of EVM defects on the defect tally sheet (each 2.5 cm increment is 1 defect).

Suggested Order of Grading Under On-Line Inspection

Example 39:

C R I T I C A L	EVM (inedible)					1	
	TOTAL CRITICAL						
	CUSUM	Grade A	0	0.5	0.5		
		Grade B	0.4	0.8	1.6		

S E V E R E	Blemished (Seriously)						
	Fiber (Woody)						
	EVM (edible)					2	
	TOTAL SEVERE						
	CUSUM	Grade A	0.4	0.8	1.6		
		Grade B	1	1	2		

$\frac{3\text{ cm}}{2.5}$

$\frac{1\text{ cm}}{2.5}$

8. Cook a representative portion of the broccoli as outlined in the *Cooking Procedures* section of the [Technical Procedures Manual](#). Inspectors may wish to select only “suspect” units for the cooking test. It isn't necessary to cook each sample unit unless a problem develops, such as fibrous units or grit.

9. Evaluate the cooked broccoli for **flavor and odor**. Assign the letter grade (A, B, or SST) for flavor and odor in the section for “prerequisites.” It isn't necessary to cook each sample unit unless a problem develops. Consider any objectionable “off-flavor” (“hay-like,” “straw-like,” “smoke,” “chemical,” or “sour”), but edible sample unit, as Substandard. Permit a slight “hay-like” or “straw like” odor in grade B.

10. Evaluate the cooked broccoli for **grit or silt**. Assign the letter grade (A, B, or SST) for freedom from grit in the section for “prerequisites.” It isn't necessary to cook each sample unit for the grit evaluation unless a problem develops.

11. Evaluate the cooked broccoli for **fiber**. Be alert for fiber located in the pieces that are cut from the base end of the stalk. Fiber can be deceptive. It's usually more tender after cooking than would be expected. It isn't necessary to cook each sample unit unless a problem develops. However, cook enough of the “suspect” units to determine where the problem units may be. The expected incidence of fiber may be higher in broccoli “pieces” than in any other style because of the absence of any head material requirement; thus, “pieces” may be composed of all stalk material.

Suggested Order of Grading Under On-Line Inspection

If any detectable fiber is to be counted against the sample unit, cook the entire sample unit. Follow this procedure:

- Separate all the units with major fiber (nonwoody noticeable fiber but can be eaten without difficulty) and place them on a suitable scale. Record the composite weight. Count each 5 g increment of this weight as 1 major defect;
- Separate all the units with severe fiber (woody) and place them on a suitable scale. Record the composite weight. Count each 5 g increment of this weight as 1 severe defect; and
- Record the number of major and severe fiber defects on the defect tally sheet.

Example 40:

S E V E R E	Blemished (Seriously)						
	Fiber (Woody)					1	
	EVM (edible)						
	TOTAL SEVERE						
	CUSUM	Grade A	0.4	0.8	1.6		
		Grade B	1	1	2		
M A J O R	Blemished (Materially)						
	Fiber (Nonwoody)					2	
	TOTAL MAJOR						
	CUSUM	Grade A	1.5	1.5	3		
		Grade B	1	3	3		

Nonwoody fiber = $\frac{10\text{ g}}{5}$ Woody fiber = $\frac{5\text{ g}}{5}$

- Total the classes of defects on the defect tally sheet and compute CUSUM values as outlined in [Cumulative Sum Sampling Plan \(CUSUM\) Attributes Standards](#).
- The style of “pieces” is a catch all from “cut” and “chopped” broccoli. It doesn't have a requirement for head material; thus, the entire sample unit could be stalk and leaf material. Any sample unit that fails requirements for “cut” or “chopped” is to be classified as “pieces.” However, this is not true for “spears” or “short spears.”

Suggested Order of Grading Under Lot Inspection

PART III – LOT INSPECTION OF FROZEN BROCCOLI

SUGGESTED ORDER OF GRADING UNDER LOT INSPECTION

SPEARS

1. Follow the procedure outlined in the [Lot Single Sampling Plan \(Attributes\)](#).
2. Use the same defect tally sheet for lot inspection as would be used for on-line inspection. Ignore the section of the tally sheet devoted to CUSUM values.
3. Open each individual container drawn for the lot. Keep the product in its container. On a container-by-container basis, without sorting through the product, tentatively evaluate the following prerequisites:
 - a. Evaluate “**brightness**” and record the letter grade (A, B, or SSTD) in the “prerequisites” section of the defect tally sheet. The overall brightness may be slightly dull in grade B. Count “off-color” (yellowish or brownish discoloration) as Substandard.
 - b. At the same time that brightness is evaluated, record the letter grade (A or SSTD) for **similar varietal characteristics** in the “prerequisites” section of the defect tally sheet.
 - c. Evaluate the broccoli for **odor**. Assign the letter grade (A, B, or SSTD) for flavor and odor in the section for “prerequisites.” Consider any objectionable “off-odor” (“hay-like,” “straw-like,” “smoke,” “chemical” or “sour”) as Substandard. However, the sample must be edible in step 19. Permit a slight “hay-like” or “straw-like” odor in Grade B.
 - d. Assign the letter grade (A, B, or SSTD) for **freedom from grit** in the section for “prerequisites.”
 - e. If any container is “suspect” because of “brightness,” “odor,” or “grit,” identify the container and its product for further examination.

Example 41: Prerequisites on a container-by-container basis

Prerequisite	Carton No. 1	Carton No. 2	Carton No. 3, etc.
Similar Varietal Char.	A	A	A
Brightness	A	A	A
Flavor and Odor	A	A	A
Grit and Silt	A	A	A

Suggested Order of Grading Under Lot Inspection

The grade for a lot of broccoli spears may not be higher than the grade of any “prerequisite” grade for any individual sample unit in the sample. If the sample fails the anticipated grade because of a prerequisite factor, don't skip the other factors. Continue grading the sample but don't spend excessive time with problem areas, such as uniformity of size, borderline trim, borderline development, etc.

4. Assemble (physically or mentally) all the spears from all the containers into one sample (for the entire lot). Adjust the total number of spears from each container to meet the applicable lot single sampling plan being used. If any of the cartons are “suspect” in step 3, inspectors may wish to assemble the spears mentally into one sample (for the entire lot). This procedure would enable the inspector to retain the identity of the “suspect” cartons.

Example 42:

Spears Per Carton	Number of Cartons			
	6	13	21	29
6	36	78	126	174
13	78	169	273	377
25	150	325	525	725
50	300	650	1050	1450
100	600	1300	2100	2900

5. Reassemble any **broken spears**. Count each reassembled spear as a single unit. Ensure there are still a total of 50 spears. See [Appendix I – Interpretative Guide for the Determination of Detached Fragments](#).

§52.635 Definitions of terms. (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.

6. Evaluate the **color** of the individual broccoli spears. The color classification of each broccoli spear is one of the following:
 - **Good color (grade A color)** – not a defect in any grade;
 - **Reasonably good color (grade B color)** – a defect in grade A only; or
 - **Poor color (Substandard color)** – A defect in grade A and grade B.

If a spear is blemished because of orange buds, olive-green leaf stem (petiole), etc., ignore the blemished areas for the purpose of color evaluation. Don't count

Suggested Order of Grading Under Lot Inspection

a spear as “reasonably good” color or “poor” color because it is blemished. Record the total number of spears in the sample on the defect tally sheet that are either “reasonably good” or “poor” color (not each container). If the sample fails requirements for grade A, adjust the tally sheet by dropping the number of “reasonably good” spears from the grade B defects. Reasonably good color (grade B color) is not a defect in a grade B sample. Count only “poor” color against a grade B sample.

Note: The white or creamy-white color on the underside of head material is a characteristic of young compact heads and has no bearing on the grade.

Example 43:

50 x 13 = 650 Spears

M A J O R	Color (Reas. Good) in A					30
	Size (Length)					10
	Detached Fragments					5
	Blemished (Materially)					10
	Trim (Poor) in A					
	Development (Poor)					
	Fiber (Non woody)					5
	TOTAL MAJOR					30 60
C U S U M	Grade A	1	4	3		
	Grade B	1	6	4		

T O T A L	TOTAL ALL CLASSES					110 140
	Grade A	2	12	5		
	Grade B	2	14	7		

SAMPLE UNIT GRADE					B
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Failed grade A

Drop the defects that are counted only against grade A before checking for compliance with grade B

7. Weigh all the **detached fragments**, if any, in the sample (not each container). Don't include loose leaves or pieces of leaves in the weight, these are minor defects. Ignore any chaff. Don't be overly critical but count each 28 g increment of the composite weight (all the detached fragments in the sample) as 1 major defect. See [Appendix I – Interpretative Guide for the Determination of Detached Fragments](#). Record on the defect tally sheet the total number of detached fragment defects as follows:

- 0 – 28 grams = 1 defect;
- 29 – 56 grams = 2 defects; or

Suggested Order of Grading Under Lot Inspection

- 57 – 84 grams = 3 defects, etc.

Example 44:

50 x 13 = 650 Spears

M A J O R	Color (Reas. Good) in A					
	Size (Length)					
	Detached Fragments					11
	Blemished (Materially)					
	Trim (Poor) in A					
	Development (Poor)					
	Fiber (Non woody)					
	TOTAL MAJOR					
	CUSUM	Grade A	1	4	3	
Grade B		1	6	4		

T O T A L	TOTAL ALL CLASSES					
	CUSUM	Grade A	2	12	5	
		Grade B	2	14	7	

SAMPLE UNIT GRADE					
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$$\text{Detached Fragments} = \frac{300 \text{ g}}{28}$$

8. Weigh the **loose leaves** and **pieces of leaves**, if any, in the sample (not each container). Count each 14 g increment of the composite weight (all the loose leaf material in the sample) as 1 minor defect. Record the total number of loose leaf defects on the tally sheet as follows:
- 0 – 14 grams = 1 defect;
 - 15 – 28 grams = 2 defects; or
 - 29 – 42 grams = 3 defects, etc.

Suggested Order of Grading Under Lot Inspection

Example 45:

50 x 13 = 650 Spears

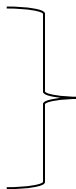
M I N O R	Size (Diameter)		
	Loose Leaves		18
	Broken		
	Damaged		
	Blemished (Slightly)		
	Trim (Reas. Well) in A		
	Trim (Poor) in B		
	Development (Reas. Well) in A		
	TOTAL MINOR		

Loose Leaves = $\frac{250\text{ g}}{14}$

9. Count the number of **broken spears**. These need to be the same spears that were reassembled in step 5, if any. Record the total number of broken spears in the sample (not each container) on the tally sheet.
10. Count the number of spears with **mechanical damage** to the head of the spear. Don't be overly critical. Don't count broken spears (step 9) or trimmed spears (step 12) as damaged, or vice versa. Record the total number of damaged spears in the sample (not each container) on the defect tally sheet.
11. Count the number of spears in the sample that are **blemished** (not each container). Blemished broccoli is the most common defect. Usually, blemishes are:
 - Discolored hollow or pithy stalks (don't count hollow or pithy stalks unless they're associated with discoloration);
 - Yellow leaves;
 - Orange buds (6 or more orange buds in a single area of the head is the cut-off point between blemished and non-blemished); and
 - Olive-green leaf stem (petiole).

Suggested Order of Grading Under Lot Inspection

Record the total number of blemished spears on the defect tally sheet as follows (use photo guides if available):

- Minor;
 - Major; or
 - Severe.
- 
- Use photo guides, if available.

12. Count the number of spears in the sample that are adversely affected by **trimming** (not each container). Use the USDA photo guides, if available. The trim classification of each broccoli spear is one of the following:

- **Well trimmed** (grade A trim) – Not a defect in any grade;
- **Reasonably well trimmed** (grade B trim) – A defect only in grade A; or
- **Poorly trimmed** (Substandard trim) – A major defect in grade A and a minor defect in grade B.

Record the total number of spears in the sample that are either “reasonably well trimmed” or “poorly trimmed” (not each container) on the defect tally sheet. If the sample fails requirements for grade A, adjust the defect tally sheet by:

- a. Dropping all “reasonably well trimmed” spears from the defects counted against grade B; and
- b. Striking out the major defects against grade A and moving them to minor defects to be counted against grade B.

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Example 46: Failed grade A, check against grade B

50 x 13 = 650 Spears

M A J O R	Color (Reas. Good) in A					
	Size (Length)					5
	Detached Fragments					
	Blemished (Materially)					20
	Trim (Poor) in A					40
	Development (Poor)					
	Fiber (Non woody)					
	TOTAL MAJOR					25 65
CUSUM	Grade A	1	4	3	85 160	
	Grade B	1	6	4		

M I N O R	Size (Diameter)					
	Loose Leaves					
	Broken					
	Damaged					
	Blemished (Slightly)					
	Trim (Reas. Well) in A					75
	Trim (Poor) in B					40
	Development (Reas. Well) in A					
	TOTAL MINOR					40 75

T O T A L	TOTAL ALL CLASSES					85 160
	CUSUM	Grade A	2	12	5	85 160
		Grade B	2	14	7	

SAMPLE UNIT GRADE					B
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Drop the defects that are counted only against grade A, before checking for compliance with grade B

13. Count the total number of spears in the sample that are adversely affected by **development** (head and bud cluster stages of maturity). Use the USDA photo guides, if available. The development classification of each broccoli spear is one of the following:

- **Well developed** (grade A development) – Not a defect in any grade;
- **Reasonably well developed** (grade B development) – A defect only in grade A; or
- **Poorly developed** (Substandard development) – A defect in grade A and grade B.

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Record the total number of spears that are either “reasonably well developed” or “poorly developed” on the defect tally sheet. If the sample fails requirements for grade A, adjust the tally sheet by dropping all “reasonably well developed” spears from the number of defects that are to be counted against grade B. Reasonably well developed (grade B development) isn't a defect in a grade B sample. Count only “poorly” developed spears as defects in a grade B sample.

Example 47: Failed grade A, check against grade B

50 x 13 = 650 Spears

MAJOR	Color (Reas. Good) in A					
	Size (Length)					
	Detached Fragments					
	Blemished (Materially)					
	Trim (Poor) in A					
	Development (Poor)					25
	Fiber (Non woody)					
	TOTAL MAJOR					25
CUSUM	Grade A	1	4	3		
	Grade B	1	6	4		

MINOR	Size (Diameter)					5
	Loose Leaves					5
	Broken					
	Damaged					
	Blemished (Slightly)					50
	Trim (Reas. Well) in A					
	Trim (Poor) in B					
	Development (Reas. Well) in A					100
	TOTAL MINOR					60 160

TOTAL	TOTAL ALL CLASSES					100 200			
	CUSUM	Grade A				2	12	5	
		Grade B				2	14	7	

SAMPLE UNIT GRADE	B
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Drop the defects that are counted only against grade A, before checking for compliance with grade B

14. Count the total number of pieces of **extraneous vegetable material (EVM)** in the sample (not each container). Count pieces of other similar plants, such as

Suggested Order of Grading Under Lot Inspection

cauliflower or brussels sprouts, as edible EVM. Record the total number of pieces of EVM on the defect tally sheet as follows:

- Severe (edible) – Tender, green blades of grass or weeds or leaves which are harmless; or
- Critical (inedible) – Course blades of grass or weeds or leaves which may or may not be tender or green and which are harmless.

15. Establish by observation the predominant length of the broccoli spears in the sample for **uniformity of size**. Don't be overly critical. If it is apparent the spears vary less than 5 cm from the predominant length, accept them as meeting length requirements. If some spears obviously vary more than 5 cm from the predominant length, do the following:

- a. Determine size variation so that the least number of defects are tallied against length; and
- b. Record the number of length defects in the total sample (not each container) on the defect tally sheet.

See [Example 2](#), [Example 3](#), and [Example 4](#).

16. Establish by observation the predominant diameter of the broccoli spears in the sample for **uniformity of diameter**. Don't be overly critical. If it is apparent the spears vary less than 2 cm from the predominant diameter, accept them as meeting requirements. If some spears obviously vary more than 2 cm from the predominant diameter, do the following:

- a. Determine diameter variation so that the least number of defects are tallied against diameter; and
- b. Record the number of diameter defects in the sample (not each container) on the defect tally sheet.

See [Example 5](#).

17. Evaluate the sample for compliance with **style requirements**.

- a. Disregard loose leaf material, pieces of leaves, EVM, and detached fragments. See [Appendix I – Interpretative Guide for the Determination of Detached Fragments](#);
- b. Determine the total number of spears in the sample (not each container) that are longer than 15.5 cm;

Suggested Order of Grading Under Lot Inspection

- c. Determine the total number of spears in the sample (not each container) that are shorter than 8.5 cm; and
- d. Record the number of defective spears found (in b and c above) in the style section of the defect tally sheet. Spears that fail style requirements aren't "pieces." If a style failure occurs, certify the grade but show: "Fails style compliance for spears."

See [Example 1](#).

- 18. Cook a representative portion of the spears as outlined in the *Cooking Procedures* section of the [Technical Procedures Manual](#). Inspectors may wish to select only "suspect" (step 3) spears for the cooking test. It isn't necessary to cook each sample unit unless a problem develops, such as fibrous spears.
- 19. Evaluate the cooked broccoli for **flavor** to verify the tentative grade given for odor in step 3.
- 20. Evaluate the cooked broccoli by chewing. This should verify the tentative grade given for **grit** in step 3.
- 21. Evaluate the cooked broccoli for **fiber**. Only fiber which is detectable in the cooked broccoli needs to be counted. It is not necessary to cook all the spears that are suspected of having tough fiber if enough of the spears are cooked to accurately determine where the problem units may be.
- 22. Compare the total number of **defects** found in the lot (entire sample) with the acceptance number for the applicable AQL and sample size in the regulations ([7 CFR §52.38c](#), Tables XV-XIX) or using the tables shown on the last couple pages of the [Lot Single Sampling Plan \(Attributes\)](#).

§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
AQL²	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.

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23. Compare the total number of **style** defectives found in the lot (entire sample) with the acceptance number for the applicable AQL and sample size in the regulations ([7 CFR §52.38c](#), Tables XV-XIX) or by using the tables shown on the last pages of the [Lot Single Sampling Plan \(Attributes\)](#).

§52.634 Tolerances for style defectives. 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.

24. Assign a grade to the lot (entire sample) based on the procedure outlined in [Lot Single Sampling Plan \(Attributes\)](#).

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SHORT SPEARS OR FLORETS

1. Follow the procedure outlined in the [Lot Single Sampling Plan \(Attributes\)](#).
2. Use the same defect tally sheet for lot inspection as would be used for on-line inspection. Ignore the section of the tally sheet devoted to CUSUM values.
3. Open each individual container drawn for the sample. Keep product in its container. On a container-by-container basis, without sorting through the product, tentatively evaluate the following prerequisites:
 - a. Evaluate “**brightness**” and record the letter grade (A, B, or SSTD) in the “prerequisites” section of the defect tally sheet. The overall brightness may be slightly dull in grade B. Count “off-color” (yellowish or brownish discoloration) as Substandard.
 - b. At the same time that brightness is evaluated, record the letter grade (A or SSTD) for **similar varietal characteristics** in the “prerequisites” section of the defect tally sheet.
 - c. Evaluate the broccoli for **odor**. Assign the letter grade (A, B, or SSTD) for odor in the section for “prerequisites.” Consider any objectionable “off-odor” (“hay-like,” “straw-like,” “smoke,” “chemical” or “sour”) as Substandard. However, the sample must be edible in step 18. Permit a slight “hay-like” or “straw-like” odor in Grade B.
 - d. Assign the letter grade (A, B, or SSTD) for **freedom from grit** in the section for “prerequisites.”
 - e. If any container is “suspect” because of “brightness,” “odor,” or “grit,” identify the container and its product for further examination.

Example 48: Prerequisites on a container-by-container basis

Prerequisite	Carton No. 1	Carton No. 2	Carton No. 3, etc.
Similar Varietal Char.	A	A	A
Brightness	A	A	A
Flavor and Odor	A	A	A
Grit and Silt	A	A	A

The grade for a lot of broccoli short spears may not be higher than the grade of any “prerequisite” grade for any individual sample unit in the sample. If the sample fails the anticipated grade because of a prerequisite factor, don't skip the other factors. Continue grading the sample but don't

Suggested Order of Grading Under Lot Inspection

spend excessive time with problem areas, such as uniformity of size, borderline trim, borderline development, etc.

4. Assemble (physically or mentally) all the short spears from all the containers into one sample (for the entire lot). Adjust the total number of short spears from each container to meet the lot single sampling plan being used. If any of the cartons are “suspect” in step 3, inspectors may wish to assemble the short spears mentally into one sample (for the entire lot). This procedure would enable the inspector to retain the identity of the “suspect” cartons.

Example 49:

Spears Per Carton	Number of Cartons			
	6	13	21	29
6	36	78	126	174
13	78	169	273	377
25	150	325	525	725
50	300	650	1050	1450
100	600	1300	2100	2900

5. Reassemble any **broken short spear**. Count each reassembled short spear as a single unit. Ensure there are still a total of 50 spears. See [Appendix I – Interpretative Guide for the Determination of Detached Fragments](#).

§52.635 Definitions of terms. (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.

6. Evaluate the **color** of the individual short spears. The color classification of each short spear is one of the following:
 - **Good color** (grade A color) – Not a defect in any grade;
 - **Reasonably good color** (grade B color) – A defect in grade A only; or
 - **Poor color** (Substandard color) – A defect in grade A and grade B.

If a short spear is blemished because of orange buds, olive-green leaf stem (petiole), etc., ignore the blemished areas for the purpose of color evaluation. Don't count a short spear as “reasonably good” color or “poor” color because it is blemished. Record the total number of short spears in the sample that are either “reasonably good” or “poor” color (not each container) on the defect tally sheet. If the sample fails requirements for grade A, adjust the tally sheet by dropping the

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number of “reasonably good” short spears from the grade B defects. Reasonably good color (grade B color) is not a defect in a grade B sample. Count only “poor” color against a grade B sample.

Note: The white or creamy-white color on the underside of head material is a characteristic of young compact heads and has no bearing on the grade.

Example 50:

50 x 13 = 650 Short Spears

M A J O R	Color (Reas. Good) in A					30
	Detached Fragments					15
	Blemished (Materially)					10
	Trim (Poor) in A					
	Development (Poor)					
	Fiber (Non woody)					5
	TOTAL MAJOR					30 60
	CUSUM	Grade A				1
Grade B		1	6	4		

Failed grade A

T O T A L	TOTAL ALL CLASSES					110 140			
	CUSUM	Grade A				2	12	5	
		Grade B				2	14	7	

SAMPLE UNIT GRADE					B
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Drop the defects that are counted only against grade A before checking for compliance with grade B

7. Weigh all the **detached fragments**, if any, in the sample (not each container). Don't include loose leaves or pieces of leaves in the weight, these are minor defects. Ignore any chaff. Don't be overly critical but count each 28 g increment of the composite weight (all the detached fragments in the sample) as 1 major defect. See [Appendix I – Interpretative Guide for the Determination of Detached Fragments](#). Record the total number of detached fragments on the defect tally sheet as follows:

- 0 – 28 grams = 1 defect;
- 29 – 56 grams = 2 defects; or
- 57 – 84 grams = 3 defects, etc.

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Example 51:

50 x 13 = 650 Short Spears

M A J O R	Color (Reas. Good) in A					
	Detached Fragments					11
	Blemished (Materially)					▲
	Trim (Poor) in A					
	Development (Poor)					
	Fiber (Non woody)					
	TOTAL MAJOR					
	CUSUM	Grade A	1	4	3	
Grade B		1	6	4		

T O T A L	TOTAL ALL CLASSES					
	CUSUM	Grade A	2	12	5	
		Grade B	2	14	7	

SAMPLE UNIT GRADE		
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Detached Fragments = $\frac{300 \text{ g}}{28}$ -----

8. Weigh the **loose leaves** and **pieces of leaves**, if any, in the total sample (not each container). Count each 14 g increment of the composite weight (all the loose leaf material in the sample) as 1 minor defect. Record the total number of loose leaf defects on the defect tally sheet as follows:

- 0 – 14 grams = 1 defect;
- 15 – 28 grams = 2 defects; or
- 29 – 42 grams = 3 defects, etc.

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Example 52:

50 x 13 = 650 Short Spears

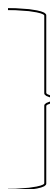
M I N O R	Size (More than 4X)		
	Loose Leaves		18
	Broken		↑
	Damaged		
	Blemished (Slightly)		
	Trim (Reas. Well) in A		
	Trim (Poor) in B		
	Development (Reas. Well) in A		
	TOTAL MINOR		

Loose Leaves = $\frac{250\text{ g}}{14}$ -----

9. Count the number of **broken** short spears. These need to be the same short spears that were reassembled in step 5, if any. Record the total number of broken short spears in the sample (not each container) on the defect tally sheet.
10. Count the number of short spears with **mechanical damage** to the head of the unit. Don't be overly critical. Don't count broken short spears (step 9) or trimmed short spears (step 12) as damaged, or vice versa. Record the total number of damaged short spears in the sample (not each container) on the defect tally sheet.
11. Count the number of short spears in the sample that are **blemished** (not each container). Blemished broccoli is the most common defect. Usually, blemishes are:
 - Discolored hollow or pithy stalks (don't count hollow or pithy stalks unless they're associated with discoloration);
 - Yellow leaves;
 - Orange buds (6 or more orange buds in a single area of the head is the cut-off point between blemished and non-blemished); and
 - Olive-green leaf stem (petiole).

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Record the total number of blemished short spears on the defect tally sheet as follows:

- Minor;
 - Major; or
 - Severe.
- 
- Use photo guides for spears, if available.

12. Count the number of short spears in the sample that are adversely affected by **trimming** (not each container). Use the USDA photo guides, if available. The trim classification of each short spear is one of the following:

- **Well trimmed** (grade A trim) – Not a defect in any grade;
- **Reasonably well trimmed** (grade B trim) – A defect only in grade A; or
- **Poorly trimmed** (Substandard trim) – A major defect in grade A and a minor defect in grade B. Record the total number of spears in the sample that are either “reasonably well trimmed” or “poorly trimmed” (not each container) on the defect tally sheet. If the sample fails requirements for grade A, adjust the defect tally sheet by:
 - (1) Dropping all “reasonably well trimmed” spears from the defects counted against grade B; and
 - (2) Striking out the major defects against grade A and moving them to minor defects to be counted against grade B.

Suggested Order of Grading Under Lot Inspection

Example 53: Failed grade A, check against grade B

50 x 13 = 650 Short Spears

M A J O R	Color (Reas. Good) in A					
	Detached Fragments					5
	Blemished (Materially)					20
	Trim (Poor) in A					40
	Development (Poor)					
	Fiber (Non woody)					
	TOTAL MAJOR					25 65
	CUSUM	Grade A	1	4	3	
Grade B		1	6	4		

M I N O R	Size (More than 4X)					
	Loose Leaves					
	Broken					
	Damaged					
	Blemished (Slightly)					
	Trim (Reas. Well) in A					75
	Trim (Poor) in B					40
	Development (Reas. Well) in A					
TOTAL MINOR		40 75				

T O T A L	TOTAL ALL CLASSES					85 160
	CUSUM	Grade A	2	12	5	
		Grade B	2	14	7	

SAMPLE UNIT GRADE					B
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Drop the defects that are counted only against grade A, before checking for compliance with grade B

13. Count the total number of short spears in the sample that are adversely affected by **development** (head and bud cluster stages of maturity). Use the USDA photo guides, if available. The development classification of each broccoli short spear is one of the following:

- **Well developed** (grade A development) – Not a defect in any grade;
- **Reasonably well developed** (grade B development) – A defect only in grade A; or

Suggested Order of Grading Under Lot Inspection

- **Poorly developed** (Substandard development) – A defect in grade A and grade B.

Record the total number of short spears that are either “reasonably well developed” or “poorly developed” on the defect tally sheet. If the sample fails requirements for grade A, adjust the tally sheet by dropping all “reasonably well developed” short spears from the number of defects that are to be counted against grade B. Reasonably well developed (grade B development) isn't a defect in a grade B sample. Count only “poorly” developed short spears as defects in a grade B sample.

Example 54: Failed grade A, check against grade B

50 x 13 = 650 Short Spears

MAJOR	Color (Reas. Good) in A					
	Detached Fragments					
	Blemished (Materially)					
	Trim (Poor) in A					
	Development (Poor)					25
	Fiber (Non woody)					
	TOTAL MAJOR		25			
CUSUM	Grade A	1	4	3	/	
	Grade B	1	6	4		

MINOR	Size (More than 4X)					5
	Loose Leaves					5
	Broken					
	Damaged					
	Blemished (Slightly)					50
	Trim (Reas. Well) in A					
	Trim (Poor) in B					
	Development (Reas. Well) in A					100
	TOTAL MINOR					60 160

TOTAL	TOTAL ALL CLASSES					100 200
	CUSUM	Grade A	2	12	5	/
		Grade B	2	14	7	

SAMPLE UNIT GRADE	B
--------------------------	----------

Drop the defects that are counted only against grade A, before checking for compliance with grade B

Suggested Order of Grading Under Lot Inspection

14. Count the total number of **extraneous vegetable material (EVM)** in the sample (not each container). Count pieces of other similar plants, such as cauliflower or brussels sprouts, as edible EVM. Record on the defect tally the total number of pieces of EVM as follows:
 - Severe (edible) – Tender, green blades of grass or weeds or leaves which are harmless; or
 - Critical (inedible) – Course blades of grass or weeds or leaves which may or may not be tender or green and which are harmless.
 15. Establish by observation the predominant weight of the short spears in the sample to check for **uniformity of size**. Don't be overly critical. If it is apparent the short spears vary less than 4 times (4X) from the predominant weight, accept them as meeting requirements. If some short spears obviously vary more than 4X from the predominant weight, do the following:
 - a. Determine size variation so that the least number of defects are tallied against size. This may be only the small units, only the large units, or both the large units and the small units; and
 - b. Record the number of size defects in the sample (not each container) on the defect tally sheet.
- See [Example 15](#), [Example 16](#), and [Example 17](#).
16. Check for **style compliance**.
 - a. Disregard loose leaf material, pieces of leaves, EVM, and detached fragments. See [Appendix I – Interpretative Guide for the Determination of Detached Fragments](#);
 - b. Determine the total number of short spears in the sample (not each container) that are longer than 9.5 cm;
 - c. Determine the total number of short spears in the sample (not each container) that are shorter than 2 cm;
 - d. The standards require that each short spear weigh more than 6 g but don't provide acceptance criteria for these small units. Do this: If any floret weighs 6 g or less and is not counted in the less than 2 cm defectives, count it as a "minor" style defective, regardless of the length; and

Suggested Order of Grading Under Lot Inspection

- e. Record the number of defective short spears found (in b, c, and d above) in the style section of the defect tally sheet. Short spears that fail style requirements aren't "pieces." If a style failure occurs, certify the grade but show: "Fails style compliance for short spears."

See [Example 14](#).

17. Cook a representative portion of the short spears as outlined in the *Cooking Procedures* section of the [Technical Procedures Manual](#). Inspectors may wish to select only "suspect" (step 3) short spears for the cooking test. It isn't necessary to cook each sample unit unless a problem develops, such as fibrous short spears.
18. Evaluate the cooked broccoli for **flavor** to verify the tentative grade given for odor in step 3.
19. Evaluate the cooked broccoli by chewing. This should verify the tentative grade given for **grit** in step 3.
20. Evaluate the cooked broccoli for **fiber**. Only fiber which is detectable in the cooked broccoli needs to be counted. It is not necessary to cook all the short spears that are suspected of having tough fiber if enough of the short spears are cooked to accurately determine where the problem units may be.
21. Compare the total number of **defects** found in the lot (entire sample) with the acceptance number for the applicable AQL and sample size in the regulations ([7 CFR §52.38c](#), Tables XV-XIX) or using the tables shown on the last couple pages of the [Lot Single Sampling Plan \(Attributes\)](#).

§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
AQL²	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.

22. Compare the total number of **style** defectives found in the lot (entire sample) with the acceptance number for the applicable AQL and sample size in the

Suggested Order of Grading Under Lot Inspection

regulations ([7 CFR §52.38c](#), Tables XV-XIX) or using the tables shown on the last couple pages of the [Lot Single Sampling Plan \(Attributes\)](#).

§52.634 Tolerances for style defectives. 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.

23. Assign a grade to the lot (entire sample) based on the procedure outlined in [Lot Single Sampling Plan \(Attributes\)](#).

Suggested Order of Grading Under Lot Inspection

CUT BROCCOLI

1. Follow the procedure outlined in the [Lot Single Sampling Plan \(Attributes\)](#).
2. Use the same defect tally sheet for lot inspection as would be used for on-line inspection. Ignore the section of the tally sheet devoted to CUSUM values.
3. Open each individual container that has been drawn for the sample (entire lot). Keep the product in its container. On a container-by-container basis, without sorting through the product, tentatively evaluate the following prerequisites:
 - a. Evaluate “**brightness**” and record the letter grade (A, B, or SSTD) in the “prerequisites” section of the defect tally sheet. The overall brightness may be slightly dull in grade B. Count “off-color” (yellowish or brownish discoloration) as Substandard.
 - b. At the same time that brightness is evaluated, record the letter grade (A or SSTD) for **similar varietal characteristics** in the “prerequisites” section of the defect tally sheet.
 - c. Evaluate the broccoli for **odor**. Assign the letter grade (A, B, or SSTD) for odor in the section for “prerequisites.” Consider any objectionable “off-odor” (“hay-like,” “straw-like,” “smoke,” “chemical” or “sour”) as Substandard. However, the sample must be edible in step 10. Permit a slight “hay-like” or “straw-like” odor in grade B.
 - d. Assign the letter grade (A, B, or SSTD) for **freedom from grit** in the section for “prerequisites.”
 - e. Evaluate the cut broccoli for **development** (head and bud cluster stages of maturity). Even though the USDA photo guides which show various stages of development, cover only spears, inspectors may use these photo guides as an indication of the cut-off point between “reasonably well developed” and “poorly developed.”

The development classifications of cut broccoli are as follows:

- **Grade A** – the broccoli may be only “reasonably well developed” (grade B); or
- **Grade B** – the broccoli may be only “poorly developed” (SSTD) if the appearance is not materially affected. Poorly developed means the individual buds are in the flowering stage.

Suggested Order of Grading Under Lot Inspection

Assign the letter grade (A, B, or SSTO) for development in the “prerequisites” section of the defect tally sheet.

- f. If any container is “suspect” because of “brightness,” “odor,” “grit” or “development,” identify the container and its product for further examination.

Example 55: Prerequisites on a container-by-container basis

Prerequisite	Carton No. 1	Carton No. 2	Carton No. 3, etc.
Similar Varietal Char.	A	A	A
Brightness	A	A	A
Flavor and Odor	A	A	A
Grit and Silt	A	A	A

The grade for a lot of cut broccoli may not be higher than the grade of any “prerequisite” grade for any individual sample unit in the sample. If the sample fails the anticipated grade because of a prerequisite factor, don't skip the other factors. Continue grading the sample but don't spend excessive with style or problem areas, such as blemishes or fiber.

4. While the cut broccoli is identified by individual containers, determine compliance with head material and leaf material (part of style). It isn't necessary to check each individual carton, but enough cartons need to be checked to satisfy whether the requirements are either met or failed. In the cartons that are selected for the check, do the following:
- a. Separate the head material and weigh (“bald” units completely stripped of flower buds should not be counted as head material);
 - b. Separate the leaf material and weigh; and
 - c. Allow the following:
 - Average:
 - Head material not less than 25%.
 - Leaf material not more than 25%.
 - Individual Sample Cartons:
 - Head material not less than 15%.
 - Leaf material not more than 35%.

Inspection Instructions for Frozen Broccoli (May 2026)

Suggested Order of Grading Under Lot Inspection

5. Assemble (physically or mentally) all the cut broccoli from all the cartons that were drawn into one sample (for the entire lot). Adjust the entire sample (either by randomly removing cuts or adding cuts) to meet the closest weight possible in the lot single sampling plan. If any of the cartons are “suspect” in step 3, inspectors may wish to assemble the broccoli mentally into one sample (for the entire lot). This procedure would enable the inspector to retain the identity of the “suspect” cartons.

Example 56:

5 gram Increments	Number of Cartons			
	6	13	21	29
	Total Weight of Broccoli (grams) ¹			
6	180	390	630	870
13	390	845	1365	1885
25	750	1625	2625	3625
50	1500	3250	5250	7250
100	3000	6500	10500	14500

¹ Sample size x 5 g increments= weight of cut broccoli equivalent to the number of sample units times the standard sample unit size.

6. Separate all the **blemished** units into 3 categories:

- Slightly;
- Materially; or
- Seriously.

Place each category, separately, on a suitable scale. Record the weight. Each 5 gram increment of this weight is 1 defect.

Blemished broccoli is the most common defect. Usually blemishes are:

- Discolored hollow or pithy stalks (don't count hollow or pithy stalks unless they're associated with discoloration);
- Yellow leaves;
- Orange buds (3 or more orange buds in a single area is the cut-off point between blemished and non-blemished); and
- Olive-green leaf stem (petiole).

Suggested Order of Grading Under Lot Inspection

Record the number of blemished defects (each 5 g increment is 1 defect) on the defect tally sheet as follows:

- Minor;
 - Major; or
 - Severe.
- Use photo guides for spears, if available.

Example 57:

S E V E R E	Blemished (Seriously)					4 ←
	Fiber (Woody)					
	EVM (edible)					
	TOTAL SEVERE					
	CUSUM	Grade A	0.4	0.8	1.6	
Grade B		1	1	2		

M A J O R	Blemished (Materially)					10 ←
	Fiber (Nonwoody)					
	TOTAL MAJOR					
	CUSUM	Grade A	1.5	1.5	3	
		Grade B	1	3	3	

MIN	Blemished (Slightly)		20
	TOTAL MINOR		↑

T O T A L	TOTAL ALL CLASSES					
	CUSUM	Grade A	1	4	3	
		Grade B	1	9	4	

SAMPLE UNIT GRADE		
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$$\text{Slightly} = \frac{100 \text{ g}}{5}$$

$$\text{Materially} = \frac{50 \text{ g}}{5}$$

$$\text{Seriously} = \frac{20 \text{ g}}{5}$$

Suggested Order of Grading Under Lot Inspection

7. Separate all the pieces of **Extraneous Vegetable Material (EVM)** into 2 categories as follows:

- Severe (edible) – Tender, green blades of grass or weeds or leaves which are harmless; or
- Critical (inedible) – Course blades of grass or weeds or leaves which may or may not be tender or green and which are harmless.

Count pieces of other similar plants, such as cauliflower or brussels sprouts, as edible EVM. Place each piece of EVM, by category, end-to-end (use the longest dimension) in a continuous row. Measure each category separately. Record the number of EVM defects (each 2.5 cm increment is 1 defect) on the defect tally sheet.

Example 58:

C R I T I C A L	EVM (inedible)					2
	TOTAL CRITICAL					
	CUSUM	Grade A	0	0.5	0.5	4
		Grade B	0.4	0.8	1.6	
S E V E R E	Blemished (Seriously)					
	Fiber (Woody)					
	EVM (edible)					
	TOTAL SEVERE					
	CUSUM	Grade A	0.4	0.8	1.6	4
		Grade B	1	1	2	

$\frac{10 \text{ cm}}{2.5}$

$\frac{4 \text{ cm}}{2.5}$

8. Check the sample for **style compliance**. It isn't necessary to use the same sample size that is being used for the other factors. Inspectors may use a smaller sample size for style. The smaller sample size makes grading faster. This procedure would be the equivalent of drawing a subsample.

For example, if using 14500 g (29 x 100-5 g increments) for the other factors, the inspector could alternately use 10500 g (21 x 100-5 g increments); or 6500 g (13 x 100-5 g increments); or 3000 g (6 x 100-5 g increments) for style. If a smaller

Suggested Order of Grading Under Lot Inspection

sample size is chosen for style, be sure to note the size on the tally sheet. Otherwise, it's difficult to reevaluate the tally sheet.

- Disregard leaf material, pieces of leaves, and EVM;
- Consider the product for the style that it is offered even if there is a disagreement with the declaration of style;
- Separate all cuts in the sample that are longer than 5 cm and place them on a suitable scale. Record the composite weight. Count each 5 g increment of this weight as 1 major style defective;
- Separate all cuts in the sample that are shorter than 1.5 cm (exclusive of chaff) and place them on a suitable scale. Record the composite weight. Count each 5 g increment of this weight as 1 minor style defective; and
- Record the number of minor and major style defectives in the style section of the defect tally sheet. If a style failure occurs, certify the style as "pieces."

Example 59:

S T Y L E	Major (Longer than 5 cm)					32 ←
	CUSUM	6500 g	1	4	3	
	Minor (Shorter than 1.5 cm)					61
	CUSUM	6500 g	1	6	4	
	Head Material					
	Leaf Material					

Longer than 5 cm = $\frac{158 \text{ g}}{5 \text{ g}}$

Shorter than 1.5 cm = $\frac{302 \text{ g}}{5 \text{ g}}$

- After the sample has been evaluated for style, cook a representative portion of the cut broccoli as outlined in the *Cooking Procedures* section of the [Technical Procedures Manual](#). Inspectors may wish to select only "suspect" units (step 3) for the cooking test. It isn't necessary to cook each sample unit unless a problem develops, such as fibrous cuts.
- Evaluate the cooked broccoli to verify the tentative grade given for **odor** in step 3.
- Evaluate the cooked broccoli by chewing representative portions. This should verify the tentative grade given for **grit and silt** in step 3.

Suggested Order of Grading Under Lot Inspection

12. Evaluate the cooked broccoli for **fiber**. Be alert for fiber located in the pieces (cuts) that are made from the base end of the stalk. Fiber can be deceptive. It's usually more tender after cooking than would be expected. Cook enough of the "suspect" cuts to determine where the problem units may be.

If any detectable fiber is to be counted against the sample, cook all the "suspect" units. Follow this procedure:

- a. Separate all the cuts with major fiber (non-woody noticeable fiber but can be eaten without difficulty) and place them on a suitable scale. Record the composite weight. Count each 5 g increment of this weight as 1 major defect;
- b. Separate all the cuts with severe fiber (woody) and place them on a suitable scale. Record the composite weight. Count each 5 g increment of this weight as 1 severe defect; and
- c. Record the number of major and severe fiber defects on the defect tally sheet.

Example 60:

S E V E R E	Blemished (Seriously)					
	Fiber (Woody)					13 ←
	EVM (edible)					
	TOTAL SEVERE					
	CUSUM	Grade A	0.4	0.8	1.6	
Grade B		1	1	2		

M A J O R	Blemished (Materially)					
	Fiber (Nonwoody)					26 ←
	TOTAL MAJOR					
	CUSUM	Grade A				1.5
		Grade B	1	3	3	

Nonwoody fiber = $\frac{128\text{ g}}{5}$

Woody fiber = $\frac{62\text{ g}}{5}$

13. Compare the total number of **defects** found in the lot (entire sample) with the acceptance number for the applicable AQL and sample size in the regulations ([7 CFR §52.38c](#), Tables XV-XIX) or using the tables shown on the last couple pages of the [Lot Single Sampling Plan \(Attributes\)](#).

Suggested Order of Grading Under Lot Inspection

§52.640 Tolerances for defects. An insignificant weight increment of defects limited to the first weight increment shall not be considered.

**TABLE VII
Cuts and Pieces**

	Grade A				Grade B			
	Total ¹	Major	Severe	Critical	Total ¹	Major	Severe	Critical
AQL²	6.5	2.5	1.0	0.4	15.0	5.0	1.5	1.0

¹ Total = Minor + Major + Severe + Critical.

² AQL expressed as defects per 100 units (50-5g increments in 250 g).

14. Compare the total number of **style** defectives found in the lot (entire sample) with the acceptance number for the applicable AQL and sample size in the regulations ([7 CFR §52.38c](#), Tables XV-XIX) or using the tables shown on the last couple pages of the [Lot Single Sampling Plan \(Attributes\)](#).

§52.634 Tolerances for style defectives. An insignificant weight increment of style defectives, limited to the first weight increment, shall not be considered.

**TABLE III
Cut**

AQL¹	Minor	Major
	10.0	6.5

¹ AQL expressed as percent defective (50-5 g increments in 250 g).

15. Assign a grade to the lot (entire sample) based on the procedure outlined in [Lot Single Sampling Plan \(Attributes\)](#).

Suggested Order of Grading Under Lot Inspection

CHOPPED BROCCOLI

1. Follow the procedure outlined in the [Lot Single Sampling Plan \(Attributes\)](#).
2. Use the same defect tally sheet for lot inspection as would be used for on-line inspection. Ignore the section of the tally sheet devoted to CUSUM values.
3. Open each individual container that has been drawn for the sample (entire lot). Keep the product in its container. On a container-by-container basis, without sorting through the product, tentatively evaluate the following prerequisites:
 - a. Evaluate “**brightness**” and record the letter grade (A, B, or SSTD) in the “prerequisites” section of the defect tally sheet. The overall brightness may be slightly dull in grade B. Count “off-color” (yellowish or brownish discoloration) as Substandard;
 - b. At the same time that brightness is evaluated, record the letter grade (A or SSTD) for **similar varietal characteristics** in the “prerequisites” section of the defect tally sheet;
 - c. Evaluate the broccoli for **odor**. Assign the letter grade (A, B, or SSTD) for odor in the section for “prerequisites.” Consider any objectionable “off-odor” (“hay-like,” “straw-like,” “smoke,” “chemical” or “sour”) as Substandard. However, the sample must be edible in step 10. Permit a slight “hay-like” or “straw-like” odor in grade B;
 - d. Assign the letter grade (A, B, or SSTD) for **freedom from grit** in the section for “prerequisites.”
 - e. Evaluate the chopped broccoli for **development** (head and bud cluster stages of maturity). Even though the USDA photo guides which show various stages of development, cover only spears, inspectors may use these photo guides as an indication of the cut-off point between “reasonably well developed” and “poorly developed.”

The development classifications of chopped broccoli are as follows:

- **Grade A** – the broccoli may be only “reasonably well developed” (grade B); or
- **Grade B** – the broccoli may be only “poorly developed” (SSTD) if the appearance is not materially affected. Poorly developed means the individual buds are in the flowering stage.

Suggested Order of Grading Under Lot Inspection

Assign the letter grade (A, B, or SSTD) for development in the “prerequisites” section of the defect tally sheet.

- f. If any container is “suspect” because of “brightness,” “odor,” “grit” or “development,” identify the container and its product for further examination.

Example 61: Prerequisites on a container-by-container basis

Prerequisite	Carton No. 1	Carton No. 2	Carton No. 3, etc.
Similar Varietal Char.	A	A	A
Brightness	A	A	A
Flavor and Odor	A	A	A
Grit and Silt	A	A	A
Development	A	A	A

The grade for a lot of chopped broccoli may not be higher than the grade of any “prerequisite” grade for any individual sample unit in the sample. If the sample fails the anticipated grade because of a prerequisite factor, don't skip the other factors. Continue grading the sample but don't spend excessive time with style or problem areas, such as blemishes or fiber.

4. While the chopped broccoli is identified by individual containers, determine compliance with **head material** and **leaf material** (part of style). It isn't necessary to check each individual carton but enough cartons need to be checked to satisfy whether the requirement is met or failed. In the cartons that are selected for the check, do the following:
- a. Separate the head material and weigh (“bald” units completely stripped of flower buds should not be counted as head material);
 - b. Separate the leaf material and weigh; and
 - c. Allow the following:
 - Average:
 - Head material not less than 25%.
 - Leaf material not more than 25%.
 - Individual Sample Cartons:
 - Head material not less than 15%.

Suggested Order of Grading Under Lot Inspection

- Leaf material not more than 35%.
5. Assemble (physically or mentally) all the chopped broccoli from all the cartons into one sample (for the entire lot). Adjust the sample (either by randomly removing units or adding units) to meet the closest weight possible for the specific lot single sampling plan being used. If any of the cartons are “suspect” in step 3, inspectors may wish to assemble the broccoli mentally into one sample (for the entire lot). This procedure would enable the inspector to retain the identity of the “suspect” cartons.

Example 62:

2.5 gram Increments	Number of Cartons			
	6	13	21	29
	Total Weight of Broccoli (grams) ¹			
6	90	195	315	435
13	195	423	683	943
25	375	813	1313	1813
50	750	1625	2625	3625
100	1500	3250	5250	7250

¹ Sample size x 2.5 g increments = weight of chopped broccoli equivalent to the number of sample units times the standard sample unit size.

6. Separate all the **blemished** units into 3 categories:

- Slightly;
- Materially; or
- Seriously.

Place each category, separately, on a suitable scale. Record the weight. Each 2.5 g increment of this weight is 1 defect.

Blemished broccoli is the most common defect. Usually blemishes are:

- Discolored hollow or pithy stalks (don't count hollow or pithy stalks unless they're associated with discoloration);
- Yellow leaves;
- Orange buds (3 or more orange buds in a single area is the cut-off point between blemished and non-blemished); and

Suggested Order of Grading Under Lot Inspection

- Olive-green leaf stem (petiole).

Record the number of blemished defects (each 2.5 g increment is 1 defect) on the defect tally sheet as follows:

- Minor;
 - Major; or
 - Severe.
- Use photo guides for spears, if available.

Example 63:

S E V E R E	Blemished (Seriously)					5
	Fiber (Woody)					
	EVM (edible)					
	TOTAL SEVERE					
	CUSUM	Grade A	0.5	1.5	2	
Grade B		1	2	2		
M A J O R	Blemished (Materially)					15
	Fiber (Nonwoody)					
	TOTAL MAJOR					
	CUSUM	Grade A	1	3	3	
		Grade B	1	6	4	
M I N	Blemished (Slightly)					22
	TOTAL MINOR					
T O T A L	TOTAL ALL CLASSES					
	CUSUM	Grade A	1	8	4	
		Grade B	2	17	7	
SAMPLE UNIT GRADE						

$\text{Slightly} = \frac{53 \text{ g}}{2.5}$
 $\text{Materially} = \frac{37 \text{ g}}{2.5}$
 $\text{Seriously} = \frac{12 \text{ g}}{2.5}$

7. Separate all the pieces of **extraneous vegetable material (EVM)** into 2 categories as follows:

Suggested Order of Grading Under Lot Inspection

- Severe (edible) – Tender, green blades of grass or weeds or leaves which are harmless; or
- Critical (inedible) – Course blades of grass or weeds or leaves which may or may not be tender or green and which are harmless.

Count pieces of other similar plants, such as cauliflower or brussels sprouts, as edible EVM. Place each piece of EVM, by category, end-to-end (use the longest dimension) in a continuous row. Measure each category separately. Record the number of EVM defects (each 2.5 cm increment is 1 defect) on the defect tally sheet.

Example 64:

C R I T I C A L	EVM (inedible)					3 ←
	TOTAL CRITICAL					
	CUSUM	Grade A	0	0.5	0.5	
		Grade B	0	1	1	

S E V E R E	Blemished (Seriously)					
	Fiber (Woody)					
	EVM (edible)					5 ↑
	TOTAL SEVERE					
	CUSUM	Grade A	0.5	1.5	2	
Grade B		1	2	2		

$\frac{12\text{ cm}}{2.5}$

$\frac{6\text{ cm}}{2.5}$

8. Check the sample unit for **style compliance**. It isn't necessary to use the same sample size being used for other factors. A smaller sample size can be used for style which makes grading faster. This procedure would be the same as drawing a subsample.

For example, if using 7250 g (29 x 100-2.5 g increments) for the other factors, the inspector could alternately use 5250 g (21 x 100-2.5 g increments); or 3250 g (13 x 100-2.5 g increments); or 1500 g (6 x 100-2.5 g increments) for style. If a smaller sample size is chosen for style, be sure to note the size on the tally sheet. Otherwise, it's difficult to reevaluate the tally sheet.

Suggested Order of Grading Under Lot Inspection

To check for style, do the following:

- Disregard leaf material, pieces of leaves, and HEM;
- Consider the product for the style that it is offered for even if there is a disagreement with the declaration of style;
- Separate all cuts in the sample unit that are longer than 2 cm and place them on a suitable scale. Record the composite weight. Count each 2.5 g increment of this weight as 1 minor style defective; and
- Record the number of minor style defectives in the style section of the defect tally sheet. If a style failure occurs, certify the style as “pieces.”

Example 65:

S T Y L E	Minor (Longer than 2 cm)						5
	CUSUM			2	10	5	
	Head Material (50g Sample Size)						
	Leaf Material (50g Sample Size)						

$$\text{Longer than 2 cm} = \frac{12 \text{ g}}{2.5 \text{ g}}$$

- After the sample has been evaluated for style, cook a representative portion of the chopped broccoli as outlined in the *Cooking Procedures* section of the [Technical Procedures Manual](#). Inspectors may wish to select only “suspect” units (step 3) for the cooking test. It isn't necessary to cook each sample unit unless a problem develops.
- Evaluate the cooked broccoli to verify the tentative grade given for **odor** in step 3.
- Evaluate the cooked broccoli by chewing representative portions. This should verify the tentative grade given for **grit and silt** in step 3.
- Evaluate the cooked broccoli for **fiber**. Be alert for fiber located in the units that are made from the base end of the stalk. Fiber can be deceptive. It's usually more tender after cooking than would be expected. Cook enough of the “suspect” units to determine where the problem units may be.

Suggested Order of Grading Under Lot Inspection

If any detectable fiber is to be counted against the sample, cook all the “suspect” units. Follow this procedure:

- Separate all the units with major fiber (non-woody noticeable fiber but can be eaten without difficulty) and place them on a suitable scale. Record the composite weight. Count each 2.5 g increment of this weight as 1 major defect;
- Separate all the units with severe fiber (woody) and place them on a suitable scale. Record the composite weight. Count each 2.5 g increment of this weight as 1 severe defect; and
- Record the number of major and severe fiber defects on the defect tally sheet.

Example 66:

S E V E R E	Blemished (Seriously)					
	Fiber (Woody)					19 ←
	EVM (edible)					
	TOTAL SEVERE					
	CUSUM	Grade A	0.5	1.5	2	
Grade B		1	2	2		

M A J O R	Blemished (Materially)					
	Fiber (Nonwoody)					38 ←
	TOTAL MAJOR					
	CUSUM	Grade A				1
		Grade B	1	6	4	

$$\text{Nonwoody fiber} = \frac{93 \text{ g}}{2.5}$$

$$\text{Woody fiber} = \frac{47 \text{ g}}{2.5}$$

- Compare the total number of **defects** found in the lot (entire sample) with the acceptance number for the applicable AQL and sample size in the regulations ([7 CFR §52.38c](#), Tables XV-XIX) or using the tables shown on the last couple pages of the [Lot Single Sampling Plan \(Attributes\)](#).

Suggested Order of Grading Under Lot Inspection

§52.640 Tolerances for defects. An insignificant weight increment of defects limited to the first weight increment shall not be considered.

**TABLE VIII
Chopped**

	Grade A				Grade B			
	Total ¹	Major	Severe	Critical	Total ¹	Major	Severe	Critical
AQL²	6.5	2.5	1.0	0.25	15.0	5.0	1.5	0.65

¹ Total = Minor + Major + Severe + Critical.

² AQL expressed as defects per 100 units (100-2.5g increments in 250 g).

14. Compare the total number of **style** defectives found in the lot (entire sample) with the acceptance number for the applicable AQL and sample size in the regulations ([7 CFR §52.38c](#), Tables XV-XIX) or using the tables shown on the last couple pages of the [Lot Single Sampling Plan \(Attributes\)](#).

§52.634 Tolerances for style defectives. An insignificant weight increment of style defectives, limited to the first weight increment, shall not be considered.

**TABLE IV
Chopped**

AQL¹	Minor
	8.5

¹ AQL expressed as percent defective (100-2.5 g increments in 250 g).

15. Assign a grade to the lot (entire sample) based on the procedure outlined in [Lot Single Sampling Plan \(Attributes\)](#).

Suggested Order of Grading Under Lot Inspection

BROCCOLI PIECES

1. Follow the procedure outlined in the [Lot Single Sampling Plan \(Attributes\)](#).
2. Use the same defect tally sheet for lot inspection as would be used for on-line inspection. Ignore the section of the tally sheet devoted to CUSUM values.
3. Open each individual container that has been drawn for the sample (entire lot). Keep the product in its container. On a container-by-container basis, without sorting through the product, tentatively evaluate the following prerequisites:
 - a. Evaluate “**brightness**” and record the letter grade (A, B, or SSTD) in the “prerequisites” section of the defect tally sheet. The overall brightness may be slightly dull in grade B. Count “off-color” (yellowish or brownish discoloration) as Substandard;
 - b. At the same time that brightness is evaluated, record the letter grade (A or SSTD) for **similar varietal characteristics** in the “prerequisites” section of the defect tally sheet;
 - c. Evaluate the broccoli for **odor**. Assign the letter grade (A, B, or SSTD) for odor in the section for “prerequisites.” Consider any objectionable “off-odor” (“hay-like,” “straw-like,” “smoke,” “chemical” or “sour”) as Substandard. However, the sample must be edible in step 8. Permit a slight “hay-like” or “straw-like” odor in grade B;
 - d. Assign the letter grade (A, B, or SSTD) for **freedom from grit** in the section for “prerequisites.”
 - e. Evaluate the broccoli for **development** (head and bud cluster stages of maturity). Even though the USDA photo guides which show various stages of development, cover only spears, inspectors may use these photo guides as an indication of the cut-off point between “reasonably well developed” and “poorly developed.”

The development classifications of broccoli pieces are as follows:

- **Grade A** – the broccoli may be only “reasonably well developed” (grade B); or
- **Grade B** – the broccoli may be only “poorly developed” (SSTD) if the appearance is not materially affected. Poorly developed means the individual buds are in the flowering stage.

Suggested Order of Grading Under Lot Inspection

Assign the letter grade (A, B, or SSTD) for development in the “prerequisites” section of the defect tally sheet.

- f. If any container is “suspect” because of “brightness,” “odor,” “grit,” or “development,” identify the container and its product for further examination.

Example 67: Prerequisites on a container-by-container basis

Prerequisite	Carton No. 1	Carton No. 2	Carton No. 3, etc.
Similar Varietal Char.	A	A	A
Brightness	A	A	A
Flavor and Odor	A	A	A
Grit and Silt	A	A	A
Development	A	A	A

The grade for a lot of broccoli pieces may not be higher than the grade of any “prerequisite” grade for any individual sample unit in the sample. If the sample fails the anticipated grade because of a prerequisite factor, don't skip the other factors. Continue grading the sample but don't spend excessive time on problem areas, such as blemishes or fiber.

4. **Assemble** (physically or mentally) all the broccoli pieces from all the cartons into one sample (for the entire lot). Adjust the entire sample (either by randomly removing pieces or adding pieces) to meet the closest possible weight for the lot single sampling plan being used. If any of the cartons are “suspect” in step 3, inspectors may wish to assemble the broccoli mentally into one sample (for the entire lot). This procedure would enable the inspector to retain the identity of the “suspect” cartons.

Example 68:

5 gram Increments	Number of Cartons			
	6	13	21	29
	Total Weight of Broccoli (grams) ¹			
6	180	390	630	870
13	390	845	1365	1885
25	750	1625	2625	3625
50	1500	3250	5250	7250
100	3000	6500	10500	14500

¹ Sample size x 5 g increments = weight of broccoli pieces equal to the number of units times the standard sample unit size.

Suggested Order of Grading Under Lot Inspection

5. Separate all the **blemished** units into 3 categories:

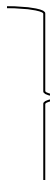
- Slightly;
- Materially; or
- Seriously.

Place each category, separately, on a suitable scale. Record the weight. Each 5 gram increment of this weight is 1 defect.

Blemished broccoli is the most common defect. Usually blemishes are:

- Discolored hollow or pithy stalks (don't count hollow or pithy stalks unless they're associated with discoloration);
- Yellow leaves;
- Orange buds (3 or more orange buds in a single area is the cut-off point between blemished and non-blemished); and
- Olive-green leaf stem (petiole).

Record the number of blemished defects (each 5 g increment is 1 defect) on the defect tally sheet as follows:

- Minor;
 - Major; or
 - Severe.
- 
- Use photo guides for spears, if available.

Suggested Order of Grading Under Lot Inspection

Example 69:

S E V E R E	Blemished (Seriously)					4 ←
	Fiber (Woody)					
	EVM (edible)					
	TOTAL SEVERE					
	CUSUM	Grade A	0.4	0.8	1.6	
Grade B		1	1	2		

M A J O R	Blemished (Materially)					10 ←
	Fiber (Nonwoody)					
	TOTAL MAJOR					
	CUSUM	Grade A				1.5
		Grade B	1	3	3	

M I N	Blemished (Slightly)					20 ↑
	TOTAL MINOR					

T O T A L	TOTAL ALL CLASSES					
	CUSUM	Grade A	1	4	3	
		Grade B	1	9	4	

SAMPLE UNIT GRADE					
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$$\text{Slightly} = \frac{100 \text{ g}}{5}$$

$$\text{Materially} = \frac{50 \text{ g}}{5}$$

$$\text{Seriously} = \frac{20 \text{ g}}{5}$$

6. Separate all the pieces of **extraneous vegetable material (EVM)** into 2 categories as follows:

- Severe (edible) – Tender, green blades of grass or weeds or leaves which are harmless; or
- Critical (inedible) – Course blades of grass or weeds or leaves which may or may not be tender or green and which are harmless.

Count pieces of other similar plants, such as cauliflower or brussels sprouts, as edible EVM. Place each piece of EVM, by category, end-to-end (use the longest dimension) in a continuous row. Measure each category separately. Record on the defect tally sheet the number of EVM defects (each 2.5 cm increment is 1 defect).

Suggested Order of Grading Under Lot Inspection

Example 70:

C R I T I C A L	EVM (inedible)					2 ←
	TOTAL CRITICAL					
	CUSUM	Grade A	0	0.5	0.5	
		Grade B	0.4	0.8	1.6	

S E V E R E	Blemished (Seriously)					
	Fiber (Woody)					
	EVM (edible)					4 ↑
	TOTAL SEVERE					
	CUSUM	Grade A	0.4	0.8	1.6	
		Grade B	1	1	2	

$\frac{10\text{ cm}}{2.5}$

$\frac{4\text{ cm}}{2.5}$

7. Cook a representative portion of the broccoli as outlined in the *Cooking Procedures* section of the [Technical Procedures Manual](#). Inspectors may wish to select only “suspect” units (step 3) for the cooking test. It isn’t necessary to cook each sample unit unless a problem develops, such as fibrous pieces.
8. Evaluate the cooked broccoli to verify the tentative grade given for **odor** in step 3.
9. Evaluate the cooked broccoli by chewing representative portions. This should verify the tentative grade given for **grit and silt** in step 3.
10. Evaluate the cooked broccoli for **fiber**. Be alert for fiber located in the pieces that are made from the base end of the stalk. Fiber can be deceptive. It’s usually more tender after cooking than would be expected. Cook enough of the “suspect” pieces to determine where the problem units may be.

If any detectable fiber is to be counted against the sample, cook all the “suspect” units. Follow this procedure:

- a. Separate all the pieces with major fiber (non-woody noticeable fiber but can be eaten without difficulty) and place them on a suitable scale. Record the composite weight. Count each 5 g increment of this weight as 1 major defect;

Suggested Order of Grading Under Lot Inspection

- b. Separate all the pieces with severe fiber (woody) and place them on a suitable scale. Record the composite weight. Count each 5 g increment of this weight as 1 severe defect; and
- c. Record the number of major and severe defects on the defect tally sheet.

Example 71:

S E V E R E	Blemished (Seriously)					
	Fiber (Woody)					13 ←
	EVM (edible)					
	TOTAL SEVERE					
	CUSUM	Grade A	0.4	0.8	1.6	
Grade B		1	1	2		

M A J O R	Blemished (Materially)					
	Fiber (Nonwoody)					26 ←
	TOTAL MAJOR					
	CUSUM					
	CUSUM	Grade A	1.5	1.5	3	
Grade B		1	3	3		

Nonwoody fiber = $\frac{128\text{ g}}{5}$

Woody fiber = $\frac{62\text{ g}}{5}$

11. Compare the total number of **defects** found in the lot (entire sample) with the acceptance number for the applicable AQL and sample size in the regulations ([7 CFR §52.38c](#), Tables XV-XIX) or using the tables shown on the last couple pages of the [Lot Single Sampling Plan \(Attributes\)](#).

§52.640 Tolerances for defects. An insignificant weight increment of defects limited to the first weight increment shall not be considered.

Table VII
Cuts and Pieces

	Grade A				Grade B			
	Total ¹	Major	Severe	Critical	Total ¹	Major	Severe	Critical
AQL²	6.5	2.5	1.0	0.4	15.0	5.0	1.5	1.0

¹ Total = Minor + Major + Severe + Critical.

² AQL expressed as defects per 100 units (50-5g increments in 250 g).

Suggested Order of Grading Under Lot Inspection

12. Assign a grade to the lot (entire sample) based on the procedure outlined in [Lot Single Sampling Plan \(Attributes\)](#).

PART IV – SPECIAL INSPECTION SITUATIONS

HOW TO ADJUST A DEFECT TALLY SHEET

If a sample fails to meet the requirements of grade A, adjust the defect tally sheet before comparing the defects against the acceptance numbers for grade B. This must be done because “reasonably good” defects are not counted against grade B. A grade B lot could have all “reasonably good” defects. The preceding examples in this manual have been simple - the three examples on the following pages are complex:

Example 72: Failed grade A, adjusted for grade B

50 x 13 = 650

P R E Q	Similar Varietal Characteristics					
	Brightness					
	Flavor/Odor					
	Grit/Silt					

C R I T	TOTAL CRITICAL					2
	CUSUM	Grade A	0.2	0.2	0.8	
		Grade B	0.5	0.5	1.5	

S E V E R E	Color (Poor)					1
	Blemished (Seriously)					2
	Fiber (Woody)					1
	EVM (edible)					1
	TOTAL SEVERE					5
	CUSUM	Grade A	0.5	0.5	1.5	
Grade B		1.5	1.5	3		

M A J O R	Color (Reas. Good) in A					~~10~~
	Size (Length)					2
	Detached Fragments					
	Blemished (Materially)					20
	Trim (Poor) in A					5
	Development (Poor)					10
	Fiber (Non woody)					
	TOTAL MAJOR					32 ~~47~~
	CUSUM	Grade A	1	4	3	
Grade B		1	6	4		

M I N O R	Size (Diameter)					
	Loose Leaves					
	Broken					
	Damaged					
	Blemished (Slightly)					50
	Trim (Reas. Well) in A					~~25~~
	Trim (Poor) in B					5
	Development (Reas. Well) in A					~~35~~
	TOTAL MINOR					55 ~~110~~

T O T A L	TOTAL ALL CLASSES					94 ~~164~~
	CUSUM	Grade A	2	12	5	
		Grade B	2	14	7	

Failed Grade A

SAMPLE UNIT GRADE						B
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HOW TO REEVALUATE A DEFECT TALLY SHEET

It is possible to reevaluate a defect tally sheet for frozen broccoli. Inspectors may encounter this situation if past production is compared against a more restrictive specification, such as a buyer's specification, after the original inspection has been completed.

Use the general procedure to reevaluate a defect tally sheet as outlined in [Cumulative Sum Sampling Plan \(CUSUM\) Attributes Standards Only](#) (for on-line inspection) or [Lot Single Sampling Plan \(Attributes\)](#) (for lot inspection). However, with frozen broccoli, it is not possible to reevaluate against all grade levels. This will depend upon the processor's designated grade.

If the original grade was against designated grade A, it is possible to reevaluate the tally sheet for grades A and B. This is because all the "reasonably good" units have been tallied against grade A.

If the original grade was against designated grade B, it is not possible to reevaluate the tally sheet against grade A - only grade B. This is because the "reasonably good" units have not been tallied against grade A.

If there is any chance the processor would ask that a tally sheet be reevaluated against a grade higher than the designated grade, it would be well to prepare for this situation during inspection. Inspectors could keep a record of all "reasonably good" units, even though the broccoli is graded against grade B, but figure the CUSUM values against grade B only for the original grade (when on-line). If the tally sheet is to be reevaluated later, figure the CUSUM values against grade A by including all "reasonably good" units in the tally sheet.

EXAMPLE 73: ORIGINALLY DESIGNATED GRADE A, REEVALUATED AGAINST A TIGHTER GRADE A

Example Foods, Top A Label

P R E Q	Similar Varietal Characteristics					A	A	A
	Brightness					A	A	A
	Flavor/Odor					A	A	A
	Grit/Silt					A	A	A
C R I T	TOTAL CRITICAL					0	1	0
	CUSUM	Grade A	0.2	0.2	0.8	0	0.8	0.6
		Grade B	0.5	0.5	1.5			
S E V E R E	Color (Poor)							
	Blemished (Seriously)					1		
	Fiber (Woody)							
	EVM (edible)							
	TOTAL SEVERE					1	0	0
	CUSUM	Grade A	0.5	0.5	1.5	1	0.5	0
Grade B		1.5	1.5	3				
M A J O R	Color (Reas. Good) in A					1		
	Size (Length)							
	Detached Fragments							
	Blemished (Materially)					1	2	1
	Trim (Poor) in A					1	1	
	Development (Poor)						1	1
	Fiber (Non woody)							
	TOTAL MAJOR					3	4	2
	CUSUM	Grade A	1	4	3	0 1	0 2	0 1
Grade B		1	6	4				
M I N O R	Size (Diameter)							
	Loose Leaves							1
	Broken							
	Damaged							
	Blemished (Slightly)					4	2	1
	Trim (Reas. Well) in A					4		1
	Trim (Poor) in B							
	Development (Reas. Well) in A						2	
	TOTAL MINOR					8	4	3
	T O T A L	TOTAL ALL CLASSES					12	9
CUSUM		Grade A	2	14	7	2 4	0 4	0 0
		Grade B	2	14	7			
SAMPLE UNIT GRADE						A	A	A

Final Grade: A

Meets 

EXAMPLE 74: ORIGINALLY DESIGNATED GRADE B, REEVALUATED AGAINST A TIGHTER GRADE B

Example Foods, Top B Label

P R E Q	Similar Varietal Characteristics				A	A	A	
	Brightness				A	A	A	
	Flavor/Odor				A	A	A	
	Grit/Silt				A	A	A	
C R I T	TOTAL CRITICAL				0	1	0	
	CUSUM	Grade A	0.2	0.2	0.8			
		Grade B	0.5	0.5	1.5	0	0.5	0
S E V E R E	Color (Poor)				1	1		
	Blemished (Seriously)					1	1	
	Fiber (Woody)							
	EVM (edible)							
	TOTAL SEVERE				1	2	1	
	CUSUM	Grade A	0.5	0.5	1.5			
		Grade B	AQL = 1.5	~~1.5~~ 1	~~1.5~~ 1	~~3~~ 2	1	~~1.5~~ 2
M A J O R	Color (Reas. Good) in A							
	Size (Length)				1			
	Detached Fragments				1			
	Blemished (Materially)					3	2	
	Trim (Poor) in A							
	Development (Poor)				1	1	2	
	Fiber (Non woody)				1		1	
	TOTAL MAJOR				4	4	5	
	CUSUM	Grade A	1	4	3			
		Grade B	AQL = 8.5	1	~~6~~ 5	4	0	0
M I N O R	Size (Diameter)						1	
	Loose Leaves				1			
	Broken							
	Damaged							
	Blemished (Slightly)				1	3	4	
	Trim (Reas. Well) in A							
	Trim (Poor) in B				2	2	1	
	Development (Reas. Well) in A							
	TOTAL MINOR				4	5	6	
	T O T A L	TOTAL ALL CLASSES				9	12	12
CUSUM		Grade A	2	12	5			
		Grade B	AQL = 20.0	2	~~12~~ 14	~~7~~ 5	0	0
SAMPLE UNIT GRADE					B	B	B	

Final Grade: B

Meets 

EXAMPLE 75: ORIGINALLY DESIGNATED GRADE B, REEVALUATED AGAINST BOTTOM GRADE A

P R E Q	Similar Varietal Characteristics				A	A	A	
	Brightness				A	A	A	
	Flavor/Odor				A	A	A	
	Grit/Silt				A	A	A	
C R I T	TOTAL CRITICAL				0	0	0	
	CUSUM	Grade A	0.2	0.2	0.8	0	0	0
		Grade B	0.5	0.5	1.5	0	0	0
S E V E R E	Color (Poor)							
	Blemished (Seriously)				1	1	1	
	Fiber (Woody)							
	EVM (edible)							
	TOTAL SEVERE				1	1	1	
	CUSUM	Grade A	0.5	0.5	1.5	1	1.5	1.5
Grade B		1.5	1.5	3	1	0.5	0	
M A J O R	Color (Reas. Good) in A							
	Size (Length)							
	Detached Fragments				1			
	Blemished (Materially)				2	2	3	
	Trim (Poor) in A				1	2	2	
	Development (Poor)				1	1		
	Fiber (Non woody)					1		
	TOTAL MAJOR				5	6	5	
	CUSUM	Grade A	1	4	3	2	3	3
Grade B		1	6	4	0	0	0	
M I N O R	Size (Diameter)							
	Loose Leaves					1		
	Broken							
	Damaged							
	Blemished (Slightly)				4	4	3	
	Trim (Reas. Well) in A				2	3	2	
	Trim (Poor) in B				1	2	2	
	Development (Reas. Well) in A				2	5	4	
	TOTAL MINOR				8	12	9	
T O T A L	TOTAL ALL CLASSES				14	19	15	
	CUSUM	Grade A	2	12	5	4	5	5
		Grade B	2	14	7	0	0	0
SAMPLE UNIT GRADE					B	B	B	

Final Grade: B

Fails grade A →

Record kept but not counted against grade B

APPENDIX I – INTERPRETATIVE GUIDE FOR THE DETERMINATION OF DETACHED FRAGMENTS

DETACHED FRAGMENTS AND BROKEN SPEARS

“Detached fragments” should not be used to reassemble “broken” spears or short spears. Only “Broken” portions are used to reassemble spears.

The U.S. Standards for Grades of Frozen Broccoli states: **§52.636 Recommended sample unit sizes. (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.**

- [Step 2](#) for on-line inspection of spears states, “Reassemble any broken spear. Count each reassembled spear as a single unit.”
- [Step 2](#) for on-line inspection of short spears states, “Reassemble any broken spear. Count each reassembled spear as a single unit.”
- [Step 5](#) for lot inspection of spears states, “Reassemble any broken spear. Count each reassembled spear as a single unit.”
- [Step 5](#) for lot inspection of short spears states, “Reassemble any broken spear. Count each reassembled spear as a single unit.”

The following definitions for “broken” and “detached fragments” in the U.S. Standards for Grades of Frozen Broccoli are as follows:

§52.635 Definitions of terms. (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.

§52.635 Definitions of terms. (b) Terms applicable to spears and short spears only; (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.

DETACHED FRAGMENTS AND STYLE DETERMINATION

“Detached fragments” should not be scored in the determination of style. “Detached fragments” are not used to reassemble “broken” spears and short spears and should be ignored when determining style.

- [Step 3.a.](#) for on-line inspection of spears states, “Disregard loose leaf material, pieces of leaves, EVM, and detached fragments.”

- [Step 3.a.](#) for on-line inspection of short spears states, “Disregard loose leaf material, pieces of leaves, EVM, and detached fragments.”
- [Step 17.a.](#) for lot inspection of spears states, “Disregard loose leaf material, pieces of leaves, EVM, and detached fragments.”
- [Step 16.a.](#) for on-line inspection of short spears states, “Disregard loose leaf material, pieces of leaves, EVM, and detached fragments.”

When there are short spears which do not meet the style weight criteria (6 grams or less), but meet the style length criteria (shorter than 2 cm), refer to step [3.d.](#) for on-line inspection of short spears or [16.c.](#) for lot inspection of short spears. This procedure is intended for “intact” short spears and not reassembled units. Count intact units that are 6 grams or less in weight and 2 cm or greater in length as a minor style defect.

Broccoli portions less than 6 grams in weight and less than 2 cm in length are considered “detached fragments” and are disregarded.

DETACHED FRAGMENTS AND DETERMINATION OF BLEMISHED UNITS AND OTHER QUALITY DEFECTS

“Detached fragments should not be scored as blemished or color defectives, etc., because they are themselves “defects (or defectives);” except when the detached fragment has a more severe defect.¹ For spears and short spears styles, “detached fragments” are not used to reassemble “broken” spears or short spears and are not considered units. Blemish, color, and other defect determinations are made on individual spear and short spear units.

The U.S. Standards for Grades of Frozen Broccoli states:

§52.636 Recommended sample unit sizes. (C) Associated Material. (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 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.

Both styles of spears and short spears instruct the inspector to reassemble any broken spears, and that these reassembled spears are counted only as one unit. Therefore, when determining the number of blemished units, any reassembled unit can only be counted once even if it is pieced together to make 1 unit.

¹ If the “detached fragment” has a defect (example: number of serious blemishes that affect the appearance or eating quality of the sample) that is too severe to ignore, count the “detached fragment” as the more severe defect only. Remember a defect or defective unit is only counted once.