



**United States
Department of
Agriculture**

**Agricultural
Marketing
Service**

**Fruit and
Vegetable
Division**

**Fresh
Products
Branch**

United States Standards for Grades of Potatoes

Effective March 27, 1991
(Reprinted - January 1997)

United States Standards for Grades of Potatoes ¹

Grades

51.1540 U.S. Extra No. 1.

51.1541 U.S. No. 1.

51.1542 U.S. Commercial.

51.1543 U.S. No. 2.

Unclassified

51.1544 Unclassified.

Size

51.1545 Size.

Tolerances

51.1546 Tolerances.

Application of Tolerances

51.1547 Application of tolerances.

Samples for Grade and Size Determination

51.1548 Samples for grade and size determination.

Skinning

51.1549 Skinning.

Definitions

51.1550 Similar varietal characteristics.

51.1551 Firm.

51.1552 Clean.

51.1553 Fairly clean.

51.1554 Mature.

51.1555 Fairly well matured.

51.1556 Well shaped.

51.1557 Fairly well shaped.

51.1558 Seriously misshapen.

51.1559 Injury.

51.1560 Damage.

51.1561 Serious damage.

51.1562 Freezing.

51.1563 Soft rot or wet breakdown.

51.1564 External defects.

51.1565 Internal defects.

Metric Conversion Table

¹Packing 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.

51.1566 Metric conversion table.

Grades

§51.1540 U.S. Extra No. 1.

"U.S. Extra No. 1" consists of potatoes which meet the following requirements:

- (a) Similar varietal characteristics;
- (b) Firm;
- (c) Clean;
- (d) At least fairly well matured;
- (e) Fairly well shaped, with 50 percent or more well shaped;
- (f) Free from:
 - (1) Freezing;
 - (2) Blackheart;
 - (3) Late blight, southern bacterial wilt and ring rot; and,
 - (4) Soft rot and wet breakdown.
- (g) Free from injury caused by:
 - (1) Sprouts; and,
 - (2) Internal defects.
- (h) Free from damage by any other cause. See §§51.1564 and 51.1565.
- (i) Size. The potatoes shall be not less than 2-1/4 inches in diameter or 5 ounces in weight and shall not vary more than 1-1/4 inches in diameter or more than 6 ounces in weight.
- (j) For tolerances see §51.1546.

§51.1541 U.S. No. 1.

"U.S. No. 1" consists of potatoes which meet the following requirements:

- (a) Similar varietal characteristics;
- (b) Firm;
- (c) Fairly clean;²
- (d) Fairly well shaped;
- (e) Free from:
 - (1) 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.

²Potatoes 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.

§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:
 - (1) 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;
- (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.

Unclassified

§51.1544 Unclassified.

"Unclassified" consists of potatoes which have not been classified in accordance with any of the foregoing grades. The term "unclassified" is not a grade within the meaning of these standards but is provided as a designation to show that no grade has been applied to the lot.

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 diameter ¹ or weight		Maximum diameter ¹ or weight	
	Inches	Ounces	Inches	Ounces
Size A ²	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
Large.....	3	10	4-1/4	16

¹Diameter means the greatest dimension at right angles to the longitudinal axis, without regard to the position of the stem end.

²In 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.

³No requirement.

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

Tolerances

§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. Extra No. 1.** A total of 5 percent for potatoes in any lot which fail to meet the requirements for the grade: **Provided**, That not more than two-fifths of this tolerance, or 2 percent, shall be allowed for potatoes which are affected by freezing, southern bacterial wilt, ring rot, late blight, soft rot or wet breakdown, including therein not more than one-half of 1 percent for potatoes which are frozen or affected by soft rot or wet breakdown. See §51.1547.

(2) **U.S. No. 1.** 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:

(i) 5 percent for external defects;

(ii) 5 percent for internal defects; or,

(iii) 3 percent for potatoes which are affected by freezing, southern bacterial wilt, ring rot, late blight, soft rot or wet breakdown, including therein not more than 1 percent for potatoes which are frozen or affected by soft rot or wet breakdown. See §51.1547.

(3) **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; or,

(iv) 3 percent for potatoes which are affected by freezing, southern bacterial wilt, ring rot, late blight, soft rot or wet breakdown, including therein not more than 1 percent for potatoes which are frozen or affected by soft rot or wet breakdown. See §51.1547.

(4) **U.S. No. 2.** 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:

(i) 6 percent for external defects;

(ii) 6 percent for internal defects; or,

(iii) 3 percent for potatoes which are affected by freezing, southern bacterial wilt, ring rot, late blight, soft rot or wet breakdown, including therein not more than 1 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.

§51.1551 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."

§51.1555 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 Injury.

"Injury" means any defect, or any combination of defects, which more than slightly detracts from the edible or marketing quality, or the internal or external appearance of the potato, or any internal defect outside of or nor entirely confined within the vascular ring which cannot be removed without a loss of more than 3 percent of the total weight of the potato.

§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 and IV.

§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 and IV.

§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 Table III.

Table III - External Defects

Defect	Damage		Serious damage	
	When materially detracting from appearance of potato	When removal causes loss of more than 5 percent of total weight of potato	When seriously detracting from appearance of potato	When removal causes loss of more than 10 percent of total weight of potato
Air cracks.....	X.....	.....	X.....	
Bruises.....	X.....	X.....	X.....	X.
Dirt.....	X.....	.....	X.....	
Enlarged lenticels	X.....	.....	X.....	
External discoloration	X.....	.....	X.....	
Flea Beetle injury	X.....	X.....	X.....	X.
Greening.....	X.....	X.....	X.....	X.
Rhizoctonia.....	X.....	.....	X.....	
Scab, pitted....	X.....	X.....	X.....	X.
Scab, russet....	X.....	.....	X.....	
Scab, surface....	When more than 5 percent of surface affected.	.....	When more than 25 percent of surface affected	
Sunburn.....	.....	X.....	.....	X.
Second growth....	X.....	.....	X.....	
Growth cracks....	X.....	.....	X.....	

Defects	Damage	Serious damage ¹
Wireworm or grass damage.....	When any hole in a potato 2-1/2 inches in diameter or 6 ounces in weight is more than 3/4 inch long, or when the aggregate length of all holes is more than 1-1/4 inches, or correspondingly shorter or longer holes in smaller or larger potatoes.	When any hole in a potato 2-1/2 inches in diameter or 6 ounces in weight is more than 1-1/2 inches long, or when the aggregate length of all holes is more than 2 inches, or correspondingly shorter or longer holes in smaller or larger potatoes.

Defects	Damage	Serious damage ¹
Insects or worms.....	(See serious damage)	When present inside the potato.
Artificial coloring.....	When unsightly or when concealing any defect causing damage or when penetrating the flesh and 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.
Sprouts.....	When more than 10 percent of the potatoes in any lot have any sprout more than 3/4 inch in length or have individual sprouts or clusters of sprouts which materially detract from the appearance of the potato.	

¹The 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.

§51.1565 Internal defects.

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

Table IV -- Internal Defects

DEFECTS	DAMAGE Maximum Allowed	SERIOUS DAMAGE Maximum Allowed
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
Occurring entirely within the vascular ring		
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. ¹	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. ¹
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. ¹	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. ¹
Internal Brown Spot and Similar Discoloration (Heat Necrosis)	Not more than the equivalent 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 equivalent of 6 scattered spots 1/8 inch in diameter in a potato 2-1/2 inches in diameter or 6 ounces in weight. ¹

¹**Note:** Correspondingly lesser or greater areas in smaller or larger potatoes.

Metric Conversion Table
§51.1566 Metric conversion table.

Ounces	Grams
1 equals	28.35
4 equals	113.40
5 equals	141.75
6 equals	170.10
7 equals	198.45
8 equals	226.80
9 equals	255.15
10 equals	283.50
12 equals	340.20
14 equals	396.90
16 equals	453.60
18 equals	510.30
19 equals	538.60
20 equals	567.00

Inches	Millimeters (mm)
1/8 equals	3.2
1/4 equals	6.4
1/2 equals	12.7
3/4 equals	19.1
1 equals	25.4
1-1/2 equals	38.1
2 equals	50.8
2-1/2 equals	63.5
3 equals	76.2
3-1/2 equals	88.9
4 equals	101.6
4-1/2 equals	114.3