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Vegetable  
Division**

**Processed  
Products  
Branch**

# **Grading Manual for Canned Onions**

## 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 guidelines to assist in the uniform application and interpretation of USDA grade standards and other similar specifications.

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INSPECTORS' INSTRUCTIONS  
FOR  
CANNED ONIONS

**I. GENERAL**

**A. Purpose and Scope.**

The instructions are designed to assist inspectors in the interpretation and uniform application of the United States Standards for Canned Onions. These instructions also serve to familiarize inspectors with commercial processing of canned onions and the general processing procedure used by the industry. Where these instructions do not appear to fully cover the situation, inspectors and supervisors are urged to refer the matter to the Washington office for consideration,

**B. Keep Instructions Current.**

These instructions may be revised, in whole or in part, whenever the need for such revision is indicated. Therefore, any comments or suggestions such as the detection of errors or the development of new and better inspection techniques should be forwarded in detail to the Washington office.

**II. PRODUCTION**

**A. Annual Pack.**

Canned onions are packed by a relatively few packers. The annual pack has increased each year as the product becomes better known and more widely distributed. It has been estimated that the annual pack amounts to approximately two million cases.

**B. Packing Areas.**

The principal producing areas of canned onions are Pennsylvania, New York, Delaware, Oregon and,California.

## II. PRODUCTION (Continuation)

### C. Varieties.

Yellow globe onions, a commercial term applied to several different varieties and strains of onions, are preferred by processors of onions. The more acceptable varieties are the Southport yellow globe and the yellow globe Denver. Western processors for the most part use only the yellow globe Denver.

### D. Harvesting.

The customary period at which to harvest onions for canning is in the fall when the tops of the onions have begun to turn greenish yellow. Usually the crop is dug by a hoe or an implement which turns the ground exposing the onions to the surface.

After the onions are taken from the ground they are thrown in windrows or piles in the field, where they remain until the tops are completely dry. After curing sufficiently, the tops are cut or pulled off close to the bulbs. The onions are then placed in sacks or crates and are placed in storage or shipped.

## III. PREPARATION AND CANNING

### A. Receiving.

Onions are usually delivered to the cannery in sacks or crates, and are placed in storage until used. Well cured onions, will keep for several months if stored in a well-ventilated place. In some areas it may be necessary to store them in an enclosed shed for protection against freezing. Onions will sprout within a few months if stored in a warm place. Badly spoiled onions become soft. The fresh fruit and vegetable inspection service inspects a large volume of onions for shippers and buyers at time of shipment or in receiving markets. Onions delivered to canners may or may not have been officially inspected.

### B. Pre-Sizing and Trimming.

Generally the onions are emptied from sacks onto a belt conveyor, carrying them to a sizer which eliminates over and under-sized onions. From the sizer the onions are placed in buckets or pans on a "merry-go-round" sorting table where ends of the onions are trimmed and onions possessing rot, decay or other serious defects are discarded.

### III. PREPARATION AND CANNING (Continuation)

#### C. Peeling.

From the "merry-go-round" sorting table, the onions are conveyed to a carborundum peeler which tends to loosen the outer skin of the onion bulb. As the onions leave the carborundum peeler they pass through a continuous lye peeler containing a three to ten percent lye solution, depending upon the variety and character of the onions, which further loosens the outer scales of the onion bulb.

#### D. Washing.

Following the peeling process, the onions pass through a rotary screen washer where adhering portions of the outer loosened scales are washed off under a strong spray of water. A closely controlled check is necessary to assure complete removal of the lye solution from the onion bulbs.

#### E. Pre-removing of Blemishes and Defects.

After washing, the onions are moved by conveyer belt to an inspection table where onions containing blemishes are removed.

#### F. Sizing.

Normally onions are separated into three size classifications: tiny, small, and medium. Each processor has developed his own particular sizing operation. However, for the most part onions exceeding an inch and one-half in diameter and those with a diameter of less than  $5/8$  of an inch are not used for canning.

#### G. Final Removing of Blemishes and Defects.

As the onions come from the sizer, they are conveyed onto a final inspection table where loosened scales, loose centers, onions possessing blemishes, or excessive discolored onions are removed.

#### H. Filling.

The onions are then filled into cans or glass jars and a sufficient amount of hot brine is added for proper fill. After the cans or glass jars are filled they are quickly closed. In packing onions, the product is acidified to assure sterilization and to prevent spoilage. A pH of 4.5 is most desirable. The acid solution may be used as a dip, or may be added direct to the containers in the filling operations.

### III. PREPARATION AND CANNING (Continuation)

#### I. Processing.

Canned onions are placed in metal baskets for processing in still retorts. Immediately after sterilization, canned onions should be thoroughly cooled to a temperature where cooking will cease and prevent drying of cans.

### IV. INSPECTION OF THE PRODUCT

#### A. General.

The United States Standards for Grades of Canned Onions describe and establish requirements for the quality factors and should be followed in the inspection of the product, except when another specification is specifically requested.

#### B. Sampling.

It is equally as important for the inspector to draw representative samples as it is to accurately examine and classify the samples as to quality. Make sure that the best possible sampling job has been done so that the samples will represent the lot which is being inspected. The sampling rates prescribed in the Rules and Regulations and in other Inspectors' Instructions and Memorandums should be followed when drawing samples for the inspection of canned onions. Pertinent information with respect to the product should be recorded on the sampling certificate such as condition of containers, cases, location of the lot, and all means of identification in the event that it will be necessary to supervise the loading of the lot.

#### C. Minimum Equipment and Inspection Material.

The following lists comprise the minimum equipment and supplies needed for inspection of canned onions:

- (1) Scales and pan.
- (2) Trays - white, shallow laboratory trays for No. 2 and smaller cans.
- (3) Trays - white, deep, large size laboratory trays for No. 3 and larger cans.
- (4) Vacuum gauge.
- (5) Can opener.



**IV. INSPECTION OF THE PRODUCT (Continuation)**

**C. Minimum Equipment and Inspection Material (continuation)**

- (6) Head space gauge.
- (7) Sieve, 8-mesh, 8-inch diameter for No. 2 and smaller cans.
- (8) Sieve, 8- mesh, 12 -inch diameter for No. 3 and larger cans.
- (9) United States grade standards and the Federal specifications for canned onions.
- (10) Inspector's Instructions -canned onions and any supplemental instructions.
- (11) Sampling sheets.
- (12) Score sheets.
- (13) Towels.
- (14) Crayon.
- (15) Sampling stamp.

**D. General Inspection Procedure.**

To uniformly apply the standards, be guided by the supervisor when there is any doubt as to the correct interpretation of any requirement. This is particularly important whenever unusual conditions are encountered on when an interpretation of a requirement will change the product from one grade to another. Quality requirements which involve judgement as to the extent which the appearance and eating quality are affected should always be checked with your supervisor, unless you are sure you are applying the proper interpretation. Supervisors should make sure their interpretation is in line with the views of the District Supervisor and the Washington office.

**1. Product description.**

Canned onions are covered under the general identity requirements for canned vegetables under the Federal Food, Drug and Cosmetic Act.

**IV. INSPECTION OF THE PRODUCT (Continuation)**

**D. General Inspection Procedure. (continuation)**

**1. Product Description (continuation)**

Additives are therefore restricted by regulation. Citric acid or a vinegar may be used, therefore, to acidify the product. The grade standard covers only whole onions and requires that the product be prepared from clean, sound bulbs. As the product is being graded, these requirements should be kept in mind and the inspector must be alert for deviations from these over-all requirements.

**2. Arranging samples and recording pertinent identification marks.**

The individual containers are arranged in such a manner as 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, 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 both the inspection documents may be introduced as evidence in court. A complete, well kept score sheet, signed by the inspector should be executed.

**3. Net weight.**

The net weight of the product means the weight of media and onions, exclusive of the container and labels. The net weight of each sample must be determined and recorded on the score sheet.

**4. Vacuum readings.**

Take vacuum readings in accordance with general instructions on this subject and record results, If no vacuum reading is registered on the gauge, record as "zero." When the tip of the vacuum gauge has penetrated the product or when a slight pressure on top of the can will cause any liquid to emerge from the puncture and the container upon opening is full, record on the score sheet as "O-F," to indicate fullness and for proper certification. If upon opening the container there is a normal head space and the container is not full and no vacuum reading is registered, record as "O."

IV. INSPECTION OF THE PRODUCT (Continuation)

D. General Inspection Procedure. (continuation)

5. Fill of Container.

(a) Metal Container.

After opening the containers, check each container to ascertain compliance or non-compliance with the recommended fill of container for canned onions. Record only when the headspace appears to be excessive or over 10 percent of the inside height of the container.

(b) Glass Container.

Headspace measurements are not applicable on glass containers because of their varying profiles. When onions in glass containers appear to be less than 90 percent of the capacity, the fill of container is ascertained as follows:

- (i) Mark the container at the uppermost level filled with onions and liquid;
- (ii) After the contents have been removed, fill the container with water to the mark;
- (iii) Remove the water to a graduated cylinder and record the volume occupied by the product (onions plus packing medium):
- (iv) If the total overflow volume (in fluid measure) of the container is unknown, fill the container again with water to the top level of the container and record the total volume of the container.
- (v) Divide the volume occupied by the product as determined in (iii), by the total volume of the container, as determined in (iv), and multiply the result by 100 to obtain the percent of total capacity occupied by the product. This represents the fill of container.

#### IV. INSPECTION OF THE PRODUCT (Continuation)

##### D. General Inspection Procedure.

###### 6. Drained Weight.

Remove the onions from the container very carefully to the draining sieve of the appropriate diameter. After draining for exactly two minutes, record the drained weight to the nearest  $\frac{1}{4}$  ounce. If exact weight scales are available the drained weight should be recorded to the nearest tenth of an ounce.

###### 7. Color.

The next step after making drained weight is over-all appraisal of color. Onions upon exposure to the air oxidize and rapidly turn dull. The rating for this factor should, therefore, be handled promptly.

The color of canned onions may vary considerably because of the various methods of processing. In rating this factor keep in mind (1) uniformity; (2) brightness, and (3) is the color typical of the variety. Overcooking or other improper processing, such as an insufficient pH value, may cause poor color. To score in the Grade A classification, the canned onions should have at least a reasonably uniform bright characteristic color which may include typical light greenish areas on the surface on the bulb. Score only the area of the bulb possessing green color which materially affects the appearance of the sample in the allowance of "one-half of the surface area of the bulb." Inspectors should, through personal review with their supervisor or exchange of samples, get their sights set on evaluation of the color factor.

Canned Onions which are not more than materially affected by oxidation, dull grayish white casts, watery-white casts, other discoloration, or exceeding the 20 percent by count tolerance for excessive greenish areas are scored as meeting the requirements of "fairly good color." Canned Onions that fail the requirements for "fairly good color" should be scored Substandard.

###### 8. Count of Onions.

The count of canned onions is determined and recorded. For purposes of determining the count, each onion bulb in a container with or without its center portion is considered as a unit.

**IV. INSPECTION OF THE PRODUCT (Continuation)**

**D. General Inspection Procedure. (continuation)**

**9. Similar Varietal Characteristics.**

Onions used for canning usually have similar varietal characteristics. In the event the onions are distinctly different in varietal characteristics they should be classified as Substandard account mixture of varietal types.

**10. Flavor.**

"Normal flavor and odor" is required in each grade above Substandard. The variation in percent pH may cause differences in the canned product but only objectionable flavors are important. When the canned product possesses a definite objectionable odor or flavor such as an excessive acid taste, the product should be classified as Substandard account of objectionable flavors.

**11. Uniformity of size and shape.**

In scoring uniformity of size and shape, the variation in size of the onions in addition to the general shape is considered.

In evaluating the score for this factor consideration is given to onions which are poorly shaped or otherwise misshapen to the extent that their appearance is seriously affected.

Then remove 5 percent by count of the onions which are most lacking in uniformity. In meeting the size requirement of each grade classification the 5 percent allowance for onions lacking uniformity of size may be made up entirely of large onions, small onions, or a combination of large and small onions. In the 95 percent, by count, that are the most uniform in size determine the smallest and the largest onion and weigh each unit to determine if the onions meet the requirement of each grade classification.

#### IV. INSPECTION OF THE PRODUCT (Continuation)

##### D. General Inspection Procedures. (continuation)

##### 12. Defects.

###### (a) General.

Immediately after ascertaining the uniformity of size and shape, segregate any defects in the following groups in accordance with the definitions outlined in the United States Standards for Grades of Canned Onions. Inspectors may wish to determine the factor of character at the same time as the separation for defects is made.

###### (b) Extraneous Vegetable Material.

Remove from each container the pieces present and arrange all the extraneous material such as loose skins, and dried onion tops. Extraneous vegetable material refers to harmless vegetable material and the material falling into this category is evaluated with respect to its effect on the over-all requirements for the grade classification. No tolerance is provided for extraneous vegetable material of a different origin than the onion plants such as weeds and weed seeds. When such extraneous material is found the supervisor should be contacted.

###### (c) Blemished Onions.

A blemished onion is one that is affected by surface or internal discoloration to such an extent that the appearance or eating quality is materially affected. The following are examples of onions scoreable as being blemished:

- (i) **Staining.** Onions that show brown or streaked discoloration from lying on the ground.
- (ii) **Seed Stems.** Onions often throw up stalks on which to bear seeds during the later part of their growth. When harvested the seed stems are cut or broken off leaving thick tough stems extending through the centers of the onions, Onions possessing tough or woody seed stems should be considered as blemished onions;

IV. INSPECTION OF THE PRODUCT (Continuation)

D. General Inspection Procedure. (continuation)

12. Defects. (continuation)

- (iii) **Sunburn.** Sunburn is a green discoloration caused by exposure of the bulb to the sun and is normally present only on the outer scale of the onion bulb. This condition should not be confused with the natural greening of certain varieties of onions wherein the green color may be present in the outer scales of the onion bulbs;
- (iv) **Sunscald.** This injury takes place at harvest time when the bulbs are exposed to the heat and bright sunlight. The tissue of the exposed area of the bulb will scald and become soft and slippery. When temperatures are reduced and the onions are exposed to the air, the scalded tissue loses moisture by evaporation and leather-like areas are produced which may be bleached almost white;
- (v) **Freezing injury.** This injury is recognized by the water soaked appearance, soft feel, and discoloration appearing in a portion of the scales or scales. The effected area normally has a translucent or paper-like appearance;
- (vi) **Smudge.** Smudge is characterized by black blotches or aggregations of minute black or dark-green dots on the outer scales. These dots are often arranged in concentric rings. Generally the lesions are on the outer scales but they may be found on inner-scales. On the fleshy scale of the bulb the fungus produces sunken yellowish spots.
- (vii) **Surface Molds.** Surface molds may be black, blue, or gray in color and may be found growing either on the outer scales or frequently between the outer scales of the bulb.
- (viii) **Rot.** Several types of rot may be present in onions, some of which are bacterial soft rot, blue mould rot, fusarium rot, and green mold rot. Normally onion bulbs affected by rot have a water soaked appearance with various discolorations of outer or inner scales. Canned onions should not contain any units showing rot other than an accidental unit.

IV. INSPECTION OF THE PRODUCT (Continuation)

D. General Inspection Procedure. (continuation)

12. Defects. (continuation)

(d) Seriously Blemished Onion.

A seriously blemished onion is an onion that is affected by surface or internal discoloration to such an extent that the appearance or eating quality is seriously affected. Insect injury, wherever the insect bite extends through the scale of an onion bulb, and is very noticeable should be considered seriously blemished. Dark pathological areas which are unsightly are considered seriously blemished.

(e) Mechanical Damage.

Onions bulbs mechanically damaged by crushing, gouging, trimming should be classified as damaged only when the condition materially affects the eating appearance or quality of the bulb.

(f) Loose Scales or Pieces of Scales.

Loose scales or pieces of scales are those not attached to an onion bulb. Do not aggregate pieces of scales to give the equivalent of one loose scale.

(g) Detached Center.

Detached center is the center portion of the onion bulb of which has become detached. The onion bulb thus damaged is scored as a defect and the loose centers which have become detached are disregarded.

(h) Well Trimmed.

Determining whether onions are well trimmed is judged entirely on an appearance basis. In meeting the requirement for well trimmed the top and root of the onion should be neatly removed. Onion bulbs with off-slant cuts which materially affect the appearance of the unit are not considered well trimmed.



IV. INSPECTION OF THE PRODUCT (Continuation)

D. General Inspection Procedure. (continuation)

13. Character.

In evaluating character the following conditions are to be considered: (a) firmness, (b) tenderness, and, (c) the tendency of the onion bulb to retain its conformation without becoming soft or spongy. The following guide and TABLE III is intended to assist inspectors in evaluating the factor of character:

"Reasonably firm" onions are those which are moderately compact and yields slightly to pressure;

"Reasonably tender" onions are those which are moderately crisp but are sufficiently processed to be reasonably tender for eating;

"Fairly firm" onions are those which are lacking in compactness, possess some degree of solidity, yielding considerably to pressure, but are not soft or puffy;

"Fairly tender" onions are those lacking in crispness but which are not soft or spongy;

"Soft or spongy" are onions which are approaching disintegration, lacks firmness, or shows little original bulb conformation.

E. Proper Evaluation of the Grades.

After the inspector has properly applied the detailed requirements of the grade standards, it is necessary before certifying the grade of the product to assure himself or herself that the over-all appearance and eating quality of the product reflects the grade that the standards have intended. If the inspector feels the grade standards do not properly reflect the proper quality level they should consult their supervisor.

F. Summary of Score Sheet.

Before preparing the certificate, the score sheet should be carefully analyzed to see that the ratings and notations are in good order. Sign and date the score sheet.

V. CERTIFICATION

A. General Instructions.

instructions pertaining to certification of all processed food products are applicable to this product.

B. Special Instructions.

1. Count of onions.

Compliance with the recommended count of canned onions is determined by averaging the counts from all the containers which are representative of a specific lot; and such lot is considered as meeting the recommendations if the following criteria are met:

- (a) The average of the counts from all of the containers is within the range of the applicable recommended count;
- (b) The number of containers which fails to meet the range of such recommended count does not exceed the applicable acceptance number in the Rules and Regulations.
- (c) The count from each of the containers which fails such range is not outside such range by more than 10 percent or more than two onion bulbs, whichever is the greater.
- (d) When the samples in the lot meet this guide report only the average count on the certificate, without any reference to individual cans that fail to meet the recommended count.

Example 1:

Canned onions (small) - No. 303 glass (30 containers with counts of 26 to 29 inclusive; 6 containers 30 to 31; but average count of 28 is within tolerance for recommended range) show in body of certificate; Count - 28 (average).

When the samples in the lot do not meet this guide, report the actual counts found in the body of the certificate, separating those that don't meet the recommended count from those that meet the recommended count, and also show the average count, whether or not the average count meets the requirement. In this case, flag the grade statement with an appropriate statement such as - "See counts above."

V. **CERTIFICATION (Continuation)**

B. **Special Instructions. (continuation)**

Example 2:

Canned onions (small) - No. 303 cans (36 cans, average count o.k., but 4 cans exceed range by more than 10 percent, by count) show in body of certificate;

Count - 32 cans - range 15 to 18  
4 cans - range 11 to 13  
(Average all cans - 16)  
Recommended average count 15 to 29.

C. **Requests for Specific Certificate Information.**

Certain purchasers of this product have set up specific requirements in their purchase specifications, sometimes based on the United States Standards. For example, such purchase specifications might require a Grade A product and also a score of 28 points for uniformity of size and shape.

**Procedure.**

If specifically requested, show such special information in the body of the certificate as:

Uniformity of size and shape score - 28 to 30 points.

The grade statement may also show compliance (or noncompliance) with a specific purchase specification in the manner outlined in general instructions on the subject of certification.

VI. **INSPECTION DURING PACKING OPERATIONS**

A. **General.**

The inspection is conducted during packing operations as in continuous inspection or other types of in-plant inspection, inspectors are expected to be familiar with the entire operation. It is the inspector's responsibility to ascertain proper compliance with the requirements of sanitary operations as described in instructions on the subject and report any deviation from good sanitary practices to the supervisor which cannot be corrected by regular plant contacts.

**VI. INSPECTION DURING PACKING OPERATIONS (Continuation)**

**B. Operations. (continuation)**

The following are particular things and points to observe during the processing operations:

**1. Raw material.**

- (a) Observe the condition of the onions at the time they arrive at the plant.
- (b) The conditions under which the onions are held before processing should be noted.
- (c) Prevalence of defective onions;
  - (i) Presence of excessive amount of foreign material;
  - (ii) Presence of excessive dirt, sand, or silt;
  - (iii) Presence of rot, mold, and other decay;
  - (iv) Presence of sprouting onions.

**2. Preparation and Workmanship.**

- (a) Check effectiveness of washing process in removing dirt, silt, and loose material;
- (b) Check effectiveness of lye peeler in removing outer scales of onion bulbs;
- (c) Check adequacy of washing process following lye peeling;
- (d) Check presence of defects and the effectiveness of trimming of the onion bulbs;

The freedom from defects depends largely on the quality of the onions, the efficiency of the washing and trimming operations, and the care exercised on the final inspection belt.

- (e) Check effectiveness of sizing operations;
- (f) Check method of filling and sealing containers.

**VI. INSPECTION DURING PACKING OPERATIONS (Continuation)**

**B. Operations. (continuation)**

**3. Processing.**

The time and temperature of processing has a direct effect on the quality of the finished product and the procedure should be observed regularly. In this connection, however, make no recommendation unless it is obvious that the standards established by the management for these factors are not being maintained.

**C. Recommendations.**

When any abnormal or unsatisfactory condition is observed in either the sanitation, operation, or processing, it should be brought to the attention of the management through a proper, previously designated official. Written reports of unsatisfactory conditions should be made to the plant management whenever it appears necessary. Suggestions and carefully thought-out recommendations should be made for overcoming objectionable conditions and improving plant operations. The inspector should keep the supervisor informed and whenever serious problems arise, he should consult his supervisor for advice. The inspector must be alert, tactful, and diplomatic at all times. He must also keep in mind that he is assigned to render a helpful service and has no regulatory authority.

