



United States Department of Agriculture

Marketing and
Regulatory
Programs

Agricultural
Marketing
Service

Fruit and
Vegetable
Program

Specialty
Crops
Inspection
Division

Frozen Squash (Summer Type)

Inspection Instructions

September 2015

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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.

These guidelines do not supersede the Federal Food, Drug, and Cosmetic Act or any other applicable Federal or State laws or regulations. Compliance with these statutes is mandatory. This publication supersedes any previously issued inspection instructions.

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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
Fruit and Vegetable Program
USDA, Agricultural Marketing Service
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These instructions replace the Grading Manual for Frozen Squash (Summer Type) dated June 1978, and include, but not limited to, all previous correspondence, memos, inspection instructions, or procedures.

INSPECTION INSTRUCTIONS FOR FROZEN SQUASH (SUMMER TYPE)

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GENERAL

The [United States Standards for Grades of Frozen Squash \(Summer Type\)](#) is a Variables Standard. In a variables standard the number of defective sample units (deviants) allowed for a given sample size is referred to as the acceptance number (or the deviant rate). Variables standards use acceptance numbers of: 0 deviants in 3, 1 deviant in 6, 2 deviants in 13, 3 deviants in 21, and 4 deviants in 29 samples. Sampling plans and deviant rates for frozen squash are provided in the [AIM Sampling manual](#).

The grade of frozen squash may be determined by considering, in conjunction with the requirements of the respective grade, the respective ratings for the factors of color, absence of defects, and character.

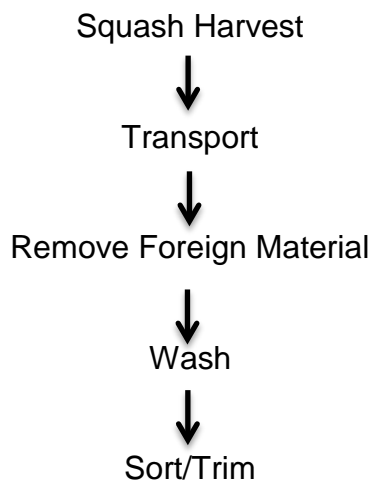
The relative importance of each scoring factor is expressed numerically on the scale of 100. The maximum number of points that may be given each factor is:

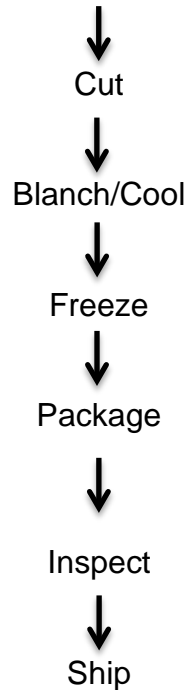
Factors	Points
Color	20
Absence of defects	40
<u>Character</u>	<u>40</u>
Total Score	100

PRODUCT DESCRIPTION

Frozen squash is the fresh, sound, immature product from the squash (summer type) plant hereinafter called frozen squash, which has been properly prepared and properly blanched, and is then frozen in accordance with good commercial practice and maintained at temperatures necessary for the preservation of the product.

PRODUCTION FLOW





INSPECTION AND GRADING

EQUIPMENT, INSPECTION AIDS, AND INSTRUCTIONS

- [U.S. Standards for Grades of Frozen Squash \(Summer Type\)](#)
- AIM Inspection Series Manuals
 - [Foreign Material Manual](#)
 - [General Procedures Manual](#)
 - [Sampling Manual](#)
 - [Technical Procedures Manual](#)
- Photo Guide PG-5, this guide is no longer available for distribution, but is still applicable.
- [FV 364-114E Score Sheet for Frozen Squash \(Summer Type\)](#) (intranet link)

SAMPLE UNIT SIZE

Uniformity in the preparation and performance of sampling procedures are a fundamental part of Division services. The [AIM Sampling Manual](#) sections on Sampling Procedure, and Sampling Rate (Table II) provide guidance on the procedures used in sampling frozen squash. Lot size and container size determine sampling rates.

LOT INSPECTION

Use the entire contents of the container. When sampling large containers, the sampling rate is based on overall weight, and is contained in the [AIM Sampling Manual](#), and the Regulations, 7 CFR 52.38 (which may be found at the following internet address: <http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR>).

Inspection data should be recorded on the [FV 364-114E, score sheet for Frozen Squash \(Summer Type\)](#) (Intranet link). The score sheet records detailed information about the findings in samples of frozen squash. The score sheet is to be used for all lot inspections and for in-plant inspections. Additional instructions on completing score sheets may be found in the [AIM General Procedures Manual](#) in the Score Sheet/Tally Sheet Completion section.

WEIGHT

NET WEIGHT

Processed foods are commonly packed to meet a prescribed net weight or content, and are labeled accordingly. This net weight or content may be specified in a purchase specification or contract. In depth instructions on performing net weights may be found in the [AIM Technical Procedures Manual](#).

TEMPERATURE AND CARE OF FROZEN PRODUCT

As a prerequisite to assigning the grade to frozen squash, the U.S. standards for frozen squash state: "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 [AIM Technical Procedures Manual](#).

THAWING

The product may be thawed in the following ways:

- Air thaw the product in its container at room temperature.
- Water thaw the product in its container or on a screen of suitable size under a fine spray of water. The water temperature should not exceed 86° F.

Regardless of the thawing method used, determine the size as soon as the units are readily separable and the sample units have been selected for product evaluation.

Detailed instructions on thawing procedures may be found in the [AIM Technical Procedures Manual](#) section on Thawing Procedures.

TYPES

Types of squash may be green, yellow, or white. These types will have a soft rind and are harvested when immature. Commercial plantings grown for processing are limited mainly to yellow crookneck, yellow straightneck, yellow hybrids, and zucchini. Several characteristics of each varietal type are listed below.

Yellow types are:

- Yellow crookneck:
 - Long, narrow, curved neck;
 - Swollen blossom-end with seeds;
 - Deep-yellow to orange-yellow color;
 - Warty skin at maturity; and
 - Noticeable variation of diameters of slices.
- Yellow straightneck:
 - Straight or slightly curved, thick neck;
 - Swollen blossom-end with seeds; and
 - Light-yellow color.
- Yellow hybrids or “banana squash”:
 - Straight, thick neck;
 - Swollen blossom-end with seeds; and
 - Milky-yellow color.

Green types are:

- Zucchini or “Italian squash”:
 - Oblong fruit; and
 - Dark-green to green color with a light-grey, mottled background.

Record inspection results on [FV 36-114E score sheet for frozen squash \(summer type\)](#) (Intranet link). Additional instructions on completing score sheets may be found in the [AIM General Procedures Manual](#) in the Score Sheet/Tally Sheet Completion section.

STYLES

Frozen squash styles are:

SLICED

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The diameters of sliced zucchini, yellow straightneck, and yellow hybrid squash are normally more uniform than sliced crookneck's. Diagonal slices and slabs are expected to occur in sliced crookneck squash.

CUT

The U.S. standards do not define "cut" squash. Consider all styles of summer squash, other than sliced, as "cut." Cut squash may be packaged in small containers for consumer outlets, or be used for manufacturing other products such as soups and vegetable blends.

Descriptions of some of the most common forms of cut squash.

- Quartered and sliced zucchini:

Zucchini squash is cut lengthwise into 4 strips (quarters) and each strip is sliced crosswise into units of approximately 1/2-inch thickness. Some small irregular slivers (chips) may be present.

- Diced zucchini:

Zucchini squash is cut into units about 3/16 x 3/8 x 3/4 inch. Small irregular slivers (chips) may be numerous.

- Long-diced or strip-cut zucchini:

Zucchini squash is cut into units about 3/8 x 3/8 x 1-1/2 inch or longer. Other cuts 1/4 x 1-1/4 x 1-1/2 are used. Small irregular slivers (chips) may be numerous.

SIMILAR VARIETAL CHARACTERISTICS

The color of frozen squash may vary among units in the same container. This is acceptable. Color variation may be caused by:

- A continuous fruiting period that produces mixed maturity fruit;
- A difference between the color of neck slices and seed cavity slices;
- Fruit that receives direct exposure to sunlight and fruit that is shaded by plant leaves; and
- Nitrogen levels in the soil.

Consider frozen squash dissimilar varietal types only when it is objectionable, such as yellow squash mixed with zucchini squash.

QUALITY FACTORS

COLOR

YELLOW VARIETAL TYPE

The rind of immature yellow squash has a pale-yellow or white-yellow color, depending upon the variety. Mature squash usually has an orange-yellow color and warty rind. Yellow squash at a suitable stage of maturity for processing has a light-green to white seed cavity. Color variation is characteristic of yellow squash. Peeled squash is usually more uniform in color than unpeeled squash.

GREEN VARIETAL TYPE

Immature zucchini squash has a light-green to dark-green color with gray mottling. At times, it has a faint striped effect to the overall background appearance. Different strains of zucchini account for variations in color.

GREEN SPOTS

Yellow squash has a greenish-yellow color in the seed cavity of blossom-end slices and the flesh of neck slices. Dark-green, objectionable, wart-like spots may occasionally be found on the rind of yellow squash. If these green spots are encountered, lower the score for the factor of color.

REPACKING FROZEN SQUASH

Frozen squash has poor color retention during storage and a relatively short “shelf life.” Significant color change could occur during storage. If the color has changed during storage and the squash is re-inspected, the score for the factor of color must be changed from the original score assigned at the time of packing.

Yellow squash stored in tote bins, large polyethylene-lined cartons, and three-pound cartons may develop a “washed-out” color. A positive enzyme test may accompany the color change.

Be alert for white or milky-white spots on the rind with overall dullness and possibly “off-flavor.” Frozen squash may test negative for enzyme activity at the time of packaging. It is not uncommon to find positive enzyme activity after storage.

Zucchini squash in tote bins could change color during storage. Be alert for zucchini squash that are bleaching in the overall brightness and intensity of color.

DEFECTS

EARTHY MATERIALS (SAND, GRIT, OR SILT)

Squash is in contact with the soil during growth. The type of soil that the squash grows on will influence the kind of earthy material that might be found in the frozen squash. Grit is a common defect of frozen squash. Be alert for embedded grit in the rind and loose grit in the bottom of the grading tray.

Scan the squash and liquid on the grading tray for any visible grit. Also, press a spoon against the bottom of the grading tray and move it through the liquid. A scratching noise indicates the presence of grit.

If there is no visible grit, chew random units of cooked squash to evaluate flavor and odor. Consider frozen squash as:

- Free of grit (Grade A) when there is:
 - No visible grit in the liquid;
 - No visible embedded grit in the rind; and
 - No detectable grit when the cooked squash is chewed.

- A trace of grit (Grade B) when there is:
 - Barely visible grit in the liquid;
 - Barely visible grit embedded in the rind;
 - Barely detectable grit when the cooked squash is chewed; and
 - No objectionable grit.

- Substandard when there is any objectionable earthy material.

Instructions and cook times for frozen squash may be found in the [AIM Technical Procedures Manual](#), Cooking Procedures section.

POORLY CUT AND HARMLESS EXTRANEIOUS VEGETABLE MATERIAL

Some squash is trimmed before it is sliced or cut, some is untrimmed. If the squash is not trimmed, processors remove as many of the stem-ends and blossom-ends as possible while the squash is on the sorting belt. The U.S. standards define “poorly cut” and “harmless extraneous vegetable material.” The photo-guides, PG-5, for frozen squash (summer type) illustrate the cutoff point for attached stems and detached stems.

If stem material is attached, count as poorly cut. This includes:

- Sliced style only:

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- include slivers, paper-thin slices, chips, ragged, noticeably irregular slices, and less than one-half of a slice.
- Sliced yellow crookneck:
 - do not count diagonal slices and slabs from the neck portion of the squash unless these slices seriously affect the overall appearance.

If stem material is detached, count as Harmless Extraneous Vegetable Material (HEVM).

In Cut Styles Only (Quartered and Sliced, Diced, Strips, etc.):

- Do not count chips and small irregular pieces (chaff) unless squash is packed to a buyer's specification that requires that small pieces (as defined) meet an allowance provided in the specification.

DAMAGE

Two types of damage are defined in the U.S. standards: mechanical damage and damage caused by discoloration or other similar means. There is an allowance for each type of damage. The photo-guides, PG-5, for frozen squash (summer type) illustrate "damage" defects. The details below apply only to damage by discoloration or other similar means.

Damage

- Insignificant:
 - Small sized, light color skin blemishes that do not penetrate the rind.
- Serious:
 - Large or dark colored areas that penetrate the rind.

Damage Blossom End

- Insignificant:
 - Light green to white, small sized, tender, and not objectionable.
 - The number of blossom-end slices should not exceed the approximate number of whole squash in the sample.
- Count as Damage:

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- Green to light tan and objectionable.
- Count as Seriously Damaged:
 - Dark brown or black, and that seriously affect the overall appearance.

CHARACTER

The character of frozen squash is directly related to the maturity of the squash and the way in which it is handled and stored. Sliced squash, processed from squash that is too mature, could lose much of the flesh in the seed cavity. When the flesh in the seed cavity is lost, the squash resembles “onion rings.” Immature squash that is not adequately drained prior to freezing could develop the same condition.

Squash is sensitive to the freezing process. Individually Quick Frozen (IQF) squash, processed from immature fruit that is well drained prior to freezing, can be expected to have good character. The character is usually affected if squash is frozen too slowly, such as tray freezing. Be alert to a breakdown of texture and watery flesh after the squash is thawed.

Check character two ways:

- Check the thawed squash prior to cooking for:
 - Fleshiness;
 - Texture; and
 - Seed development.
- Check the squash after cooking for tenderness;

Instructions and cook times for frozen squash may be found in the [AIM Technical Procedures Manual](#), Cooking Procedures section.

Characteristics of immature squash:

- Rind tender;
- Seeds light green or white;
- Seeds blend with the color of the flesh;
- Flesh firm, no separation from the seeds

Characteristics of mature squash:

- Yellow squash

- Rind: ridged or warty
 - Color: orange-yellow
 - Flesh: pithy and separates from seeds
 - Seed: large, firm, and chewy
 - Flavor: bitter
- Green squash
 - Rind: firm
 - Color: dark green
 - Flesh: pithy
 - Seed: large, firm, and chewy
 - Flavor: missing the slightly sweet taste

Frozen sliced squash with hollow centers is scored under the factor of character. Do not score hollow centers under defects. Flesh in the seed cavity of mature squash is pithy and shrinks from the seed. This leaves a weak structure to hold the centers intact. Rough handling can cause further deterioration of the centers.

Score hollow centers as follows:

- If the rind and accompanying flesh would score as grade A character, count the hollow center as Grade B and apply it against the allowance for character in the U.S. standards.
- If the rind and accompanying flesh would score as grade B character, count the hollow center as substandard and apply it against the allowance for character in the U.S. standards. There is no allowance for substandard squash in Grade A.

FLAVOR AND ODOR

Cook squash to evaluate flavor and odor. Any “suspect” sample unit with a noticeable odor in the frozen state should be checked by cooking. Instructions and cook times for frozen squash may be found in the [AIM Technical Procedures Manual](#), Cooking Procedures section.

Consider flavor and odor that is less than desirable, but not objectionable, as “reasonably good.” If the flavor or odor is objectionable, but the squash is edible, consider it as Substandard.