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Fruit and
Vegetable
Division

Processed
Products Branch

Grading Manual for Frozen Apples

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This manual is designed for Processed Products Branch Personnel of the U.S. Department of Agriculture. Its purpose is to give background information and guidelines to assist in the uniform application and interpretation of U.S. grade standards, other similar specifications and special procedures.

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PROCESSING TECHNIQUES

Apples oxidize rapidly whenever the cut surfaces are exposed to air. This oxidation may be retarded by the use of an antioxidant or by deactivating the enzymes by a quick blanch, or both. Weak salt brine may be used by some processors. Oxidation may be controlled by using one or a combination of the following methods:

Steam or hot water blanch.

Hot water blanching is effective but has a tendency to soften or disintegrate the slices and to leach the soluble solids from the apples. Careful adjustment and control of the blanching must be maintained in order to avoid internal discoloration of the slices.

Addition of sulfur dioxide.

The bleaching action of SO_2 has a tendency to make all apple slices the same color. SO_2 may impart an objectionable flavor and/or odor to the product.

Vacuum processing.

This process is designed to pull a vacuum in the presence of a suitable additive (salt, sugar, organic food grade acids, etc.) and suddenly release the vacuum. The vacuum process is used rather widely because it retains the texture of the apple product.

QUALITY EVALUATION

Similar varietal characteristics.

Single varieties of apples are usually selected for freezing. Variation of color, texture, and flavor within a single variety or similar varieties is normal and will be affected by the type of process used to inhibit oxidation of the product. Only if the appearance and flavor are seriously affected should the sample unit be graded Substandard.

Flavor.

In evaluating flavor and odor, consider the type of process which is used to preserve the color of the frozen apples and the maturity and varietal flavor characteristics of the fruit. When additives (salt, organic food grade acids, SO₂, etc.) are used, the flavor and odor evaluation should consider the correct usage of these additives. The presence of additives might be slightly noticeable upon tasting and yet be considered normal. However, too much of any or all of the additives might render the product objectionable. This is a subjective evaluation and depends upon the experience and training of the analysts. A slight flavor and odor of sulfur, in the uncooked product, should completely disappear upon cooking.

Color.

Color may range from an almost pure white to yellow, orange, or a greenish cast. The apple slices in each container should indicate similar varietal characteristics. Different containers in a lot may contain apples of different varietal characteristics.

Grade A Reasonably uniform, bright, and pleasing.

Grade C May be dull, slightly brown, or slightly gray. Slight internal discoloration is permitted.

Uniformity of size.

Consider the average size of the units in the sample unit. Units that deviate from the average, such as large units, small units, or both large and small units, may be removed from the sample unit down to the required percentage, before determining uniformity of thickness.

Defects.

Exact weight sample units in 16-ounce multiples from large containers make for easier calculation.

1. Harmless extraneous material.

Grade A Allow only a very slight amount.

Grade C If the EVM is noticeable, but does not seriously affect the appearance or eating quality.

Substandard Seriously affects the appearance or eating quality.

2. Damaged.

Defects which the consumer would not normally remove before using the product. Slight flecks of corky tissue, very slight bruises and flecks of peel which are inconspicuous are not considered.

3. Seriously damaged.

Defects which the consumer would normally remove before using the product. Worm holes, unsightly calyx ends, large or dark bruises, dark internal discoloration, and other serious discolorations would fall in this group.

Character.

Character of frozen apples may be affected by maturity, firmness, degree of blanch, addition of firming agents, size of the units and the time and temperature of processing.

Grade A It is not expected that all the apple slices will be of uniform texture. However, to be judged as having "good character" the texture should be reasonably uniform and should be firm but not hard. Soft or flabby slices tend to disintegrate when reheated for pies or other baking products and are not Grade A.

Grade C The slices may be variable in texture.