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Branch**

United States Standards for Grades of Potatoes for Chipping

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United States Standards for Grades of Potatoes for Chipping ¹

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Grades

§51.4575 U.S. No. 1 Potatoes for Chipping.

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

(a) Basic requirements: (1) Similar varietal characteristics; (2) firm; (3) fairly clean; (4) fairly well shaped.

(b) Free from: (1) Freezing; (2) blackheart; (3) late blight tuber rot; (4) southern bacterial wilt; (5) bacterial ring rot; (6) nuts of nut sedge; (7) tuber moth injury; (8) soft rot and wet breakdown.

(c) Free from damage by any other cause.

(d) Size. Not less than 1-7/8 inches (47.7 mm) in diameter, unless otherwise specified. See

¹Compliance with the provisions of these standards shall not excuse failure to comply with the provisions of the Federal Food, Drug and Cosmetic Act, or with applicable State Laws and regulations.

§51.4577.

(e) For tolerances see §51.4579.

§51.4576 U.S. No. 2 Potatoes for Chipping.

"U.S. No. 2 Potatoes for Chipping" consists of potatoes which meet the following requirements:

- (a) Basic requirements: (1) Similar varietal characteristics; (2) fairly firm; (3) not seriously damaged by dirt; (4) not seriously misshapen.
- (b) Free from: (1) Freezing; (2) blackheart; (3) late blight tuber rot; (4) southern bacterial wilt; (5) bacterial ring rot; (6) nuts of nut sedge; (7) tuber moth injury; (8) soft rot and wet breakdown.
- (c) Free from serious damage by any other cause.
- (d) Size. Not less than 1-3/4 inches (44.5 mm) in diameter, unless otherwise specified. See §51.4577.
- (e) For tolerances see §51.4579.

Size

§51.4577 Size.

(a) The minimum size, maximum size or range in size may be specified in connection with the grade in terms of diameter or weight of the potato, or in accordance with one of the size classifications given in the following table:

TABLE I

Size classification	Minimum diameter ¹	Maximum diameter ¹ or weight ²
A ³	1-7/8 in (47.7 mm)	16 oz (453.6 g).
B.....	1-1/2 in (38.1 mm)	2-1/4 in (57.2 mm).
Small.....	1-3/4 in (44.5 mm)	2-1/2 in (63.5 mm).

¹Diameter means the size designation in terms of inches or 8ths of an inch indicating the greatest dimension at right angles to the longitudinal axis, without regard to the position of the stem end.

²Weight means the size designation in terms of whole ounces indicating the minimum weight of the potato. For example, a potato having a designation of 10 oz (283.50 g) is one which weighs at least 10 oz (283.50 g) but less than 11 oz (311.85 g).

³In addition to the minimum size specified, a lot of potatoes designated as size A shall contain at least 40 pct of potatoes which are 2-1/2 in (63.5 mm) in diameter or larger or 6 oz (170.10 g) in weight or larger.

Optional Tests for Specific Gravity and Fry Color

§51.4578 Optional tests for specific gravity and fry color.²

Tests to determine specific gravity and fry color shall be made in accordance with the procedures set forth in this section. The potatoes used for such determinations shall be taken at random from a composite sample drawn from containers throughout a load, or a comparable sample from a bulk load or storage bin.

(a) **Optional test for specific gravity.** Specific gravity shall be determined by either hydrometer, or by calculation from the weights of the sample in air and in water, with equipment which has been tested and calibrated to give accurate results. The reading obtained from each specific gravity test shall be corrected for temperature variations as prescribed by Table II of this section. The specific gravity for any lot of potatoes shall be the average of at least 3 such corrected readings on separate tests from the composite sample.

(1) **Temperature correction.** The pulp temperature of the potatoes and the temperature of water shall be recorded immediately before testing and the specific gravity reading corrected as indicated in the following table:

Table II. -- Correction Factors for Specific Gravity of Potatoes
 [Corrected to zero of 50° F tuber temperature and 50° F water temperature]

	Water temperature (degrees Fahrenheit)									
	38°	40°	45°	50°	55°	60°	65°	70°	75°	80°
Tuber temperature										
38°.....	-0.0021	-0.0020	-0.0018	-0.0018	-0.0020	-0.0023	-0.0029	-0.0038	-0.0047	-0.0056
40°.....	-.0017	-.0016	-.0014	-.0014	-.0016	-.0019	-.0025	-.0034	-.0043	-.0052
45°.....	-.0009	-.0008	-.0006	-.0006	-.0008	-.0011	-.0017	-.0026	-.0035	-.0044
50°.....	-.0003	-.0002	0000	0000	-.0002	-.0005	-.0011	-.0020	-.0029	-.0038
55°.....	+0.0001	+0.0002	+0.0004	+0.0004	+0.0002	-.0001	-.0007	-.0016	-.0025	-.0034
60°.....	+0.0004	+0.0005	+0.0007	+0.0007	+0.0005	+0.0002	-.0004	-.0013	-.0022	-.0031
65°.....	+0.0005	+0.0006	+0.0008	+0.0008	+0.0006	+0.0003	-.0003	-.0012	-.0021	-.0030
70°.....	+0.0006	+0.0007	+0.0009	+0.0009	+0.0007	+0.0004	-.0002	-.0011	-.0020	-.0029
75°.....	+0.0007	+0.0008	+0.0010	+0.0010	+0.0008	+0.0005	-.0001	-.0010	-.0019	-.0028
80°.....	+0.0008	+0.0009	+0.0011	+0.0011	+0.0009	+0.0006	0000	-.0009	-.0018	-.0027

²Whenever proper testing equipment is not available for official use at point of inspection or at the local field office of the Fresh Fruit and Vegetable Inspection Service, optional testing for specific gravity or fry color shall be performed by the Inspection Service at one of the following USDA Fresh Inspection Offices: Room 2052, S. Building, Washington, D.C. 20250; Room 1160, 610 South Canal St., Chicago, Ill. 60607 or, Appraisers Building, Room 739, 630 Sansome St., San Francisco, Calif. 94111.

85°.....	+0.0009	+0.0010	+0.0012	+0.0012	+0.0010	+0.0007	+0.0001	-0.0008	-0.0017	-0.0026
90°.....	+0.0010	+0.0011	+0.0013	+0.0013	+0.0011	+0.0008	+0.0002	-0.0007	-0.0016	-0.0025
95°.....	+0.0011	+0.0012	+0.0014	+0.0014	+0.0012	+0.0009	+0.0003	-0.0006	-0.0015	-0.0024
100°....	+0.0012	+0.0013	+0.0015	+0.0015	+0.0013	+0.0010	+0.0004	-0.0005	-0.0014	-0.0023

¹ To apply correction factor, change actual specific gravity reading by adding or subtracting the appropriate factor according to the plus or minus sign.

(b) **Optional test for fry color.** The test to determine compliance with a specified fry color is made by frying potato slices 0.05 inch (1.3 mm) thick from the center portion of the potato sliced longitudinally in an approved oil with a starting temperature of 365° F (185° C) for not less than 1 minute 40 seconds. A minimum of 40 slices shall be used for color evaluation. Unless otherwise specified, the color index of the composite sample of fried chips shall be not less than a reading of 25 on a USDA approved photoelectric colorimeter (Agtron M - 30A or M - 300 A) or it may be based on one or more of the color designations with corresponding colorimeter indices (Agtron M - 30A or M - 300 A) specified in Table III. Photoelectric equipment (Agtron M - 30A or M - 300 A) shall be calibrated at 0 and 90 using M - 00 and M - 90 calibration discs on the red mode.³

Table III

	Agtron index range
Color designations:	
1.....	65 and higher.
2.....	55 to 64.
3.....	45 to 54.
4.....	35 to 44.
5.....	25 to 34.

Application of Standards

§51.4579 Application of standards.

In the application of these standards to determine the percentage of the lot which meets the requirements of the grades, tolerances shall not apply.

(a) **Tolerances.** When a lot of potatoes is required to meet one of the grades, the following tolerances, by weight, are provided as specified:

(1) **For defects.** 15 percent for potatoes in any lot which fail to meet the requirements of the grade: **Provided**, That included in this tolerance not more than the following percentages shall be

³Fry color determinations may be made using other approved electronic color meters (which have been properly calibrated and standardized) which would give readouts that could be mathematically converted to Agtron numerical index values shown in Table III.

allowed for the defects listed:

(i) 5 percent internal defects;

(ii) 10 percent external defects, including not more than 3 percent for potatoes which are affected by freezing, Blackheart, Late Blight Tuber Rot, Southern Bacterial Wilt, Bacterial Ring Rot, nuts of nut sedge, Tuber Moth injury, 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.

(2) **For offsize:** -- (i) **Undersize:** 3 percent when the minimum size specified is less than 2-1/4 inches (57.2 mm) in diameter or less than 6 ounces (170.10 g) in weight; and 5 percent when the minimum size specified is 2-1/4 inches (57.2 mm) or more in diameter or 6 ounces (170.10 g) or more in weight.

(ii) **Oversize:** 10 percent.

(3) **For Off-color -- Visual determination:** (i) Unless otherwise specified, when a lot of potatoes is required to meet a specified visual color, not more than 10 percent of the slices tested may be darker than the specified color.

Samples for Grade and Size Determination

§51.4580 Samples for grade and size determination.

Individual samples shall consist of 25 pounds (11.34 kg). The number of individual samples drawn for grade or size determination will vary with the size of the lot.

Definitions

§51.4581 Similar varietal characteristics.

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

§51.4582 Firm.

"Firm" means the individual potato is not shriveled or wrinkled over more than 15 percent of the surface.

§51.4583 Fairly firm.

"Fairly firm" means that the individual potato is not soft or flabby or excessively shriveled over more than 25 percent of the surface.

§51.4584 Fairly clean.

"Fairly clean" means that the individual potato is not caked with dirt over more than 5 percent of the surface or not more than 1/3 of the surface is affected by smearing or staining.

§51.4585 Seriously damaged by dirt.

"Seriously damaged by dirt" means that more than 25 percent of the surface of the individual potato is affected by caked dirt or more than 2/3 of the surface is affected by smearing or staining.

§51.4586 Fairly well shaped.

"Fairly well shaped" means that the individual potato is not ridged, lumpy, dumbbell-shaped, materially affected by second growth or otherwise misshapen.

§51.4587 Seriously misshapen

"Seriously misshapen" means that the individual potato is seriously dumbbell-shaped, ridged, lumpy or seriously affected by second growth or otherwise seriously misshapen.

§51.4588 Soft rot or wet breakdown.

"Soft rot or wet breakdown" means any soft, mushy or leaky condition of the tissue such as leak, slimy soft rot, wet breakdown, or wet type Fusarium Tuber Rot.

§51.4589 Sprouts.

"Sprouts" means any sprout more than 1 inch (25.4 mm) in length attached to the potato.

§51.4590 Foreign or extraneous material.

"Foreign or extraneous material" means rocks, loose or chunks of dirt, vines, stems, trash and other material including detached sprouts.

§51.4591 Damage.

"Damage" means any defect or combination of defects other than those listed in Tables IV and V, which cannot be removed without a loss of more than 5 percent of the total weight of the potato.

§51.4592 Serious damage.

"Serious damage" means any defect or combination of defects other than those listed in Tables IV and V, which cannot be removed without a loss of more than 10 percent of the total weight of the potato.

§51.4593 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 IV.

Table IV. -- External Defects

Defect	Damage	Serious damage ¹
Air cracks.....	Removal causes loss of more than 5 pct of total weight of potato.	Removal causes loss of more than 10 pct of total weight of potato.
Bruises.....	do.....	Do.
Flea beetle injury.....	do.....	Do.
Scab, pitted.....	do.....	Do.
Sunburn, greening, wind-burn or Silver Scurf.	do.....	Do.
Pressure bruise..... discoloration.	do.....	Do.
Wireworm, grass,..... grub and other insects.	do.....	Do.
Dry rots.....	do.....	Do.
Growth cracks.....	The length of the crack or aggregate lengths of 2 or more cracks exceed 2/3 the length of the potato or the maximum depth exceeds the maximum width of the cracks.	The length of the crack or aggregate lengths of 2 or more cracks equals the length of the potato or the maximum depth exceeds the maximum width of the cracks.
Rhizoctonia light.....	More than 50 pct of surface affected.	More than 75 pct of surface affected.
External surface..... discoloration.	do.....	Do.
Scab, surface.....	do.....	Do.

Cuts (slab, knife).....	Cuts aggregating more than 1 in. in diameter (25.4 mm) on a potato 2-1/2 in (63.5 mm) in diameter or 6 oz (170.10 g) in weight and correspondingly smaller and larger cuts on smaller and larger potatoes.	Cuts aggregating more than 1-1/2 in (38.1 mm) in diameter on a potato 2-1/2 in (63.5 mm) in diameter or 6 oz (170.10 g) in weight and correspondingly smaller and larger cuts on smaller and larger potatoes.
Dirt.....	More than 5 pct of the surface is affected by caked dirt or more than 1/3 of the surface is affected by staining or smearing.	More than 25 pct of the surface is affected by caked dirt or 2/3 of the surface is affected by staining or smearing.
Rhizoctonia, caked.....	More than 25 pct of surface affected.	More than 50 pct of surface affected.
Sprouts.....	More than 10 pct of the potatoes have any sprout more than 1 in (25.4 mm) in length.	

¹ The following defects are considered serious damage when present in any degree: freezing; blackheart; late blight tuber rot; southern bacterial wilt; bacterial ring rot; nuts of nut sedge; tuber moth injury; soft rot; and wet breakdown.

§51.4594 Internal defects.

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

Table V. -- Internal defects

Defect	Damage	Serious damage
Hollow heart.....	Cracks aggregating 3/8 in (9.6 mm) in width or exceeds 1/4 the length of the largest diameter of the potato.	Cracks aggregating 1/2 in (12.7 mm) in width or exceeds 1/3 the length of the largest diameter of the potato.
Ingrown sprouts.....	Removal causes a loss of more than 5 pct of the total weight of the potato.	Removal causes a loss of more than 10 pct of the total weight of the potato.
Vascular discoloration....	do.....	Do.
Internal discoloration.....	More than the equivalent of 3 scattered light brown spots 1/8 in (3.2 mm) in diameter in a potato 2-1/2 in (63.5 mm) in diameter or 6 oz (170.10 g) in weight, or correspondingly lesser or greater amounts in smaller or larger potatoes.	More than the equivalent of 6 scattered light brown spots 1/8 in (3.2 mm) in diameter in a potato 2-1/2 in (63.5 mm) in diameter or 6 oz (170.10 g) in weight, or correspondingly lesser or greater amounts in smaller or larger potatoes.