

United States Department of Agriculture

Agricultural Marketing Service

Fruit and Vegetable Programs

Fresh Products Branch

# United States Standards for Grades of Potatoes

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# United States Standards for Grades of Potatoes 1

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<sup>&</sup>lt;sup>1</sup>Packing of the product in conformity with requirements of these standards shall not excuse failure to comply with the provisions of the Federal Food and Drug Cosmetic Act or with applicable State laws and regulations.

#### Grades

# §51.1540 [Reserved].

## 851.1541 U.S. No. 1.

- "U.S. No. 1" consists of potatoes which meet the following requirements:
- (a) Similar varietal characteristics, except when designated as a mixed or specialty pack;
- (b) Firm;
- (c) Fairly clean;2
- (d) Fairly well shaped;
- (e) Free from:
- Freezing;
- (2) Blackheart;
- (3) Late blight, southern bacterial wilt and ring rot; and,
- (4) Soft rot and wet breakdown.
- (f) Free from damage by any other cause. See §§51.1564 and 51.1565.
- (g) Size. Not less than 1-7/8 inches in diameter, unless otherwise specified in connection with the grade.
- (h) For tolerances see §51.1546.

# §51.1542 U.S. Commercial.

- "U.S. Commercial" consists of potatoes which meet the requirements of U.S. No. 1 grade except for the following:
- (a) Free from serious damage caused by:
- Dirt or other foreign matter;
- (2) Russet scab; and,
- (3) Rhizoctonia.
- (b) Increased tolerances for defects specified in §51.1546.

# §51.1543 U.S. No. 2.

- "U.S. No. 2" consists of potatoes which meet the following requirements:
- (a) Similar varietal characteristics, except when designated as a mixed or specialty pack;
- (b) Not seriously misshapen;
- (c) Free from:
- (1) Freezing;
- (2) Blackheart;
- (3) Late blight, southern bacterial wilt and ring rot; and,
- (4) Soft rot and wet breakdown.
- (d) Free from serious damage by any other cause. See §§51.1564 and 51.1565.
- (e) Size. Not less than 1-1/2 inches in diameter, unless otherwise specified in connection with the grade.
- (f) For tolerances see §51.1546.

# §51.1544 [Reserved].

<sup>&</sup>lt;sup>2</sup>Potatoes in containers bearing official State Seed Certification Tags and Seals are not required to be fairly clean but shall be free from damage by dirt.

#### Size

## §51.1545 Size.

- (a) The minimum size, or minimum and maximum sizes may be specified in connection with the grade in terms of diameter or weight of the individual potato, or in accordance with one of the size designations in Table I or Table II: **Provided**, That sizes so specified shall not be in conflict with the basic size requirements for the grade.
- (b) When size is designated as shown in Table II, the corresponding weight ranges shall apply. These size designations may be applied to potatoes packed in any size container: Provided, That the weight ranges are within the limits specified.

Table I

Size designation	Minimum dia me ter <sup>1</sup> or weight		Maximum dia meter <sup>i</sup> or weight	
	Inc hes	Ounces	Inc hes	Ounces
C rea mer	3/4	(3)	1-5/8	(3)
Chef	2-3/4	8	4-1/2	28
Size A <sup>2</sup>	1-7/8	(3)	(3)	(3)
Size B	1-1/2	(3)	2-1/4	(3)
Small	1-3/4	(3)	2-1/2	6
Medium	2-1/4	5	3-1/4	10
La rge	3	10	4-1/2	28

<sup>&</sup>lt;sup>1</sup>Dir meter means the greatest dimension at right angles to the longitudinal axis, without regard to the position of the stemend.

Table II
[Ounces]

Size designation	Minimum weight	Maximum weight
Under 50	15	
50	12	19
60	10	16
70	9	15
80	8	13
90	7	12
100	6	10
110	5	9
120	4	8
130	4	8
140	4	8
Over 140	4	8

stemend.

In addition to the minimum size specified, a lot of potatoes designated as Size A shall contain at least 40 percent of potatoes which are 2-1/2 inches in diameter or larger or 6 ounces in weight or larger.

No requirement.

#### Toleran ces

## §51.1546 Tolerances.

To allow for variations incident to proper grading and handling in each of the foregoing grades, the following tolerances by weight or equivalent basis, are provided as specified.

- (a) For defects -- (1) U.S. No. 1. (i) At Shipping Point: A total of 8 percent for potatoes in any lot which fail to meet the requirements for the grade: Provided, That included in this tolerance not more than the following percentages shall be allowed for the defects listed:
- (A) 5 percent for external defects;
- (B) 5 percent for internal defects; and
- (C) Not more than a total of 1 percent for potatoes which are frozen or affected by soft rot or wet breakdown. See §51.1547.
- (ii) En route or at Destination: A total of 10 percent for potatoes in any lot which fail to meet the requirements for the grade: Provided, That included in this tolerance not more a total of 8 percent shall be allowed for permanent defects: And provided further, the following percentages shall be allowed for the defects listed:
- (A) 7 percent for external defects, including therein not more than 5 percent for permanent external defects;
- (B) 7 percent for internal defects, including therein not more than 5 percent for permanent internal defects; and
- (C) Not more than a total of 2 percent for potatoes which are frozen or affected by soft rot or wet breakdown. See §51.1547.
- (2) U.S. Commercial. A total of 20 percent for potatoes in any lot which fail to meet the requirements for the grade: Provided, That included in this tolerance not more than the following percentages shall be allowed for the defects listed:
- (i) 10 percent for potatoes which fail to meet the requirements for U.S. No. 2 grade, including therein not more than:
- (ii) 6 percent for external defects,
- (iii) 6 percent for internal defects; and
- (iv) Not more than a total of 1 percent for potatoes which are frozen or affected by soft rot or wet breakdown. See §51.1547.
- (3) U.S. No. 2. (i) At Shipping Point: A total of 10 percent for potatoes in any lot which fail to meet the requirements for the grade: Provided, That included in this tolerance not more than the following percentages shall be allowed for the defects listed:
- (A) 6 percent for external defects;
- (B) 6 percent for internal defects; and
- (C) Not more than a total of 1 percent for potatoes which are frozen or affected by soft rot or wet breakdown. See §51.1547.
- (ii) En route or at Destination: A total of 12 percent for potatoes in any lot which fail to meet the requirements for the grade: Provided, That included in this tolerance not more than 10 percent shall be allowed for permanent defects: And provided further, the following percentages shall be allowed for the defects listed:
- (A) 8 percent for external defects, including therein not more than 6 percent for permanent external defects;
- (B) 8 percent for internal defects, including therein not more than 6 percent for permanent internal defects; and

- (C) Not more than a total of 2 percent for potatoes which are frozen or affected by soft rot or wet breakdown. See §51.1547.
- (b) For off-size. (1) Not more than 3 percent of the potatoes in any lot may be smaller than the required or specified minimum size except that a tolerance of 5 percent shall be allowed for potatoes packed to meet a minimum size of 2-1/4 inches or larger in diameter or 5 ounces or more in weight. In addition, not more than 10 percent may be larger than any required or specified maximum size. See §51.1547.
- (2) When a percentage of the potatoes is specified to be of a certain size and larger, individual samples shall have not less than one-half of the percentage specified: **Provided**, That the average for the entire lot is not less than the percentage specified.

# Application of Tolerances

# §51.1547 Application of tolerances.

Individual samples shall have not more than double the tolerances specified, except that at least one defective and one off-size potato may be permitted in any sample: **Provided**, That en route or at destination one-tenth of the samples may contain three times the tolerance permitted for potatoes which are frozen or affected by soft rot or wet breakdown. **And provided further**, That the averages for the entire lot are within the tolerances specified for the grade.

# Samples for Grade and Size Determination

# §51.1548 Samples for grade and size determination.

Individual samples shall consist of at least 20 pounds. When individual packages contain at least 20 pounds, each individual sample is drawn from one package; when packages contain less than 20 pounds, a sufficient number of adjoining packages are opened to provide at least a 20-pound sample. The number of such individual samples drawn for grade and size determination will vary with the size of the lot.

#### Skinning

# §51.1549 Skinning.

- (a) The following definitions provide a basis for describing lots of potatoes as to the degree of skinning whenever description may be appropriate:
- (1) "Practically no skinning" means that not more than 5 percent of the potatoes in the lot have more than one-tenth of the skin missing or "feathered;"
- (2) "Slightly skinned" means that not more than 10 percent of the potatoes in the lot have more than one-fourth of the skin missing or "feathered;"
- (3) "Moderately skinned" means that not more than 10 percent of the potatoes in the lot have more than one-half of the skin missing or "feathered;" and
- (4) "Badly skinned" means that more than 10 percent of the potatoes in the lot have more than one-half of the skin missing or "feathered."

#### Definitions

# §51.1550 Similar varietal characteristics.

"Similar varietal characteristics" means that the potatoes in any lot have the same general shape, color and character of skin, and color of flesh.

#### 851.1551 Firm.

"Firm" means that the potato is not shriveled or flabby.

## §51.1552 Clean.

"Clean" means that at least 90 percent of the potatoes in any lot are practically free from dirt or staining and practically no loose dirt or other foreign matter is present in the container.

#### §51.1553 Fairly clean.

"Fairly clean" means that at least 90 percent of the potatoes in any lot are reasonably free from dirt or staining and not more than a slight amount of loose dirt or foreign matter is present in the container.

#### §51.1554 Mature.

"Mature" means that the skins of the potatoes are generally firmly set and not more than 5 percent of the potatoes in the lot have more than one-tenth of the skin missing or "feathered." 851.1555 Fairly well matured.

"Fairly well matured" means that the skins of the potatoes are generally fairly firmly set and not more than 10 percent of the potatoes in the lot have more than one-fourth of the skin missing or "feathered."

# §51.1556 Well shaped.

"Well shaped" means that the potato has the normal shape for the variety.

# §51.1557 Fairly well shaped.

"Fairly well shaped" means that the potato is not materially pointed, dumbbell-shaped or otherwise materially deformed.

# §51.1558 Seriously misshapen.

"Seriously misshapen" means that the potato is seriously pointed, dumbbell-shaped or otherwise badly deformed.

## §51.1559 [Removed and Reserved].

# §51.1560 Damage.

"Damage" means any defect, or any combination of defects, which materially detracts from the edible or marketing quality, or the internal or external appearance of the potato, or any external defect which cannot be removed without a loss of more than 5 percent of the total weight of the potato. See Tables III, IV, V, and VI in §51.1564 and Table VII in §51.1565.

## §51.1561 Serious damage.

"Serious damage" means any defect, or any combination of defects, which seriously detracts from the edible or marketing quality, or the internal or external appearance of the potato, or any external defect which cannot be removed without a loss of more than 10 percent of the total weight of the potato. See Tables III, IV, V, and VI in §51.1564 and Table VII in §51.1565.

#### §51.1562 Freezing.

"Freezing" means that the potato is frozen or shows evidence of having been frozen.

## §51.1563 Soft rot or wet breakdown.

"Soft rot or wet breakdown" means any soft, mushy, or leaky condition of the tissue such as slimy soft rot, leak, or wet breakdown following freezing injury.

# §51.1564 External defects.

"External defects" are defects which can be detected externally. However, cutting may be required to determine the extent of the injury. Some external defects are listed in Tables III, IV, V, and VI.

Table III - External Defects

Defects	Damage	Serious Damage 1
Air Cracks	When removal causes a loss of more than 5 percent of the total weight of the potato or when the air crack(s) affects more than 1/3 the lengthor diameter of the potato (whichever is greater) in the aggregate.	When removal causes a loss of more than 10 percent of the total weight of the potato or when the air crack(s) affects more than 3/4 the length or diameter of the potato (which ever is greater) in the aggregate.
Artificial Coloring	When unsightly or when concealing any defect causing damage or when penetrating the fleshand removal causes loss of more than 5 percent of total weight of potato.	When concealing a serious defect or when penetrating into the flesh and removal causes loss of more than 10 percent of total weight of potato.
Bruises (Not including pressure bruise and sunken discolored areas)	When removal causes a loss of more than 5 percent of the total weight of the potato or when the area affected is more than 5 percent of the surface in the aggregate (i.e. 3/4 inch on a 2-1/2 inch or 6 oz. potato). Correspondingly lesser or greater areas in smaller or larger potatoes.	When removal causes a loss of more than 10 percent of the total weight of the potato or when the area affected is more than 10 percent of the surface in the aggregate (i.e. 1-1/4 inches on a 2-1/2 inchor 6 oz potato).  Correspondingly lesser or greater areas in smaller or larger potatoes.
Cuts	When one smooth cut affects more than 5 percent of the surface area.	Cut(s) that affect more than 10 percent of the surface area in the aggregate or when a single side cut extends beyond 1/2 the length of the potato.
Dirt	When materially detracting from the appearance of the potato.	When seriously detracting from the appearance of the potato.
Elepha nt Hide	When a ffecting over 10 percent of the surface a rea of the potato.	When a ffecting over 25 percent of the surface area.
Enlarged Lenticels	When materially detracting from the appearance of the potato.	When seriously detracting from the appearance of the potato.
External Discoloration (Areas that are light tan or lighter in color and blends should be ignored.)	When more than 30 percent of the surface is affected by light tanor light brown to lors which do not blend or when more than 15 percent of the surface is affected by colors darker than light tanor light brown.	When more than 60 percent of the surface is affected by light tanor light brown colors which do not blend or when more than 30 percent of the surface is affected by colors darker than light tanor light brown.

Defects	Damage	Serious Damage <sup>1</sup>
Flattened or Depressed Areas/Pressure Bruises	When removal of underlying discolored flesh causes a loss of more than 5 percent of the total weight of the potato or when the flattened or depressed area(s) covers more surface area than allowed in Table IV. (See Table IV.)	When removal of underlying discolored flesh causes a loss of more than 10 percent of the weight of the potato or when the flattened depressed area (s) covers more surface area than allowed in the Table IV. (See Table IV.)
Flea Beetle Injury	When materially detrecting from the appearance or when removal causes a loss of more than 5 percent of the total weight of the potato or when the area affected is more than 5 percent of the surface in the aggregate.	When seriously detracting from the appearance of the potato or when removal causes a loss of more than 10 percent of the weight of the potato or when the area affected is more than 10 percent of the surface in the aggregate.
Greening	When removal causes a loss of more than 5 percent of the total weight of the potato or when green color affects more than 25 percent of the surface in the aggregate.	When removal causes a loss of more than 10 percent of the weight of the potato or when green color affects more than 50 percent of the surface in the aggregate.
GrowthCncks	When the growth crack(s) affects more than 1/2 the length of the potato in the aggregate on round varieties or more than 1/3 the length in the aggregate on long varieties; or, when the depth is greater than that as outlined in Table V. (See Table V.)	When the growth crack(s) affects more than 3/4 the length of the potato in the aggregate or when the depth is greater than that a soutlined in Table V. (See Table V.)
Grub Da ma ge	When removal causes a loss of more than 5 percent of the total weight of the potato or when affecting more than 5 percent of the surface area (i.e. more than 3/4 inch on a 2-1/2 inch or 6 ounce potato). Comespondingly lesser or greater areas in smaller or larger potatoes.	When removal causes a loss of more than 10 percent of the total weight of the potato or when affecting more than 10 percent of the surface area (i.e. more than 1-1/4 inc hon a 2-1/2 inc hor 6 ounce potato). Correspondingly lesser or greater areas in smaller or larger potatoes.
Insects or Worms	(See Serious Damage.)	When present inside the pots to.
Nema tode (Root Knot)	When removal causes loss of more than 5 percent of total weight of potato.	When removal causes loss of more than 10 percent of total weight of potato.
R hizoctonia	When affecting more than 15 percent of the surface in the aggregate.	When affecting more than 50 percent of the surface in the aggregate.

D efect s	Damage	S erious Damage <sup>i</sup>
Rodent or Bird Damage	When removal causes a loss of more than 5 percent of the total weight of the potato or when a ffecting more than 5 percent of the surface area (i.e. more than 3/4 inch on a 2-1/2 inch or 6 ounce potato). Correspondingly lesser or greater areas in smaller or larger potatoes.	When removal causes a loss of more than 10 percent of the total weight of the potato or when affecting more than 10 percent of the surface area (i.e. more than 1-1/4 inchon a 2-1/2 inchor 6 ounce potato). Correspondingly lesser or greater areas in smaller or larger potatoes.
Russeting (OnNonRusset Type)	When more than 50 percent of the surface is a ffected in the aggregate.	N/A
Scab, Pitted	When removal causes a loss of more than 5 percent of the total weight of the potato or when scab affects an aggregate area of more than 1/2 inch. (Based on a potato 2-1/2 inches in diameter or 6 oz. in weight.) Correspondingly lesser or greater areas in smaller or larger potatoes.	When the removal causes a loss of more than 10 percent of the total weight of the potato or when scab affects an aggregate area of more than 1 inch. (Based on a potato 2-1/2 inches in diameter or 6 oz. in weight.) Correspondingly lesser or greater areas in smaller or larger potatoes.
Scab, Russet	Smooth and a ffecting more than 1/3 of the surface or rough russet scab which affects more than 10 percent of the surface in the aggregate.	Rough and affecting more than 25 percent of the surface in the aggregate.
Scab, Surface	When more than 5 percent of the surface in the aggregate is affected.	When more than 25 percent of the surface in the aggregate is a ffected.
Second Growth	When materially detracting from the appearance of the potato.	When seriously detracting from the appearance of the potato.
Silver Scurf	When affecting more than 50 percent of the surface area of the potato.	When its severity causes a wrinkling of the skin over more than 50 percent of the surface.
Sprouts	When more than 5 percent of the potatoes in any lot have any sprout more than 1/4 inch in length at shipping point, more than 1/2 inch in length at destination; or have numerous individual and/or clusters of sprouts which materially detract from the appearance of the potato.	When more than 10 percent of the po tables in any lot have any sprout more than 1/2 inch in length at shipping point, more than 1 inch in length at destination; or have numerous individual and/or clusters of sprouts which seriously detract from the appearance of the potato. Serious damage by sprouts shall only be scored a gainst the U.S. Commercial and U.S. No. 2 grades.

D efect s	Damage	S erious Damage <sup>i</sup>
Sunburn	When removal causes loss of more than 5 percent of total weight of pota to.	When removal causes loss of more than 10 percent of total weight of potato.
Sunken Discolored Areas	SEE TABLE VI	SEE TABLE VI
Surface Cracks (Areas affected by fine net-like enacking should be ignored.)	When smoothshallow encking affects more than 1/3 of the surface or when rough deep encking affects more than 5 percent of the surface.	When roughdeep eracking affects more than 10 percent of the surface.
Wirewormor Grass Damage	When affecting the flesh of the potato and removal causes loss of more than 5 percent of total weight of potato.	When affecting the flesh of the potato and removal causes loss of more than 10 percent of total weight of potato.

<sup>&</sup>lt;sup>3</sup>The following defects are considered serious damage when present in any degree: 1. Freezing. 2. Late blight. 3. Ring rot. 4. Southern bacterial wilt. 5. Soft rot. 6. Wet breakdown.

Table IV Flattened or Depressed Areas - Pressure Bruises Maximum Area Allowed

Diameter	Weight	No. 1 (aggregate area)	No. 2 (aggregate area)
Pota to is:	Potato is:	Not more than:	Not more than:
Less than 2 in.	Less than 4 oz.	1/2 in.	1 in.
2 to 2-1/2 in.	4 to 6 o z	1 in.	1-1/2 in.
More than 2-1/2 to 3 in.	More than 6 to 8 oz.	1-1/4 in.	1-3/4 in.
More than 3 to 3-1/2 in.	More than 8 to 14 oz.	1-1/2 in.	1-7/8 in.
More than 3-1/2 to 4 in.	More than 14 to 20 oz.	1-3/4 in.	2 in.
More than 4 to 4-1/2 in.	More than 20 to 28 oz	2 in.	2-1/4 in.
More than 4-1/2 to 5 in.	More than 28 to 36 oz	2-1/4 in.	2-3/4 in.
More than 5 in.	More than 36 oz.	2-1/2 in.	3-1/4 in.

Table V

Depth Allowed For Growth Cracks

Deput Anomed For Chomin Clarks		
Weight	No. 1 (Depth)	No. 2 (D epth)
Potato is:	Not more than:	Not more than:
Less than 4 oz.	1/8 in.	1/4 in.
4 oz to 6 oz	1/4in	3/8 in.
More than 6 oz to 8 oz	3/8 in.	1/2 in.
More than 8 oz	1/2 in.	5/8 in.
	Weight Potato is: Less than 4 oz. 4 oz to 6 oz More than 6 oz to 8 oz	Weight No. 1 (Depth)  Potato is: Not more than:  Less than 4 oz. 1/8 in.  4 oz to 6 oz 1/4in.  More than 6 oz to 8 oz 3/8 in.

Table VI Sunken Discolored Areas Maximum Area Allowed

Diameter	Weight	No. 1 (aggregate area)	No. 2 (aggregate area)
Pota to is:	Potato is:	Not more than:	Not more than:
Less than 2 in.	Less than 4 o z.	3/8 in.	3/4 in.
2 to 2-1/2 in.	4 to 6 o z	3/4 in.	1 in.
More than 2-1/2 to 3 in.	More than 6 to 8 oz.	l in.	1-1/4 in.
More than 3 to 3-1/2 in.	More than 8 to 14 oz.	1-1/4 in.	1-1/2 in.
More than 3-1/2 to 4 in.	More than 14 to 20 oz.	1-1/2 in.	1-3/4 in.
More than 4 to 4-1/2 in.	More than 20 to 28 oz.	1-3/4 in.	2 in.
More than 4-1/2 to 5 in.	More than 28 to 36 oz	2 in.	2-1/4 in.
More than 5 in.	More than 36 oz.	2-1/4 in.	2-1/2 in.

§51.1565 Internal defects.
"Internal defects" are defects which cannot be detected without cutting the potato. Some internal defects are listed in Table VII.

Table VII -- Internal Defects

D ef ect s	D amage Maximum Allowed	Serious Damage Maximum Allowed			
Occurring ou	Occurring outside of or not entirely confined to the vascular ring				
Ingrown Sprouts, Internal Black Spot, Internal Discoloration, Vascular Browning, Fusarium Wilt, Net Necrosis, Other Necrosis, Stem End Browning	5% waste	10% waste			
Internal Black Spot.	When the spot(s) are darker than the official color chip (POT-CC-2) after removing 5 percent of the total weight of the potato.	When the spot(s) are darker than the official color chip (POT-CC-2) after removing 10 percent of the total weight of the potato.			
Oe	curring entirely within the vascular r	ing			
Hollow Heart or Hollow Heart with Discoloration	Area affected not to exceed that of a circle 1/2 inch in diameter in a potato 2-1/2 inches in diameter or 6 ounces in weight.	Area affected not to exceed that of a circle 3/4 inch in diameter in a potato 2-1/2 inches in diameter or 6 ounces in weight. <sup>1</sup>			
Light Brown Discoloration (Brown Center)	Area affected not to exceed that of a circle 1/2 inch in diameter in a potato 2-1/2 inches in diameter or 6 ounces in weight.	Area affected not to exceed that of a circle 3/4 inch in diameter in a potato 2-1/2 inches in diameter or 6 ounces in weight. <sup>1</sup>			
Internal Brown Spot and Similar Discoloration (Heat Necrosis)	Not more than the equiva lent of 3 scattered spots 1/8 inch in diameter in a potato 2-1/2 inches in diameter or 6 ounces in weight. 1	Not more than the equiva lent of 6 scattered spots 1/8 inch in diameter in a potato 2-1/2 inches in diameter or 6 ounces in weight. 1			

\*Note: Correspondingly lesseror greater areas in smaller or larger potatoes.

# Metric Conversion Table §51.1566 Metric conversion table.

Ounces	Grams
1 equals	28.35
4 equals	
5 equals	141.75
6 equals	
7 equals	198.45
8 equals	226.80
9 equals	
10 equals	283.50
12 equals	
14 equals	
16 equals	
18 equals	
19 cquals	
20 equals	56 7.00
Inches	Millimet er s (mm)
1/8 equals	3.2
1/4 equals	6.4
1/2 equals	
3/4 equals	19.1
1 equals	25.4
1-1/2 equals	38.1
2 equals	
2-1/2 equals	
3 equals	
3-1/2 equils	
4 equals	
4-1/2 equals	1143