# INSTRUCTIONS FOR INSPECTION

of

# CANNED ASPARAGUS

*For Use Of USDA Processed Foods Inspectors*

UNITED STATES DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE
FRUIT AND VEGETABLE DIVISION
PROCESSED PRODUCTS STANDARDIZATION AND INSPECTION BRANCH

# PREFACE

These instructions are designed primarily for Processed Fruit and Vegetable Inspectors of the U. S. Department of Agriculture. They are not intended to be a comprehensive treatise on the subject but give background information and guide-lines to assist in the uniform application and interpretation of USDA grade standards and other similar specifications.

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INSTRUCTION FOR INSPECTION
OF
CANNED ASPARAGUS

March 1970

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# PRODUCTION

## IMPORTANCE.

In number of cases packed, asparagus ranks eighth among canned vegetables, being exceeded by tomatoes and tomato products, peas, corn, green and wax beans, beets, sauerkraut, and sweet potatoes.

## RECENT TRENDS IN PRODUCTION OF ASPARAGUS.

As evidenced by the data in Table I there was a slight upward trend in the production and utilization of asparagus during the period of 1958 through 1963. During the period of 1964 through 1967, however, there was a steady decline in the amount of asparagus produced in the United States. The reduction of asparagus producing acreage in California is largely responsible for this decline. In 1967 California had approximately thirty percent less acreage devoted to asparagus production than in 1960.

TABLE I

COMMERCIAL ASPARAGUS PRODUCTION
(Number of Tons) 1/
(Figures Rounded)

| Year | For fresh consumption | For canning | For freezing | Total |
|---|---|---|---|---|
| 1958 | 65,350 | *111,400 | | 176,750 |
| 1959 | 62,150 | *119,220 | | 181,370 |
| 1960 | 61,500 | *126,600 | | 188,100 |
| 1961 | 54,900 | *129,700 | | 184,600 |
| 1962 | 52,150 | *133,900 | | 186,050 |
| 1963 | 51,850 | 105,150 | 30,800 | 187,800 |
| 1964 | 50,000 | 97,330 | 28,820 | 176,150 |
| 1965 | 51,350 | 89,170 | 30,030 | 170,550 |
| 1966 | 42,100 | 94,930 | 33,570 | 170,600 |
| 1967 | 41,100 | 77,240 | 33,710 | 152,050 |
| 1968 | 45,900 | 81,600 | 34,200 | 161,800 |

* For Canning and Freezing Combined.

1/ Crop Reporting Board -- USDA and National Canners Association.

RECENT TRENDS IN PRODUCTION OF ASPARAGUS. (Continued)

Unitl 1967, green asparagus comprised approximately seventy-five percent of the total canned in the United States. The balance, culturally bleached or white, is produced only in California. In 1967, the production of white asparagus was drastically reduced. The number of cases for each type is given in Table II.

TABLE II

Canned Green and White Asparagus
(Number of actual cases packed) 1/
(Figures rounded)

| Year | Green | White (culturally bleached) | Total |
|---|---|---|---|
| 1958 | 4,400,000 | 2,826,000 | 7,226,000 |
| 1959 | 4,907,000 | 1,926,000 | 6,833,000 |
| 1960 | 5,586,000 | 2,141,000 | 7,727,000 |
| 1961 | 5,273,000 | 2,787,000 | 8,060,000 |
| 1962 | 5,691,000 | 3,076,000 | 8,767,000 |
| 1963 | 5,571,000 | 3,278,000 | 8,849,000 |
| 1964 | 5,191,000 | 2,660,000 | 7,851,000 |
| 1965 | 5,718,000 | 1,270,000 | 6,988,000 |
| 1966 | 5,817,000 | 1,822,000 | 7,639,000 |
| 1967 | 6,010,000 | 504,000 | 6,514,000 |
| 1968 | 6,028,000 | 783,000 | 6,811,000 |

1/ National Canners Association

Container trends.

The number of different container sizes in which canned asparagus is marketed has decreased considerably since the 1940's and 1950's. The use of the square container, at one time rather popular, is non-existent in current packing practices. By far the greatest number of cases is in the small family size containers of the No. 300 and No. 303. Table III shows the pack by container size.

TABLE III

U. S. Asparagus Pack by Can Sizes
(1,000 actual cases) 1/

| Year | 8Z Tall | No. 1 Pic. | No. 300 & 303 | 300 x 509 & 510 | No. 2 | No. 5 Squat. | No. 10 | Misc. | Total |
|---|---|---|---|---|---|---|---|---|---|
| 1957 | 364 | 858 | 3,378 | 199 | 899 | 165 | 326 | 581 | 6,769 |
| 1958 | 410 | 908 | 4,041 | 191 | 930 | 205 | 337 | 204 | 7,226 |
| 1959 | 361 | 901 | 3,962 | 221 | 574 | 235 | 348 | 230 | 6,833 |
| 1960 | 364 | 902 | 4,496 | 261 | 625 | 251 | 395 | 434 | 7,727 |
| 1961 | 410 | 1,008 | 4,620 | 277 | 649 | 255 | 412 | 429 | 8,060 |
| 1962 | 462 | 964 | 5,119 | 318 | 617 | 231 | 499 | 556 | 8,767 |
| 1963 | 416 | 1,233 | 4,883 | 312 | 663 | 225 | 524 | 591 | 8,849 |
| 1964 | 389 | 1,002 | 4,267 | 289 | 646 | 339 | 472 | 447 | 7,851 |
| 1965 | 329 | 816 | 4,062 | 288 | 267 | 232 | 431 | 565 | 6,988 |
| 1966 | 407 | 1,072 | 4,460 | 63 | 325 | 282 | 425 | 605 | 7,639 |
| 1967 | 361 | 637 | 4,063 | 72 | 165 | 305 | 437 | 474 | 6,514 |
| 1968 | 399 | 736 | 4,235 | 167 | 103 | 276 | 403 | 492 | 6,811 |

1/ National Canners Association.

PRODUCING AREAS.

In California practically the entire production of canned asparagus is grown in the reclaimed islands and lowlands comprising the Sacramento Delta area. This area is at the confluence of the Sacramento and San Joaquin Rivers The light, easily worked peat soil of the area is very well adapted to the growing of the crop.

In the Pacific Northwest most canned asparagus is grown in scattered valley areas east of the Cascade Mountains in the southern portion of Washington, and northern Oregon. Most of the pack is made in the State of Washington.

Production areas in Michigan are scattered, but the bulk of the pack is made in the southwestern part of the State.

In Illinois production is practically restricted to the northern part of the State.

In New Jersey canning of asparagus is restricted almost entirely to the southern portion of the State.

Other areas of significant commercial production include Maryland and Delaware.

VARIETIES.

Horticulturists classify asparagus varieties in two groups, based principally on color.

The first group consists of varieties, such as Mary Washington and Martha Washington, with spears having purplish tips just before pushing through to the light. The spears become dark green on exposure to light. Practically all asparagus grown for canning or freezing, and most of that grown for the fresh market, is of one or the other of the two varieties named. The Mary Washington is the principal variety grown in California, while the Martha Washington is grown extensively in other parts of the country.

The other group of varieties, grown on a very limited scale for the fresh market, is characterized by light green or whitish spears. These should not be confused with white asparagus, which is bleached by cultural methods.

TYPES OF ASPARAGUS.

Canned asparagus is of four types, depending on the cultural, harvesting, and packing methods used:

Green or all green asparagus is green or yellowish green the entire length of the unit. Green asparagus generally has less fiber, but heads are less compact and more likely to be crooked than green tipped and white and white asparagus.

Green tipped. In the application of the U. S. Grades, green tipped asparagus is defined as spears, tips, and points, of which one-half or more of the unit measured from the tip end is green, light green, or yellowish green in color. This type is essentially green asparagus with white butts. It is sometimes referred to as "Boston" green asparagus.

Green tipped and white asparagus is asparagus having predominantly greenish colored heads. Portions of the spear below the head may also show some greenish color to not more than one-half of the length of the stalk measured from the tip end and green tipped and white spears, tips, and points, when cut into units, may consist of a mixture of typical white, yellowish white, green, light green, or yellowish green units.

The production of green tipped and white asparagus is usually incidental to the growing of white asparagus. The spears grow rapidly and tips which had not become visible one day frequently appear above the surface of the soil and develop green color on exposure to sunshine before the next cutting.

White asparagus, as defined in the U. S. Grades and in certification, consists of spears or cuts that are practically all white or yellowish white in color. White asparagus and green tipped and white asparagus is frequently referred to as culturally bleached.

Peeled white asparagus is very popular in Europe. It has not gained popularity to any degree in the United States probably due mostly to the high cost of production.

According to available statistics production of culturally bleached asparagus in the United States is rapidly diminishing. High cost of production and competition with imports probably is largely responsible for this reduction.

PROCESSING VERSUS FRESH MARKET.

Asparagus is often harvested both for the fresh market and for canning or freezing from the same field. The usual procedure in such cases is to harvest for the fresh market while prices are favorable and then switch to processing as supplies become more plentiful. In other cases fields are grown exclusively for processing and no effort is made to market any of the product on the fresh produce market.

In the processing crop areas of California, it is the universal practice to market the early portion of the crop in fresh form. Harvesting in the Delta area begins in February and cutting for the fresh market continues until early April. By that time homegrown supplies in midwestern and eastern consuming markets have become sufficiently plentiful to render shipment from California unprofitable, and processing plants begin operation. The California processing season lasts until the end of June.

It is the usual practice to mound the rows slightly for the production of green asparagus. If the field is to be devoted to the production of white asparagus for canning, these mounds are raised with appropriate mounding implements when harvesting for the fresh market ends. Rows must be spaced farther apart for the production of white than for the production of green asparagus, so that sufficient soil will be available for high mounding.

Asparagus fields may remain in full production for 10 to 15 years. In some areas the prevailing age is considerably more, and fields have been known to produce continuously for more than 50 years.

## HARVESTING METHODS.

### Cutting.

When harvesting green asparagus, the usual practice is to cut the spear just below the surface of the ground with a chisel-like knife. Handfuls from contiguous rows are combined and picked up by a worker and placed on a tractor-drawn sled or trailer.

Considerable work has been done on the automation of harvesting asparagus. As yet, equipment has not been perfected such that it may be put to commercial use.

When harvesting white asparagus, the cutter watches for signs of a tip about to emerge from the top of the mound, then inserts the knife into the side of the mound to sever the spear to a length in excess of 7 inches. By a slight upward movement of the knife, the tip of the spear is raised sufficiently so that it can be grasped by the cutter.

### Field snapping of green asparagus.

Experimental work by the Michigan State Experiment Station gave rise to a growing practice among the canners of that State of field snapping green asparagus. Instead of cutting the spear below the surface of the ground the picker grasps the spear and snaps it off at the point where it becomes tender enough to make a clean break. Above this point the spear is tender and all usable. Below, it is more or less tough and fibrous.

Field snapping saves labor and requires the handling of little more than half as much asparagus as the customary methods, and almost entirely eliminates the waste disposal problem since only usuable asparagus is delivered to the cannery.

More skill is required to snap asparagus properly than to cut it in the usual manner. Care must be taken to avoid snapping in such a manner as to include a portion of the fibrous stalk.

### Washing and packing before hauling.

In California, where large acreages are the rule, asparagus is commonly hauled to a packing shed in or near the field, where the spears are cut to a uniform length of 7 to 7-1/2 inches, washed, and packed in field lugs, and wet down thoroughly before hauling to the factory. Prompt washing is important in the case of white asparagus, to prevent staining by adhering soil.

## SOME EFFECTS OF WEATHER

Asparagus is more responsive than most vegetables to changes in weather conditions. Under conditions of high temperature and ample moisture spears may grow several inches in a day. Such asparagus is tender and relatively free of fiber, but the percentage of open heads may be high. Low temperatures check growth and reduce supplies. Harvestings during cool weather are likely to show a high percentage of tough stalks.

On the other hand, cool weather tends to discourage the development of asparagus beetles and to reduce damage from this cause. Strong winds increase the proportion of crooked spears, while heavy rains usually increase the amount of grit and sand in the heads and under the bracts which are difficult to remove by washing.

## CONTRACTING.

A number of packers grow part or all of their own supplies of asparagus on their own land. Most canners, however, purchase from growers on contract. Since 40 to 50 percent of the raw stock purchased by most packers is waste, contracts have become rather explicit in defining acceptable quality. Most contracts specify a maximum spear length, usually 7 or 7-1/2 inches, and many specify a minimum length of green color, usually 4-1/2 inches. In some areas, growers deliver 7 to 9-inch green spears.

Most contracts contain provisions against the delivery of asparagus with crooked, spreading, or broken tips or showing excessive damage by beetles or other cause. Some contracts specify a minimum spear diameter. In some cases waste material from each grower's deliveries is weighed and deducted from the total delivery weight.

Where field-snapped asparagus is purchased, there is usually less waste to be charged against the grower.

## INSPECTION.

In some cases, deliveries are inspected by State inspectors to determine the grade of each load on the basis of State grades. Processors may also purchase asparagus on the basis of the United States grades, subject to inspection at time of delivery by a Federal-State inspector. The inspector determines by sorting representative samples the percentage of No. 1 and No. 2 spears and of culls in the load. White butts in excess of the amount permitted are cut off and weighed in with the culls. The grower is then paid an agreed contract price for his No. 1's, a lower agreed price for the No. 2's and nothing for his culls.

# CANNERY OPERATIONS

## HOLDING BEFORE CANNING.

The quality of asparagus deteriorates rapidly after cutting. Spears develop fiber, and may wilt or shrivel; heads of green asparagus start to open, and clinging soil produces soil stains on white spears. Asparagus should, therefore, be hauled to the processing plant and processed with the minimum of delay.

When deliveries are irregular, it is unavoidable that some asparagus will be held for several hours to a day or more before canning. Some canners manage to keep sufficiently caught up with deliveries so that special steps to prevent deterioration of the raw material are unnecessary.

A few canners have refrigerated rooms in which asparagus that has to be held a day or more is placed. In other canneries the asparagus is held in a cold water tank, wet down with a very fine water spray, or piled and covered with crushed ice. It is important that the field heat be reduced and the moisture content maintained at a normal level.

## CUTTING.

### Spears, Tips, and Points.

The asparagus is delivered to the cutting belt in the field lug boxes. The cutting belt consist of two belts placed approximately 90 degrees to each other. The surface or horizontal belt is tilted at a slight angle away from the workers. The vertical belt -- at approximately 90 degrees to the horizontal belt -- serves as a stop for the asparagus heads. Both belts travel at exactly the same speed.

Women take asparagus from the boxes by the handfuls and place it on the horizontal belt, gently pressing the heads against the vertical belt. The asparagus may be stacked two to four inches in depth. The belts convey the asparagus into cutting saws which may be in the form of a circular saw or band saw. The saws are spaced at varying distances from the vertical belt to give the desired length of cut. The first saw removes the butt end of the asparagus which is discarded and conveyed to the garbage. The second cut ranges from one to two inches and is saved for the center cut pack (bottom cuts, tips removed).

CUTTING (Cont'd).

When spears are packed, generally only two cuts are made. The second cut leaves a spear of the desired length for the container size.

When tips or points are packed, a third cut may be made which is also retained for the bottom cuts or may be blended in with the cuts and tips to regulate the percentage of head material. The remaining portion is used for the tips or points pack.

Waste disposal.

Butts and other waste material may be hauled away in trucks and dumped on fields where it is plowed under to improve the texture of the soil. In a few cases it is ground and washed down the sewer.

Experimental work has been done on waste utilization, but little commercial use of asparagus waste has been made. The juice from the butts is sometimes pressed and filtered to use instead of plain brine as a packing medium. The butts may be steamed a few minutes before pressing to inactivate enzymes that tend to darken the color and affect the flavor.

Washing.

Following the cutting operations the spears, tips, and points of cut asparagus are usually carried by conveyor belt or flume to the washer. Flume conveyors are frequently used because of less injury to the tender tips. In a typical operation the spears are washed in a tank of warm water (115° to 140° F.), then carried over revolving brushes under a strong spray. The warm water causes the bracts of the head to expand slightly, making it easier for the brushes and spray to dislodge grit.

Blanching.

The purpose of blanching is to render the asparagus pliable so that full cans that will meet minimum recommended drained weights can be packed. It also partially opens the bracts so that any remaining grit may be removed in the subsequent washing. Another important purpose is that the chlorophyl is set so that further cooking in the cans will not leach it out into the brine or packing media.

CUTTING (Cont'd).

Blanching (Cont'd).

Separate blanchers are usually provided for spears and for bottom cuts. Either water or steam may be used, and the spears or cuts may be placed in metal or woven bamboo baskets for blanching.

In the flume type hot water blancher the asparagus is carried through by movement of the water, which gives considerable washing action.

Blanching times and temperatures vary considerably, but usually range from 175° to 200° F. for two to five minutes. Green asparagus is usually blanched for a slightly shorter period, or at a slightly lower temperature, than white asparagus.

COOLING.

The asparagus is rinsed with a strong cold water spray immediately after blanching which removes the last traces of grit or silt and cools the asparagus sufficiently for hand packing.

White or green and white asparagus is often put through a detergent wash and then a second set of brushes after the blanch in an effort to remove any remaining grit or silt and stains.

SIZING.

Many plants use mechanical sizers in lieu of the hand sizing operation. After the asparagus is blanched and cooled it is delivered by flume or belt to the sizer. This equipment consists of three or four sets of two rollers each. The rollers are mounted at an angle and are spaced so they diverge from the top end toward the lower end. The rollers turn in opposite directions so the asparagus is kept on top as it travels down the rollers to a space that will permit it to drop through. The smallest sizes pass through the rollers at the top end and the larger sizes pass through as they enter the appropriate spacing further down the rollers. Conveyor belts or flumes under the rollers catch asparagus and deliver it to the canning tables. Chutes under the rollers may be positioned to give single sizes or combinations of sizes as desired by the packer.

SIZING (Cont'd).

In a typical hand sizing operation the asparagus is delivered to the canning tables as previously explained. Women select the asparagus by size as it travels down the table. Generally, the women at the head end of the belt pick up the small and medium sizes, while those farther down the belt select the larger sizes. As the women gain experience, most become quite accurate in their selection for sizes.

FILLING.

Containers.

Packers must be careful in their selection of the type of metal containers they use for canned asparagus. Metal containers for canned asparagus must contain the proper type of tin-plate to prevent development of dark discoloration. Tin must be available to the canned asparagus in order to prevent reaction of constituants in the asparagus with the iron of the container and resultant discoloration. This is discussed further under "Inspection Procedures - color."

When glass containers are used, stannous chloride is generally added to aid in preservation of color, since tin is not available from the container. When tin-plate line lids are used, less stannous chloride is necessary for this purpose than when lids lined with an insert material are used.

Spears, Tips, and Points.

In an operation utilizing mechanical sizers, the various sizes are delivered to the canning table where women place the asparagus in the containers by hand. In the case of spears, tips, and points, with few exceptions, the asparagus is put into the containers head down. Occasionally, the asparagus may be layer-packed in a random fashion in No. 5 squat. containers. The canning women must select the asparagus by grade. This selection is generally made by the seedy or lack of seedy appearance of the head. The women are also trained to be alert for the presence of various types of damage that may downgrade the product. It is not economically feasible for these women to scrutinize each spear for damage. As a result, only those spears on which the damage is obvious or readily visible as they are picked up or travel down the belt are sorted out.

In a hand sizing operation, the canning women must also select according to grade in addition to size.

FILLING (Cont'd)

Cut Asparagus

The excess asparagus not picked up by the canners is delivered by conveyor belt to the cutters for cuts and tips style. These cutters are usually of the Urschel Bean type cutter and may be set to give various lengths of cut as desired by the packer. The usual length for cuts and tips is 1 or 1-1/2 inches.

The cuts and tips are conveyed to automatic fillers where they are filled into the containers. Bottom cuts are also filled in this manner.

Brining.

Just before entering the exhaust the cans pass under a flow of hot brine (190° to 200° F.) or hot water may be used in conjunction with salt tablets. The use of salt tablets placed in the bottom of the can may produce a localized high concentration of brine that causes darkening and shriveling of adjacent portions of spears or cuts. To help prevent this condition the water should always be hot to dissolve the salt tablet, and the cans upended to allow the salt solution to quickly equalize throughout the can.

EXHAUSTING

The brined cans pass into a steam or hot water exhauster to attain a closing temperature of 150° to 160° F. Some canners do not exhaust the smaller size cans. Exhaust times and temperatures used by canners frequently range between five and eight minutes at 180° to 190° F., the shorter exhaust being usually correlated with the higher temperature, and vice versa.

COOKING

Asparagus processed in horizontal or retorts.

The California State Board of Health has prescribed minimum times, temperatures, and pressures for processing asparagus in that State. Every plant that processes canned asparagus in California is visited each day of asparagus processing by a state inspector to review retort charts to ascertain compliance with the state minimum cook requirements for this non-acid vegetable. Failure to comply results in the state issuing a "hold" order on the particular batch in question. This prohibits the packer from moving the batch until it is released by the state.

The "hold" period serves as an "incubation" period for any botulinus spores that may be present and active. Samples are also taken to the laboratory and plate specimens incubated for evidence of activity by this organism.

COOLING.

Cooling may be done in the retort when the product is processed in upright retorts or by drawing the retort baskets through a cooling tank, or by passing individual cans under a spray of cold water. When processed in rotary cookers the cook is usually followed by cooling in a rotary cooler. Cooling should be promptly done so as to cut off cooking at the proper point. Prolongation of the cook through insufficient cooling tends to lower the quality of the product and may encourage development of heat resistant bacteria, resulting in flat sours and other forms of spoilage.

Cans should be cooled until only enough heat remains to dry the containers and prevent rust. The preferred method is to cool to 95° - 105°F., and then allow the cans to air dry before casing or stacking. Cans should never be cased at temperatures above 95°F. Water in the cooling tank should be kept clean.

## FEDERAL FOOD AND DRUG STANDARDS OF IDENTITY

GENERAL.

Standards of Identity have been established by the Food and Drug Administration which specify the forms or styles in which canned asparagus may be legally marketed as well as various food additives that may be used in the packing media.

No minimum standards of quality have been established by the Food and Drug Administration. However, canned asparagus is regulated under the general requirements with respect to wholesomeness and sanitation that are applicable to all processed foods.

STANDARDS OF IDENTITY.

The Food and Drug Standards of Identity require canned asparagus be obtained by proper preparation from the succulent edible portions of the asparagus plant with additional ingredients as required or permitted, and sealed in a container and so processed by heat as to prevent spoilage.

The forms or styles and requirements therefor as well as the required and permissive additional ingredients are given in Table IV and V respectively.

TABLE IV

FOOD AND DRUG STANDARDS OF IDENTITY

| Form or Style | Requirement for form or style |
|---|---|
| Stalks or spears. | Three and three-fourths inches or more of upper end. |
| Peeled stalks or peeled spears | Three and three-fourths inches or more of peeled upper end. |
| Tips | Not less than two and three-fourths inches but less than three and three-fourths inches of the upper end. |
| Points | Less than two and three-fourths inches of the upper end. |
| Cut stalks or Cut spears | Sprouts cut in pieces. |
| Bottom cuts or cuts - tips removed. | Sprouts from which the tip has been removed, cut in pieces. |

TABLE V

FOOD AND DRUG STANDARDS OF IDENTITY (cont'd)

| Required Additional Ingredients | Permitted Additional Ingredients |
|---|---|
| Water or Asparagus Juice -- Asparagus juice is the clear unfermented liquid expressed from the washed and heated asparagus sprouts | Refined sugar (sucrose).<br>Refined corn sugar (dextrose).<br>Corn Sirup glucose sirup.<br>Dried corn sirup, dried glucose sirup.<br>Spice.<br>A vinegar.<br>Green peppers or red peppers which may be dried.<br>Mint leaves.<br>Onions which may be dried.<br>Garlic which may be dried.<br>Horseradish.<br>Lemon juice or concentrated lemon juice.<br>Butter -- not less than 3% by weight of the finished food.<br>Salt.<br>Monosodium glutamate.<br>Disodium inosinate.<br>Disodium guanylate.<br>Hydrolized vegetable protein.<br>Autolized yeast extract.<br>Flavoring (except artificial). |
| A combination of water and asparagus juice -- when in combination the packing medium is known as water | In glass containers only -<br>Stannous chloride not to exceed 15 ppm, except with lids lined with an inert material - not to exceed 20 ppm.<br>Citric acid or a vinegar when combined with any lemon juice or concentrated lemon juice that may be added, is not more than sufficient to permit effective processing by heat without discoloration or other impairment of quality. |

[RESERVED FOR FUTURE DEVELOPMENTS]

# INSPECTION OF THE PRODUCT

## GENERAL

The United States Standards for Grades of Canned Asparagus describes and establishes requirements for the various quality factors and should be followed in the official inspection of the product, except when another specification is specifically requested.

## MINIMUM EQUIPMENT AND INSPECTION MATERIAL

The following list comprises minimum equipment and supplies needed for the inspection of canned asparagus:

1) Scale. (preferably graduated to 0.1 ounces)

2) Tares. (for net weights and drained weights)

3) Sieves, as specified in the United States Standards for Grades of Canned Asparagus.

4) Trays. white, laboratory. Shallow type for No. 2 cans and smaller; deep type for cans larger than No. 2 size.

5) Glass cylinders. (approximately 1-1/4" diameter; 10" tall)

6) Vacuum gauge.

7) Headspace gauge.

8) Can opener.

9) Fiberometer.

10) USDA Canned Asparagus size gauge.

11) Supplies, other than inspection equipment.

    a) A folder containing -- These Inspector's Instructions, inspection aids, and any supplemental instructions on the product or related subjects; United States Standards for Grades of Canned Asparagus.

    b) Inspection papers, such as -- Applicant's information; Contract instructions; Score sheets and applicable work sheets for preparing certificates for typing.

## ARRANGING SAMPLES AND RECORDING PERTINENT IDENTIFICATION MARKS

The containers of asparagus must be handled with care. Any rough handling may cause shattering of the heads which in turn may be sufficient to cause erroneous downgrading of the product.

The individual containers are arranged in a manner to facilitate evaluation of data. Generally, code marks that are identical are grouped together; likewise, they are normally arranged in ascending numerical order if the marks so indicate. Any continuity with respect to individual lots must be retained.

The code marks (including any ring-marks), together with label nomenclature and a brief description of the container, are recorded in the appropriate spaces of the score sheet. There is always a possibility that the inspection documents may be introduced as evidence in court. A complete well-kept score sheet, signed by the inspector, should be executed.

## NET WEIGHTS.

The net weight of each sample unit should be entered in the space provided in the score sheet. Weigh and record to the nearest one-tenth of an ounce. Any low weights should be encircled so as to stand out. Inspectors under in-plant inspection should consult plant management for desired net weights. The required net weight will be that which will appear on the label.

## VACUUMS.

Using proper equipment and technique, vacuums should be determined and recorded. Minus vacuums (pressures) and vacuums of from zero to four inches, inclusive, should be encircled so as to stand out on the score sheet.

HEADSPACE AND FILL OF CONTAINER.

In the case of a vertical pack, containers should be opened with head end of the asparagus up.

After removing the lid of the container, observe for any excessive headspace. The quality control department of most plants under in-plant inspection prefer to have the headspace recorded for all containers opened for inspection. Under lot inspection the headspace should be recorded for all low net weight containers. Maximum headspace recommendations are not included in the United States Standards but are required in the Federal Specifications to assure a proper fill of both vegetable and packing liquid.

DRAINED WEIGHTS.

One method of ascertaining compliance with proper fill with respect to the vegetable ingredient is the drained weight method. Recommended minimum drained weights are provided in the grade standards for canned asparagus.

For the styles of spears, tips or points drained weights are specified according to size groupings and type. Separate drained weight values are specified for the size grouping of small, medium, large, and blends of these sizes according to type. This means that the values under this size group heading are applicable to these sizes whether they occur as a single size or as a blend of small and medium, medium and large, small and large, or small, medium, and large.

Separate drained weight values are specified for the size grouping of extra large, colossal, giant sizes, or blends including these sizes, according to type. This means that if the asparagus of these larger sizes occur single, in combination with each other as blends, or as blends with the smaller sizes the drained weight values specified under the larger size grouping are applicable.

The minimum sample size for ascertaining drained weights for lot inspection as well as under in-plant inspection must be not less than that specified for the single sampling plan in the Regulations Governing Inspection and Certification of Processed Fruits, Vegetables, and Related Products.

Criteria for compliance with recommended minimum drained weights is contained in the canned asparagus grade standards and in the above mentioned instructional document.

FILL WEIGHTS

A second and more reliable method of ascertaining the amount of vegetable ingredient in the containers is by the fill weight procedure. This method however, is restricted to in-plant inspection. It is advantageous over the drained weight procedure for several principal reasons among which are:

1) Since it employs non-destructive sampling, a much larger sample than for drained weights is possible which reduces sampling error;

2) Fewer variables are involved making test results more reliable.

3) It provides continuous information to plant personnel during processing of the progress of the filling operation which permits adjustments in the fill weights when necessary.

4) The packer may be informed as to acceptance or rejection of a lot the same day of pack rather than having to wait until a later date.

* **The U. S. Standards for Inspection by Variables, File Code 140-A-1, and the U. S. Standards for Determination of Fill Weights, File Code 140-A-3, contain pertinent information regarding application of the fill weight procedure. The Standard for Inspection by Variables explains in general terms the procedure for determination of compliance for any variable. It is important to know the statistical symbols as well as their meanings as contained in the document.**

The instructional documents mentioned above explain in detail the application of the fill weight procedure. Inspectors should be thoroughly familar with these instructions. It is particularly important to have a thorough knowledge of the acceptance and rejection criteria as specified in these instructions.

Proper interpretation of plotted control chart values is also very important in order that plant personnel may make appropriate fill weight adjustments. Control charts are also an excellent tool for estimating the filling process capabilities. Therefore, proper interpretation of the plottings will enable the inspector to make appropriate recommendations to the USDA for the possible need for adjustments in recommended fill weights.

* Change.

FILL WEIGHTS (Cont'd).

There are several good statistical text books that may be referenced for information regarding control charts. Two such texts that are excellent for such information and may be available in public libraries are;

"Statistical Quality Control"
by Grant
3rd Edition
McGraw Hill Book Company
New York, New York

"Quality Control and Industrial Statistics"
by Duncan
1955
Richard D. Irwin, Inc.
Homewood, Illinois

* The recommended fill weight values are contained in the grade
* standards for canned asparagus. These values may
*
*
* be used to certify compliance or non-compliance with fill of container requirements based on the USDA Fill weight procedure in lieu of the drained weight procedure when requested by the applicant.

The fill weight values are specified according to size and type in the same manner as they are in the grade standards for drained weights. These values are to be applied the same as previously explained in these instructions for drained weights.

STYLE.

The style of the product is to be recorded on the score sheet(s) and appear on the Certificate of Quality and Condition as mentioned in the grade-standard.

SIZES OF SPEARS, TIPS, AND POINTS.

A. GENERAL.

The United States Standards for Grades of Canned Asparagus include size designations for spears, tips, and points (as applicable) and state the manner in which size (diameter) is to be determined. The U. S. Department of Agriculture has developed a device to measure and classify the size (diameter) of such units.

* Change.

SIZES OF SPEARS, TIPS, AND POINTS (Cont'd)

B. EXPLANATION.

The USDA asparagus sizer consists of a white, opaque plexiglass plate (3" X 8") with a "V" shaped notch extending lengthwise. One side is marked for frozen asparagus; the other side is marked for canned asparagus. The right-hand edge of the "V" on each side of the plate includes the diameter dimensions for the respective size designations. The diameter dimensions imprinted on the sizer is the width of the "V" at the point indicated by the dimension.

One edge on each side is marked off in 1/4-inch graduations for measuring the length of the asparagus units.

Information regarding a current source of supply for the USDA asparagus sizer, copies of these instructions, and the United States Standards for Grades of Canned Asparagus and of Frozen Asparagus may be obtained upon request from:

Processed Products Standardization
and Inspection Branch
Fruit and Vegetable Division
Agricultural Marketing Service
U. S. Department of Agriculture
Washington, D. C. 20250

C. HOW TO USE THE USDA ASPARAGUS SIZER.

1) Use the side applicable to the canned product.

2) Insert the asparagus unit into the "V" so that:

   a) The asparagus unit length is approximately at right angles to the sizer; and

   b) The point of measurement on the asparagus unit is 5 inches from the top for units more than 5 inches in length, and at the base of the unit for units 5 inches or less in length. (Misshapen units should be straightened when determining the length)

3) Move the asparagus unit down the "V" until the unit barely makes contact with both sides of the "V". Do not force the unit beyond this point.

4) Classify the unit as to the size designation -- stated between the diameter divisions -- within which the unit falls.

Example:

If a canned asparagus spear when measured as prescribed herein falls between the diameter divisions of 6/16" and 8/16" the spear is classified as "medium" size.

5) In a borderline measurement, where the approximate center line (diameter) is on a dividing line between two size designations, the unit is considered as of the larger size.

Example:

When the diameter of a canned asparagus spear is on the 6/16 inch mark, the unit is considered "medium" size instead of "small".

D. CARE OF THE ASPARAGUS SIZER.

The asparagus sizer should be handled carefully to avoid breakage. It should be cleaned with warm water and dried with a soft cloth to preserve the markings. No abrasive cleaner should be used.

E. DETERMINATION OF COMPLIANCE WITH SIZE DESIGNATIONS.

1) General.

The sizes in the grade standards refer to individual containers and are designated as follows:

| Word Designation | Diameter (16th's of an Inch) |
|---|---|
| Samll | Approximately 6/16 |
| Medium | 6/16 to 8/16 |
| Large | 8/16 to 10/16 |
| Extra Large or Mammoth | 10/16 to 13/16 |
| Colossal | 13/16 to 16/16 |
| Blend of Sizes | A mixture of two or more of the foregoing sizes. |

E. DETERMINATION OF COMPLIANCE WITH SIZE DESIGNATIONS(Cont'd).

2) Size with respect to individual containers.

The grade standards define each single size in diameters of 16th's inch and the procedure for compliance with a single size for any given container. The standard states in Section 52.2549, "Canned asparagus spears, tips, and points will be considered as meeting a designated size when not more than 20 percent, by count, of all the units are of the next size smaller or the next size larger than the diameter range of the particular size designation." This is interpreted to mean that at least 80 percent, by count, of the units in an individual container are of a single size and not more than 20 percent, by count, are of the next size smaller and the next size larger, with none more than one size smaller or one size larger.

In ascertaining the sizes present in any individual container it should not be necessary to make actual measurements of each unit. Separate the units according to diameter, placing those units that appear to be of the same diameter together. Measure only two or three units from each size group thus formed to establish the various sizes and percentage of each that may be present.

The grade standards define a "blend of sizes" as a mixture of two or more single sizes. An individual container of canned asparagus spears, tips, or points that fails to meet the requirements of a single size is a mixture of two or more or a "blend of sizes."

3) Sizes with Respect to Lots.

A single lot of canned asparagus spears, tips, or points may be reported as (1) single size; (2) blend of sizes; or (3) mixed sizes if the criteria set up herein for the lot comply neither with a single size or blend of sizes.

a) Single size.

A lot will be considered as complying with a designated single size if the number of sample units which fail to meet the requirements of such single size does not exceed the applicable acceptance number indicated in the sampling plans contained in Table No. VI.

TABLE NO. VI

| Sample Size | 2 | 4 | 9 | 15 | 21 | 28 | 35 | 42 | 50 |
|---|---|---|---|---|---|---|---|---|---|
| Acceptance No. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

When applying this acceptance criteria all the sample units in the sample drawn for quality determination must be evaluated for compliance with size requirements for individual containers, even though the sample size for quality differs from that specified in Table No. VI of this instruction. The acceptance numbers in Table VI are applied to the entire sample drawn for quality. This acceptance criteria is to be used for lot inspection as well as in-line inspection

Example 1

Sample size for quality -- 6

Number of sample units permitted to fail size requirements. -- 1

Example 2

Sample size for quality -- 13

Number of sample units permitted to fail requirements for size -- 2

In each example the sample size for quality is greater than the sample size specified in Table VI for the stated acceptance number, but less than the sample size for the next higher acceptance number.

The sampling plan specified in Table VI is based statistically on an acceptable quality level (AQL) of 10 percent defectives (containers that fail) while the sampling plan for quality is based statistically on an AQL of 6.5 percent defectives. Sample units which fail to meet the requirements of a designated single size should not deviate materially from such single size. For example, a sample unit of a single size more than one size larger or smaller than the designated size would be considered to deviate materially. In the case of a sample unit of a blend of sizes that are predominantly more than one size larger or smaller than the designated single size would also deviate materially.

b) Blend of sizes.

If a lot fails to meet the guide for designating the lot as a whole as a "single size" apply the following criteria to ascertain compliance for a "blend of designated sizes."

i Ascertain the percentage of each size in the individual containers.

ii Determine the average for each size in all the containers in the sample.

iii Disregard the sizes that average less than 10 percent, by count.

iv Consider the lot to be a "blend" of those sizes that average 10 percent by count, or more if:

a) The sizes are adjacent sizes; and

b) The number of individual containers which meet the requirements of a single size does not exceed the applicable acceptance number in the sampling plans contained in Table No. VI.

Example: The following percentages of various sizes are found in six individual containers:

| | Small | Medium | Large | Extra Large | Colossal | Giant |
|---|---|---|---|---|---|---|
| Can #1 | 5 | 30 | 45 | 10 | 5 | 5 |
| Can #2 | -- | 20 | 55 | 15 | 10 | -- |
| Can #3 | -- | 5 | 85 | 10 | -- | -- |
| Can #4 | 10 | 35 | 55 | -- | -- | -- |
| Can #5 | -- | 25 | 40 | 25 | 5 | 5 |
| Can #6 | -- | 55 | 15 | 25 | -- | 5 |
| Averages | 2-1/2 | 28 | 49 | 14 | 3-1/2 | 2-1/2 |

Disregarding those sizes averaging less than 10 percent, consider the lot to be a "blend" of medium, large, and extra large, which are adjacent sizes. Can #3 is the only container which is of a single size. This does not exceed the applicable acceptance number in Table No. VI.

c) Mixed sizes.

If a lot fails to meet the guide for reporting the lot as a whole as a "single size" or a "blend" it has been administratively decided that the designation applicable to such lots is "mixed sizes."

For example, the individual samples may be as follows:

5 samples - small
8 samples - medium
14 samples - large
21 samples - colossal

In this instance the lot as a whole would be reported as "mixed sizes." In some instances the lot as a whole may be a mixture of individual samples which meet requirements of a "single size" and others for a blend of "designated sizes."

CUT SPEARS.

The grade standards provide minimum percentages of head material according to length of cut for the style of cut spears. Page 27 provides illustrations of terms used in connection with the cut spears.

The illustration shows two spears of asparagus, numbered 1 and 2. Sketch number 1 shows a spear that has been cut so as to yield two portions that may be counted as a head. Sketch number 2 shows the same spear, cut at different points, and yielding only one portion that may be counted as a head.

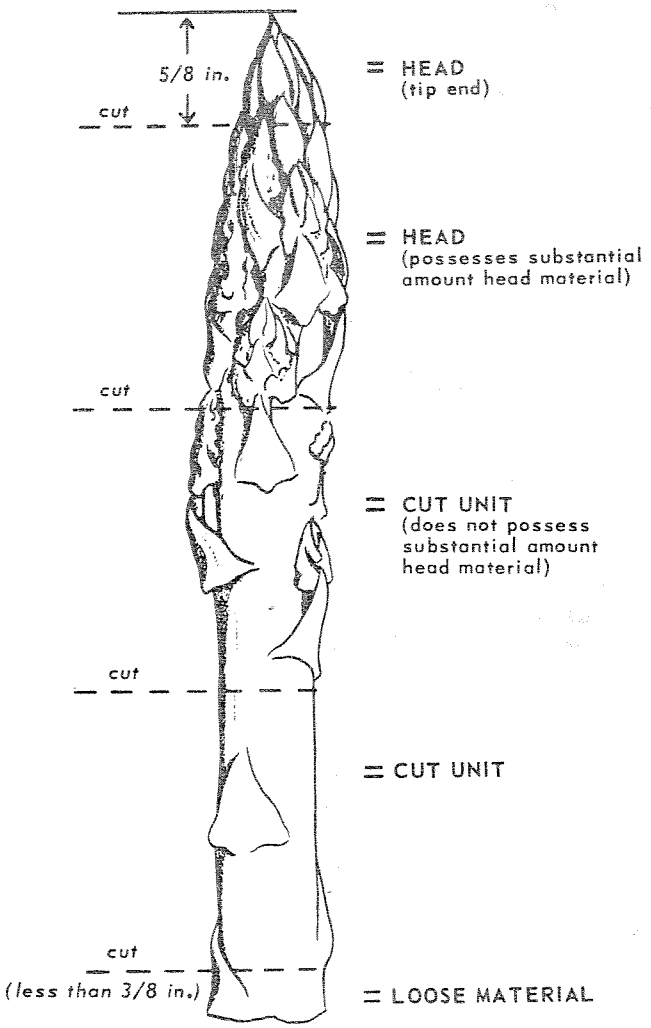
Each USDA inspection office has been provided with a supply of this inspection aid enclosed in a plastic envelope for protection during use.

Copies of this visual aid without the plastic envelope will be mailed to industry members upon a request to:

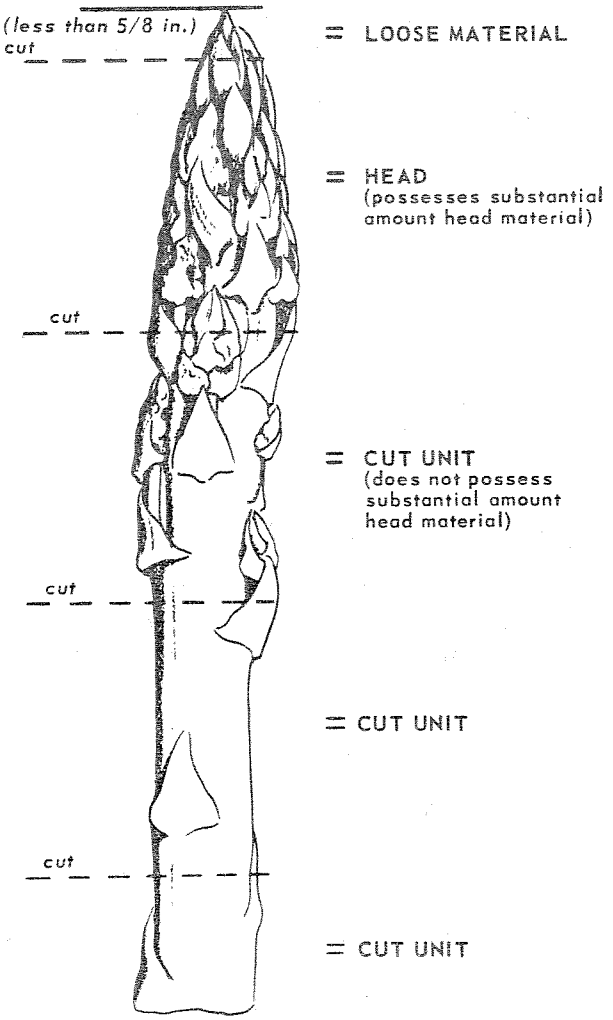
Chief, Processed Products and Inspection Branch
Fruit and Vegetable Division
Consumer and Marketing Service
U. S. Department of Agriculture
Washington, D. C. 25250

# CANNED CUT ASPARAGUS (GREEN TYPE)

## Definition of Terms




1.




2.

For the purpose of determining the percent, by count, of heads in "cut green asparagus," tip ends which are 5/8 inch or more in length are counted as one head.

Portions of a spear which possess a substantial amount of head material, and which are approximately the same length as the other cut units, are also counted as one head.

U.S. DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE
FRUIT AND VEGETABLE DIVISION
PROCESSED PRODUCTS STANDARDIZATION AND INSPECTION BRANCH

GRADE FACTORS NOT RATED BY SCORE POINTS.

The factor of flavor refers to the flavor and odor of the product.

To be rated in the Grade A classification, the product should have a good flavor. Good flavor means that the product has a good, characteristic, normal flavor and odor and is free from objectionable flavors and odors of any kind.

The product may be rated in the Grade C classification if it has a fairly good flavor and odor but is free from objectionable flavors and odors of any kind.

Although the factor of flavor is not scored, it is nevertheless a requirement of the grade. This requirement is provided in the definition of each of the respective grades. A good flavor is required in canned asparagus in order to be graded A or Fancy. If the flavor of the canned asparagus is classified as fairly good, the product cannot be graded above Grade C or Standard.

Off odors may be considered presumptive evidence of bacterial
* spoilage of the product.
*
*

GRADE FACTORS RATED BY SCORE POINTS.

Liquor.

The liquor may possess a tinge of color having a typical yellowish or greeish cast, depending on the type and style of canned asparagus. The liquor must be fairly free from suspended material and sediment to score in the Grade A classification. Whenever there is a question as to whether the sample unit complies with the requirements for the factor of "Clearness of Liquor", the following procedure and guidelines should be followed:

(1) Pour the liquor into a cylinder that is approximately 1-1/2 inches in diameter and 10 inches in height;

(2) Allow to stand for 10 minutes;

(3) Consider the sample unit as meeting requirements for clearness of liquor for Grade A provided;

(a) In the case of white and green tipped and white asparagus the sediment and flocculent material do not exceed approximately 5 percent of the height of the liquor in the cylinder; or

(b) In the case of green and green tipped asparagus, the sediment and flocculent material do not exceed 10 percent of the height of the liquor in the cylinder.

* Change.

The sample unit is scored in the Grade C range if the sediment and flocculent material exceed (3) (a) or (b) above, as appropriate, but do not exceed 25 percent of the height of the liquor in the cylinder.

The liquor is not considered to be excessively cloudy for Grade C if the amount of sediment is not in excess of 25 percent. The liquor may also be slightly gray or slightly brown but not off color, and the appearance of the liquor is not seriously affected.

B. Color.

The color of canned asparagus should be bright and characteristic of the type and style of the product. Observe the limiting provisions for classification and determine compliance with the overall color requirements for the different grade ranges. The exterior surface of green asparagus should be a typical bright green color. A dark discoloration of canned all-green asparagus may occur soon after the containers are opened and the contents exposed to the air. Investigations have shown that this discoloration is caused by a reaction of the iron derived from the can and tannin-like substances which were found to be rutin and/or quercetin, natural constituents of the asparagus. It was found that this reaction was directly related to the surface properties of the tinplate of the container. If the containers show signs of detinning, the chances are that discoloration will not occur. If the containers appear bright inside, discoloration may be predicted.

When such discoloration occurs, the factor of color should be scored down according to the severity by which the color is affected.

Canned green asparagus which has been packed for 12 months or more will lose to some extent its bright green color. It may develop a pronounced pale yellowish green color and a dull overall appearance. Canned green tipped and white and white asparagus may develop a more pronounced yellowish white color.

1) Spears, tips, and points.

a) Green. Green asparagus, when young and tender, should be bright and may be green, light green, or yellowish green in color. Not more than 10 percent, by count, of units may have white butt ends, but the white area may not exceed one-eighth of the length of the unit to fall into the Grade A color classification.

1. Spears, tips, or points (continuation).

   b. Green tipped. Green tipped asparagus, when young and tender, should be bright and may be green, light green, or yellowish-green in color over one-half or more of the length of the unit measured from the tip end, and may have white or yellow-white cut ends with not more than 20 percent, by count, of units which may have white or yellowish-white color in excess of one-half of the length of the unit, or all green.

   c. Green tipped and white. Green tipped and white asparagus, when young and tender, will have a bright yellowish head and adjacent areas. Not more than 20 percent, by count, of units may be green, light green, or yellowish-green heads and adjacent areas exceeding one-half of the length of the unit.

   d. White. When young and tender, white asparagus may have a white or yellowish-white color. The stalk may have pinkish markings which are characteristic of young and tender white asparagus. Not more than 10 percent, by count, of the units may have green, light green, or yellowish-green heads and adjacent areas but not to exceed one-half of the length of the unit.

2. Cut spears, bottom cuts or cuts - tips removed, and mixed.

   a. Green. The color should meet similar color requirements for green spears, tips, and points, with not more than 10 percent, by count, of units which may be green and white with not more than 2 percent, by count, of white units.

   b. Green tipped and white or white. The color should meet similar color requirements for green tipped and white or white spears, tips and points without limitation for length or percent, by count, of units which may be all green.

Canned asparagus having only a fairly good color will fall into the Grade C color classification. This is not a limiting rule in the Grade C classification. If the color is characteristic of fairly well developed canned asparagus, the product may be grade A provided the total score is 85 points or more and no limiting rules are exceeded.

When the color falls into the Substandard classification the product cannot be graded above Substandard, regardless of the total score. Off color asparagus, regardless of the cause, will fall into Substandard classification.

TABLE VII
SCORING GUIDE FOR COLOR

| Color deviation for each style and type. | Grade A Classification Score Points | | | | Grade C Classification Score Points 1/ | | |
|---|---|---|---|---|---|---|---|
| | 20 | 19 | 18 | 17 | 16 | 15 | 14 |
| Spears, tips, and points | Percent by Count | | | | Percent by Count | | |
| Green<br>Units showing typical white or yellowish-white not to exceed -- | | | | | | | |
| 1/8 of length of unit | 0 | 1-3* | 4-6* | 7-10* | 11-13 | 14-16 | 17-20 |
| 1/4 of length of unit | 0 | 0 | 0 | 0 | 1-10 | 11-15 | 16-20 |
| Green tipped<br>Units showing typical white or yellowish-white in excess of — | | | | | | | |
| 1/2 of length of unit | 0-5 | 6-10 | 11-15 | 16-20 | 21-30 | 31-40 | 41-50 |
| Green tipped and white<br>Units showing green, light-green, or yellowish-green heads and adjacent areas in excess of -- | | | | | | | |
| 1/2 of length of unit | 0-5 | 6-10 | 11-15 | 16-20 | 21-30 | 31-40 | 41-50 |
| White<br>Units showing green, light-green, or yellowish-green heads and adjacent areas not to exceed -- | | | | | | | |
| 1/2 of length of unit | 0 | 1-4 | 5-7 | 8-10 | 11-13 | 14-17 | 18-20 |
| Cut spears, bottom cuts, or cuts-tips removed, and mixed | | | | | | | |
| Green<br>Units green and white or white units | 0 | 1-3* | 4-6* | 7-10* | 11-13 | 14-17 | 18-20 |
| Percent white units only | 0 | 0 | 1 | 2 | 3 | 4 | 5 |
| Green tipped and white or white | Good color typical of well developed asparagus | | | | Fairly good color typical of fairly well developed asparagus | | |

1/ Partial limiting rule.

* Revised January 1977

C. Defects.

The defects found in canned asparagus which may be scored are grit or silt, loose material, shattered heads, misshapen units, poorly cut units, and units damaged or seriously damaged by pathological, mechanical, or other means.

1) Grit or silt.

Grit or silt is determined by visual and organoleptic examination. Silt is seldom detected upon chewing. Examination for this type of material is done visually.

If, upon chewing several representative portions of the sample, grit or sand is not more than slightly noticeable in an occasional portion, the product may be considered to be practically free from grit.

When the amount of grit present is not more than slightly noticeable but can be detected in more than an occasional portion when chewed, but does not materially affect the eating quality, the product contains not more than a trace and may be considered to be fairly free from sand or silt.

When the amount of sand or grit is present in a sufficient amount to be readily detected upon chewing and the eating quality of the asparagus is materially affected, the product is then considered to contain more than a trace of grit.

Grit or silt may be found in the liquor, under the bracts, or on the sides of the units. If the presence of grit or silt is noticeable to the extent that the appearance is affected the product is scored into the Grade C classification for the factor of defects. When present in an amount that the appearance is more than slightly noticeable the product is graded substandard.

2) Loose material.

Shattered asparagus material from heads or adjacent portions of the spear which are due to rough handling or other mechanical causes, and cut or broken pieces of asparagus material which is less than three-eighths inch in length may be classified as loose material. The amount of loose material present should not materially affect the appearance of the product to score in the Grade A classification and may be scored in the Grade C classification if the amount present does not seriously affect the appearance of the product. When the liquor falls in the C classification using the guide for rating liquor, usually loose material is present to an extent to materially affect the appearance and will warrant a score in the Grade C classification.

C. Defects (Cont'd)

3) Shattered heads.

Shattered or broken heads should be counted prior to emptying the contents of the containers to ascertain drained weights.

This defect should be scored only when the head of the asparagus is broken or shattered to the extent that the appearance of the unit is seriously affected.

4) Misshapen.

Only spears, tips, or points, which are seriously affected in appearance by doubles or by crooked units, or other malformations should be scored in this classification.

5) Poorly Cut.

Classify as poorly cut units those units which have very ragged, stringy, or frayed edges or a unit that is only partially cut or is cut at an angle of less than approximately 45 degrees.

6) Damaged and seriously damaged units.

When the appearance or eating quality of the unit is materially affected by pathological or mechanical injury or damage by other means, the defect is classified as "damaged".

If the unit is damaged to the extent that the appearance or eating quality is seriously affected, the defect is classified as "seriously damaged".

7) Scoring guide for defects.

Allowances for the various types of defects are summarized in Table VIII along with a scoring guide for assigning score points for the factor of defects.

TABLE VIII

SCORING GUIDE FOR DEFECTS

| Defects | Grade A Classification | | | | | | Grade C Classification | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Score Points | | | | | | Score Points 1/ | | | |
| | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 |
| GRIT OR SILT | None | | None that affects appearance or edibility | | | | Not more than trace that affects appearance or edibility | | | |
| LOOSE MATERIAL | None | May not materially affect appearance | | | | | May not seriously affect appearance | | | |
| MAXIMUM PERCENT, BY COUNT | | | | | | | | | | |
| Shattered heads, misshapen units, poorly cut units, damaged and seriously damaged units | | | | | | | | | | |
| Spears, tips, and points | | | | | | | | | | |
| Green and green tipped, total | None | 2 | 4 | 6 | 8 | 10 | 12 | 15 | 18 | 20 |
| Green tipped and white and white total | None | 3 | 6 | 9 | 12 | 15 | 18 | 23 | 27 | 30 |
| All types, serious damage only | None | None | None | 1 | 2 | 3 | 4 | 6 | 8 | 10 |
| | | | | (1 unit per container permitted if average all containers is within tolerance) | | | | | | |
| Cut spears, bottom cuts, cuts-tips removed, and mixed | None | 2 | 4 | 6 | 8 | 10 | 12 | 15 | 18 | 20 |
| Serious damage only | None | None | None | 1 | 2 | 2 | 3 | 5 | 6 | 7 |
| | | | | (1 unit per container permitted if average all containers is within tolerance) | | | | | | |

1/ Limiting rule.

D. Character.

1) Development.

The tenderness and texture of canned asparagus, together with the development of the head and bracts, are considered in scoring the character of the product. The head development of spears and cut asparagus should be examined and classified as well developed, fairly well developed, or substandard.

The stages of development of heads in canned asparagus are illustrated in the illustration of asparagus spears on the following pages. The spears numbered 1 to 9 on Plates 1, 2, and 3 are described as follows:

a) Plate 1

Spears 1 and 2 illustrate the lower limit for Grade A head development or heads to be classified as "Well developed". The heads are practically compact; the bud stems are slightly elongated at the lower part of the head; practically no seediness is shown in the upper one-third of the head; and at the lower part of the head the bud clusters are beginning to show above the tips of the scales or bracts, causing a slightly seedy appearance.

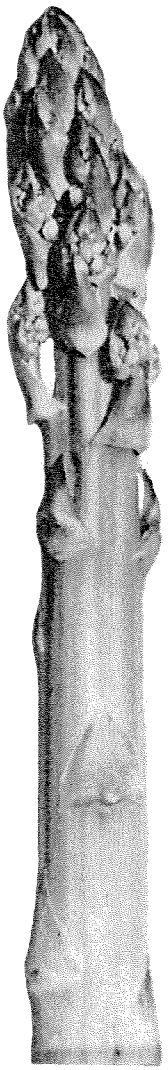
b) Plate 2

Spears 3, 4, 5, and 6 illustrate the lower limit for Grade C head development or heads classified as "Fairly well developed". The bud stems on the lower two-thirds of the heads are elongated; the head is also elongated; the bud clusters show above the bracts over most of the head, causing a seedy appearance.

c) Plate 3

Spears 7, 8, and 9 illustrate Substandard head development. Bud stems are elongated; the head is elongated; and the bud clusters are seedy and the bud clusters begin to fall away from the spear, causing a loose appearing head.

# STAGES OF DEVELOPMENT
# IN
# CANNED ASPARAGUS



1.

2.

**PLATE 1**

SPEARS SHOW LOWER LIMIT FOR WELL DEVELOPED HEADS

U.S. DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE
FRUIT AND VEGETABLE DIVISION
PROCESSED PRODUCTS STANDARDIZATION AND INSPECTION BRANCH

September, 19

# STAGES OF DEVELOPMENT
# IN
# CANNED ASPARAGUS

3. 4. 5. 6.

**PLATE 2**

SPEARS SHOW LOWER LIMIT FOR FAIRLY WELL DEVELOPED HEADS

U.S. DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE
FRUIT AND VEGETABLE DIVISION
PROCESSED PRODUCTS STANDARDIZATION AND INSPECTION BRANCH

September, 1968

# STAGES OF DEVELOPMENT IN CANNED ASPARAGUS

7. 8. 9.

**PLATE 3**

SPEARS SHOW SUBSTANDARD DEVELOPMENT OF HEADS

U.S. DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE
FRUIT AND VEGETABLE DIVISION
PROCESSED PRODUCTS STANDARDIZATION AND INSPECTION BRANCH

September, 1968

D. Character (Cont'd)

2) Tenderness.

The tenderness of the unit in spears, tips, and points is determined by chewing and by means of the fiberometer. The final determination of tenderness should be made by chewing as there may be instances where the fiberometer will indicate that a unit is tough but the toughness will not be materially objectionable upon eating.

The procedure for testing for tenderness by the fiberometer is given in the grade standards under "Definitions and Explanations."

The official procedure for testing cut spears, bottom cuts or cuts-tips removed, and mixed, for tenderness is by chewing.

The usual procedure for testing for tenderness in the case of all styles is by feeling the cut end(s) of the units with the thumb or forefinger. If tough fiber is present, the cut end will feel quite rough. Suspected units should be set aside for further testing to confirm the presence of tough fiber.

A fork may be used to test for fiber in the styles of cut spears, bottom cuts or cuts-tips removed, and mixed. In this test, the edge of a regular table fork is used to cut the suspected units by applying moderate pressure and a slight rocking motion on the fork. If the unit possesses tough fiber the fork will not cut through. In cases where there is any doubt, the unit should be chewed as a final determination.

If a fiberometer is not available the fork test may also be used to determine tenderness in the styles of spears, tips, or points.

Table IV provides a scoring guide with permissible percentages of fairly well developed, substandard development, and tough units in the various types and styles for the different grades of canned asparagus.

TABLE IX

SCORING GUIDE FOR CHARACTER

| CHARACTER | Grade A Classification | | | | | | | Grade C Classification | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Score Points | | | | | | | Score Points | | | | | |
| DEVELOPMENT | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 |
| | Maximum Percent By Count | | | | | | | Maximum Percent By Count | | | | | |
| Spears, tips, & points | | | | | | | | | | | | | |
| Fairly well developed | -- | 2 | 5 | 7 | 10 | 12 | 15 | 20 | 60 | 80 | 100 | 95 | 90 |
| Substandard | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5 | 10 |
| Cut spears and mixed | | | | | | | | | | | | | |
| Fairly well developed | -- | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 80 | 90 | 100 | 95 | 90 |
| Substandard | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5 | 10 |
| TOUGH UNITS: | | | | | | | | | | | | | |
| Spears, tips, & points | | | | | | | | | | | | | |
| Green and green tipped | None | | 2 | 4 | 6 | 8 | 10 | 12 | 15 | 18 | 20 | 23 | 25 |
| Green tipped & white and white | None | 1 | 4 | 8 | 12 | 16 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| Cut spears & mixed | | | | | | | | | | | | | |
| Green and green tipped | None | | 2 | 4 | 6 | 8 | 10 | 12 | 15 | 18 | 20 | 23 | 25 |
| Green tipped & white and white | None | 1 | 4 | 8 | 12 | 16 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| Bottom cuts or cuts-tips removed | | | | | | | | | | | | | |
| Green and green tipped | None | | 2 | 4 | 6 | 8 | 10 | 12 | 15 | 18 | 20 | 23 | 25 |
| Green tipped & white and white | None | 5 | 10 | 15 | 20 | 25 | 33⅓ | 35 | 40 | 45 | 45 | 50 | 50 |

## CERTIFICATION

The certification of canned asparagus and preparation of inspection reports shall be in accordance with applicable general instructions.

The following information shall be included in the body of the certificate in addition to usual net weight, vacuum, and drained weight or fill weight information:

Type;

Style;

Size (in the case of spears, tips, or points);

Count (in the case of spears, tips, or points only upon request of the applicant.);

Percent heads (average for the sample in the case of cut spears);

Length of cut (in the case of cut spears and bottom cuts).