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Fruit and Vegetable
Division

Processed Products
Branch

Grading Manual for Frozen French Fried Potatoes

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

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The following are superseded by these instructions:

1. Instructions for Inspection of Frozen French Fried Potatoes - June 1956, and all revised pages issued through December 1968.
2. A-385, April 6, 1965 - Visual Aids - Models for Shape of Potatoes.
3. A-401, July 1, 1966 - Revised Instructions.
4. A-403, August 1966 - USDA Color Standards - Second Edition.

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Pages 11, 12, 13, 13a, 13b, 14, 17, 18, 19, 20, 25, 26 Which were revised and/or reissued January 1972 contain clarifying material but do not establish new or revised substantive rules.

PRODUCTS COVERED BY THE U. S. STANDARDS FOR FROZEN FRENCH FRIED POTATOES

The principal products covered are the traditional "French Fries" potatoes cut into strips, partially deep fried and frozen. The standard also may be applied to any potato product, regardless of shape or composition which is similarly processed and frozen. This includes products fabricated primarily from mashed, crushed, cut, or shredded potatoes and which are pre-formed into units prior to frying and freezing.

Because of the difficulty of keeping oils in suitable condition, deep frying has not been popular with home cooks. With the discovery and development of frozen french fries, home consumption has increased rapidly. Institutional use also is increasing yearly.

Yearly production now far exceeds any other frozen vegetable.

Statistics of the National Association of Frozen Food Packers for 1967 shows a total production of frozen potato products in the United States at 1,406,809,000 pounds with regular "strip" french fries at 1,224,981,000 pounds.

Areas of Production

The white potato is the world's most important vegetable crop. It is grown to some extent in all agricultural areas in the United States. Certain types of potatoes particularly those of low solids content are not always suitable for manufacturing. Therefore, extensive production of frozen french fried potatoes is limited principally to those areas where the raw product is most suitable. They are in general the Idaho, Eastern Oregon, and Washington areas, the San Joaquin Valley of California, the State of Maine with some sizeable production in New Jersey, Eastern Pennsylvania, Michigan, and the Red River Valley of Minnesota.

Because of varietal differences and growing conditions potatoes from these widely separate areas have their own characteristics particularly with respect to flavor and mealiness. Very mealy french fries are produced principally from the Russett varieties in the Pacific Northwest. In other sections of the country the solids of the raw product are generally lower and the finished french fries have a slightly different flavor and are less mealy than those from the Northwest region. These regional differences have given rise to claims of superiority of the product based principally on the degree of mealiness. This is partially a matter of personal preference. Good quality french fries are produced in all the leading producing areas.

Varieties

There are several dozen recognized market varieties of potatoes grown in the United States and more are being developed each year. The Irish Cobbler is probably the most widely grown and the Katahdin is grown in the greatest volume. Among the more popular varieties are the Russet Burbank (Idaho), Cobbler, Katahdin, White Rose, Green Mountain, Bliss, Triumph (red), Russett Rural, Kennebec, Norgold, and Pontiac. Various varieties of potatoes have their own cooking qualities. Some are more popular for one quality than for another, that is, bakers, boilers, and fryers. The characteristics of the various varieties are not distinct and they are not always the same in all growing areas and all seasonal conditions. Therefore, no one variety or varieties is used entirely for the production of frozen french fried potatoes.

Receiving

Frozen french fries are usually produced fairly close to the source of supply but occasionally the raw product may be drawn from any of the principal potato producing areas of the country. At time of harvest most late varieties of potatoes have a total sugar content of less than one (1) percent of total solids. Such potatoes are usually suitable for manufacturing into frozen french fries. After the potatoes are stored for a period of time at 40° or less the starch content partially changes to sugar and the potatoes if used immediately out of storage may be unsatisfactory because of the high sugar content. Sugar in excess of two to three percent (based on dry potato weight) may render the potato practically worthless for deep frying. Such potatoes subjected to high temperatures develop black or brown areas, spots or streaks, due to caramelizing and burning of the sugar.

They also may have a burnt or sweet taste. Most potatoes can be "conditioned" by storing for a period of time, at least two weeks, at near 60 or 70 degrees temperature. In "conditioning" the potato starts to respire, a process which uses the sugar and converts a portion of it back to starch. If the potatoes have been subjected to excessive cold storage, that is down to 32 to 34 degrees or lower, trouble in conditioning may be encountered, such as tissue breakdown leading to rotting.

Determining the Quality and Condition of Raw Potatoes for Frying Purposes

Processors try to evaluate and classify the quality of the raw product prior to purchase or processing. Two of the most important characteristics that indicate quality are specific gravity, closely associated with moisture content, and the degree to which starch has been converted to sugar. These will affect the texture and the color of the product. The size and shape of the potatoes is also important because of the cost of operations, the yield, the length of the units, and the number of slivers and irregular-shaped pieces. The presence of off-odors and off-flavors such as those caused by some insecticides is at times very serious.

Determining the Quality and Condition of Raw Potatoes for Frying Purposes - continuation

No entirely satisfactory method seems to have been developed to pre-determine the cooking quality of potatoes. Specific gravity tests, which to some extent indicate the degree of mealiness, are sometimes made. Picric acid color tests may also be made. These indicate to some extent the relative amount of sugars present. The objectionable flavor of benzene hexachloride -- an insecticide -- can be detected by boiling and mashing a sample of the potatoes.

Probably the most satisfactory method of determining the quality of the raw product is to subject a representative sample of the lot to a cooking test similar to the process which will be used in manufacture. The Department of Agriculture in cooperation with the State of Maine and certain potato processors have developed a series of color photographs which show various degrees of darkening after a standard fry. Comparison of actual samples of cooked potato to the photographs provides a fairly accurate means of evaluating the quality of a load of potatoes for the purpose of making french fries. Some large users base their raw potato contracts on the fry colors shown in the USDA Color Standards for Frozen French Fried Potatoes.

MANUFACTURE

Each processor of frozen french fried potatoes has his own particular methods of manufacture. However, there are a number of things common to all processors. The following outline describes the principal steps in manufacture. These steps may vary with different manufacturers. The principles given here are basic.

After receiving potatoes or having withdrawn them from storage bins or "conditioning" cellars frying and/or suitable chemical tests are made from representative samples of the lot to determine whether potatoes are in condition to be processed.

Washing

If potatoes are in condition suitable for processing they are washed and may be run through hot water to remove some of the dirt and to loosen the peel. The potatoes may then be sized prior to peeling. Some plants flume the potatoes from place of storage to the peelers thus accomplishing the preliminary washing in this manner.

Manufacture - continuation

Peeling

After washing off excessive dirt the potatoes are dropped into peeling machines. These may be steam, lye, abrasive or roller type peelers. The steam and lye peelers give a quick cook which loosens the skin or peel but does not penetrate deeply into the potatoes. The peelings are then removed by passing the potatoes through rubber rollers and water sprays. In abrasive, roller type peelers the skin or peel is removed without the addition of heat.

Trimming

The potatoes after leaving the peeling machines are trimmed on wide moving belts. In the better plants these belts are arranged in sections so that each potato is picked up by an operator, examined for defects, trimmed if necessary, and tossed over a barrier onto another section of the belt. This procedure is much more satisfactory than trying to stir the potatoes on a single belt because many potatoes may miss any examination at all on the single belt. At this time the potatoes may also be sorted for size; the larger ones going to institutional lines; the smaller ones into the retail and by-product lines.

In some plants electric eye sorters are installed after the slicing operation to eliminate blemished units, thus cutting down on the amount of hand sorting and trimming of the whole potatoes.

Slicing

After the potatoes are trimmed and sorted to size they go to the slicing machines. These slicers usually consist of two set of knives either rotary or fixed. One set of knives slices the potato to the desired thickness. The potato slices are then passed through another set of knives, which cut the slices to strips if desired. The size of the strips depends on the wishes of the management. It may vary from one quarter by one quarter inch to one half by one half inch in cross-section. The usual size for retail sales is 3/8 by 3/8 inch. Poor slicing may be caused by small or irregular-shaped potatoes, by poor machinery, or good machinery not properly used or adjusted. The knives may be straight or corrugated.

Manufacture - continuation

Sizing

In the process of cutting potatoes into strips, there is always a certain amount of slivers and otherwise irregular shaped pieces. A certain number of these more or less irregular shaped pieces are expected in this product and are allowed for in the tolerances contained in the grade standards. It is usually necessary, however, to pass the cut potatoes over some type of shaker screen to remove a portion of the small pieces and slivers. The amount of chip material removed depends to some extent on the wishes of the purchaser. Processors do not like to remove any more than they have to because of the loss in yield.

By-Products

The excessive loss of potato material because of the peeling, trimming and screening operations causes processors to consider by-products to utilize this material. Often this material is wasted; however, a large number of products, such as patties, puffs, shreds, diced, and mashed have been developed to utilize this material. Dehydrated flakes is also an important use. Where satisfactory use is made of screenings and sound throw-outs, there is less tendency to keep this material in the frozen french fry pack.

Desugaring

Sugar in excessive amounts or irregular quantities of sugar between units may cause french fried potatoes to have dark or irregular color, poor texture and/or unpleasant taste. Proper harvesting, good storage and conditioning after storage helps in the control of the sugars. However, conditioning and storing potatoes is an expensive process and is avoided whenever possible. Reasonably satisfactory methods of rapid equalization of sugar content has been developed. The methods used vary between manufacturers. However, the basic principle is to run the sliced potatoes through a water bath leaching out a portion of the surface sugar and then replacing the sugar to the desired level by blanching in a sugar solution (partially cooking the product) so that upon frying the color between units will be uniform. This method, based on a patented process, evens the surface sugar content between units. The sugar content of the whole slice is not greatly affected.

Manufacture - continuation

Blanching

The sliced potatoes are usually run through a hot water blanch which partially cooks the product. This may or may not be a part of a desugaring process referred to previously. After blanching the product may pass beneath heating units, under forced draft, which tends to remove most of the excessive moisture before entering the fryer.

Frying

Frying of the potatoes is usually a continuous process. The potatoes enter the hot oil on or under a draper-chain type belt traveling a certain distance and being removed, or by an undulating type belt moving the potatoes in and out of the oil; the oil flow carrying the potatoes along from one end of the fryer to the other. Some manufacturers use a double fry. That is, after the first fry, approximately 350 to 370 degrees Fahrenheit, the potatoes fall onto another belt and enter another fryer at about the same temperature. There are several reasons for this; the principle one being that there is more even coloring because of the stirring of the potatoes as they fall from one belt to another.

Fat or Oil

The term "fat" refers to a product that is plastic at room temperature such as lard or the usual vegetable shortenings. Oils are liquid at ordinary temperatures. The terms are here used to mean the same thing. Any animal or vegetable fat or oil which does not impart an unpleasant flavor to the french fries is suitable for the purpose. Different processors use different oils. However peanut oil, cotton-seed oil, or mixtures of vegetable oils including some amount of soybean oil are also used. Lard, which is hog fat imparts a flavor to the french fries that is particularly desirable to some people. Soybean oil in large amounts may impart a flavor that is usually disliked. Hydrogenated lard is tasteless.

Manufacture - continuation

Fat or Oil - continuation

One of the biggest difficulties in proper frying is to maintain the fat or oil in good condition. Fats and oils deteriorate rapidly with the addition of water under high temperature, also when in contact with bronze or brass fittings. When the frying oil deteriorates it darkens in color, develops unpleasant odors which are imparted to the product. Dark bits of burnt carbon may be deposited on the french fries giving them an unpleasant appearance. Quality control people often use the amount of free fatty acid present in the oil as an indication of degree of deterioration. A range in the area of 0.4 to 1.0 percent is regarded as normal.

Potatoes lose up to 30 to 40% of their weight, principally water during frying. Water is removed from the oil by a partial vacuum created by the upward draft in the hood and attaching stack covering the frying vat. Condensation from the hood is carried away by troughs along the edge of the hood. The tendency to deteriorate may be checked by eliminating bronze or brass fitting, adjusting size of fryer to volume of potatoes, using oil that will stand the highest temperature in the system, and by adding new oil from time to time.

In the better processing methods the amount of oil used is very small and is usually heated by super-heated steam in a heat exchanger rather than by direct flame. This keeps the oil in all parts of the system well below the scorching point. Usually the oil is filtered continually to remove charred materials and is thus kept clean.

Time and Temperature

There are many variants to be considered in determining the time and temperature of the fry. Potatoes of high specific gravity require less time to lose their excess moisture than those of low specific gravity. Different varieties of potatoes and potatoes in different conditions with respect to reducing sugars may require different cooks to attain a uniform degree of color. Certain markets seem to want potatoes fried much lighter in color than do other markets. French fries packed for institutional use, where an additional fry is to be given by the users, are usually fried to a much lighter color than are retail packs where the cooking is usually completed by the oven method. These light colored fries are usually designated as "oil-blanching" or "par-fried".

Manufacture - continuation

Time and Temperature - continuation

Probably the most satisfactory means of arriving at the correct time and temperature for frying is to actually fry representative sample batches of each new load. If samples come out too dark either the time or the temperature, or both, of the cook may be reduced; if too light they may be increased. In most plants quality control people watch the color of the fries as they leave the fryer, both for overall color and for uniformity of color and recommend suitable adjustments of the process. These recommendations may be based on experience or on actual color plates or models which are provided as guides for the operators. The USDA color standards may be used for this purpose.

Immediately after coming from the fryer heat may be applied to drive off excess surface oil. In many plants the potatoes are cooled quickly after the fry by a blast of air. This air blast may be designed to blow off the outer oil which clings to the hot potatoes.

Packaging

Packaging is usually accomplished by automatic machinery which places the proper amount of the french fries into each package. The packages are usually weighed individually and adjusted for exact weight. This packaging operation may take place before freezing or, if belt freezing is used, after the potatoes emerge from the freezer. The resulting end product of the belt freezing method is easier to handle because the units separate easily where as the plate frozen product may emerge as one solid unit. Broken units are more common when the product is belt frozen.

INSPECTION DURING PACKING OPERATIONS

The basic principles of in-plant inspection outlined in pertinent instructions on this subject apply in general to inspection during manufacture. Processing operations as outlined in these instructions and as observed in the plant will suggest observation to be made and the best points to make them.

Good sanitation, particularly with respect to conveyors, belts, cutting machines and machinery that comes in contact with cut potatoes is particularly important because yeasts, molds, and bacteria thrive in a potato-water medium and odors develop quickly. Also, there may be a build-up of oil or grease between fryer and packaging lines.

Samples checked for color at the discharge end of the fryers will indicate whether the potatoes are in proper condition for frying. Samples taken over the last shaker and just prior to packaging can be checked for defects (including defectives per pound). Cooking tests should be made as soon as practical after freezing in order to develop all the information necessary for the Daily Inspection Report.

INSPECTING THE PRODUCT

Sample Unit Size

Any change in sample unit sizes from those specified in the standards changes the probability of the lot of passing or failing the intended grade. The size of the sample unit used is, therefore, very important. The sizes are:

In Retail Type - 16 ounces of product selected either from a production line or from one or more market packages.

In Institutional Type -- 32 ounces of product selected either from a production line or from one market package.

CAUTION: Make every effort to obtain a representative sample. French fries, particularly strip styles, tend to stratify themselves with vibration. Therefore, try to take from the full depth on the belt or package rather than from the top. Often a "sweep" across the entire width of a belt would be better than from just one spot.

Initial Fry Color, Types, Styles, and Length Designations

These items provide much needed standardized language for trading since these terms - previously widely used - were subject to much individual interpretation. Accurate identification of the **fry color, type, style, and length designation** is very important. They should be reported on all certificates.

Color changes caused by frying require special consideration. Keep in mind the following definitions:

Fry Color refers to the color change which occurs in the potato units solely because of the **initial** frying or oil blanch process.

Fry Color of the Individual Units is ascertained by comparing them with the USDA Color Standards for Frozen French Fried Potatoes. The range of color includes the "color space" up to but not including, the next darkest color.

Fry Color of the Sample Unit is the range of colors that occur in the frozen product before any additional heating.

Fry Color Designation of a Sample Unit is the fry color designation appropriate to the ranges specified in Section 52.2392 of the Standards.

The USDA Color Standards referenced are a series of colors which depict changes that occur solely because of the frying process. They are numbers 0, 1, 2, 3, and 4.

These designations are further amplified as follows:

USDA No. 0 in the color standards has no browning caused by frying. The background colors of all these illustrations is yellow. Background colors of potato strips are usually basically white. They may be creamy-white, yellow-white, or any other characteristic color.

USDA Color	Optional Fry Color Designation	Application to a Sample Unit
No. 0	"Extra Light"	A sample unit may be designated "Extra Light" if almost all of the units have no fry color at the edges as in USDA No. 0.
No. 1	"Light"	A sample unit may be designated "Light" if most of the potato units are lighter than USDA Color No. 2.
No. 2	"Medium Light"	A sample unit may be designated "Medium Light" if most of the potato units are lighter than USDA Color No. 3 but may include Color No. 1.
No. 3	"Medium"	A sample unit may be designated "Medium" if most of the potato units are darker than USDA Color No. 2 and may further range in color as dark as Color No. 4.
No. 4	"Dark"	A sample unit may be designated "Dark" if most of the potato units are darker than USDA Color No. 3. This designation may contain units similar to No. 4, and darker. Sample units designated No. 4 "dark" fry color are not allowed in Grade A.

"Re-fry color" means the actual color of a potato unit after heating - either deep frying or in an oven.

"Re-fry color of the sample unit" is the range of colors that are present after heating in preparation for grading.

"Re-fry color designation" is the color designation which may be given to the sample unit after heating. The appropriate criterion for this designation is given in **Re-fry or (after heating) Color Range Guide** in this handbook.

Frozen French
Fried Potatoes
January 1972

(Reserved For Future Developments)

Fry Color, Types, Styles, and Length Designations - continuation

Types

Many plants pack primarily for retail and others primarily for the institutional market. Some pack an identical product for both types. For retail, however, the fry process usually has progressed to the extent that there is some color change and sufficient oil is retained that french fried potatoes of characteristic texture may be prepared by heating the product in an oven. For institutional use the units are usually processed very lightly, resulting in little color change and often not enough oil retention for proper preparation in an oven. This is often referred to as oil blanched or par fried.

The determination of type is based on intended use. You must make this determination on the information available to you.

Guidelines for this decision are as follows:

- (1) Small packages (5 pounds or less) which are labeled or marked as is customary or required for retail sales, and particularly those bearing official USDA marks, are considered to be "retail type". Five-pound packages which are so marked, however, **may** be considered to be institutional type if declared by the applicant to be intended for such use.
- (2) Packages of any size which are not labeled or marked as is customary or required for retail sales and display are considered to be "institutional type" unless specifically declared to be retail by the applicant for inspection.
- (3) If the product is unpackaged, as on belts or in tote bins, or if the packaging does not indicate the intended use, it is considered to be "retail type" and the retail type defective allowances apply. Such a lot, however, may be considered to be "institutional type" if so requested by the applicant.

An applicant's wishes concerning classification as to type should be considered. They should be honored if not in conflict with these instructions and if believed to be consistent with the intent of the standards - "intended use". If there is a question about the "intended use", and there is a difference in grade, assign the grade under both types as

U.S. Grade A - Institutional Type
U.S. Grade B - Retail Type

Fry Color, Types, Styles, and Length Designations - continuation

Styles

Strips. This style should be designated as either:

Straight cut, or
Straight cut-shoestring, or
Crinkle cut.

The cross-sectional dimensions of the strips are also important to the buyer. Because of the nature of the product these are not very uniform. Designate the cross-sections, therefore, as "approximate" and to 1/8 inches - as: approximately 5/8 x 5/8 inch, or 5/8 x 3/4 inch, etc. The cross-sectional dimension of crinkle cut strips are normally measured from "hill" to "valley".



Slices, Dices, Rissolé, Other -- See U.S. Standards

Length Designations (Applies only to strips). Length in french fries is closely related to quality and value for many purposes. "Extra long", for example is usually considered a "premium" pack for institutional use. It is seldom packed for retail since it presents difficulties in packaging in retail size containers, and often requires sizing of the uncut potatoes. "Long" is packed in both retail and institutional type and is often considered a "premium" pack for retail. "Medium" is the usual retail size.

With the exception of "Short" lengths which are specifically excluded from U.S. Grade A, the length of units is not considered to be a factor of quality under the U.S. standards. "Short" lengths may, however, be designated "U.S. Grade A Short" if the strips meet the other requirements of U.S. Grade A.

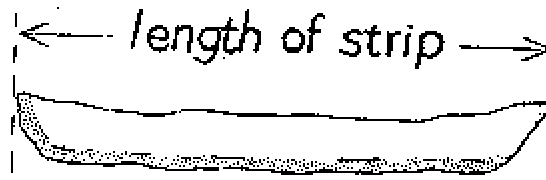
The lengths designated in the standards are intended to provide workable and much needed definitions for terms which are regularly used in trading.

Determining the length. The length designation may be determined readily by isolating the strips that are 3 inches in length or longer and those that are less than 2 inches in length. The percentages "2 inches in length or longer" and "3 inches in length or longer" may be readily calculated. Chips, slivers, pieces, and strips which are less than 1/2 inch in length are not considered in the total count.

Fry Color, Types, Styles, and Length Designations - continuation

See File Code 130-A-75 for description and scale drawing of the Vegetable Strip Sizer, a very effective device for sizing the strips.

The overall length is measured as indicated in this drawing:



Length Designation of a Lot -- See Standards

The application of the criterion for length designation of a lot presupposes the accurate classification of each sample unit for its length designation. It may well be, however, that when there is very little variation in lengths between sample units an experienced inspector could make the determination without "breaking down" each sample unit. The responsibility for this decision rests with the inspector.

Minimum Equipment for Inspecting Frozen French Fried Potatoes

- (1) Grading scale.
- (2) Large flat trays.
- (3) Ruler. (Size and length grading plate.)
- (4) Percentage calculator.
- (5) Authorized visual USDA Color Standards for Frozen French Fried Potatoes.
- (6) Vegetable Strip Sizer.
- (7) Oven of suitable type, or deep frying equipment.

Preparation of Sample

The factors of color and defects are partially evaluated before the product is heated. Often when a package is opened there is a film of frost on the units which masks the color or if storage conditions have not been good there may be a crust of ice or a heavy coating of ice crystals. If there is any appreciable condition of frost, ice crystals, or icing in the sample, thaw until the condition disappears to the extent that the color may be properly evaluated. Icing is usually not serious; however, the thawing of the sample in the oven may add enough moisture to the potatoes so that they are soggy when cooked, also cause an explosion when put into hot frying oil (See Texture).

The sample should be examined for color designation using the USDA Color Standards as a guide, as discussed under color.

QUALITY EVALUATION

Grade Factors Which Are Not Scored

Flavor

The flavor of french fried potatoes is affected by the conditions of the potatoes with respect to sugar or sunburn, the condition of the fat or oil used, and, to a certain extent, by the variety of the potatoes, the type of soil, and climatic conditions; whether or not certain insecticides have been applied to the growing potatoes.

Good flavor is required in Grades A and A Short and at least **reasonably good flavor** in Grade B. Sweetness, bitterness, rancidity of oil and pronounced scorched or caramelized flavor and odors are the usual reasons for lowering the evaluation of flavor from "good" to only "reasonably good". Any definitely objectionable flavors or odors would be cause for lowering the grade of the product to Substandard.

After the product has been heated in a suitable manner, **taste and smell it and classify its flavor as "good", "reasonably good", or "poor"**.

Quality Evaluation - continuation

Grade Factors which are not scored -- continuation

Color Designation of a Sample Unit

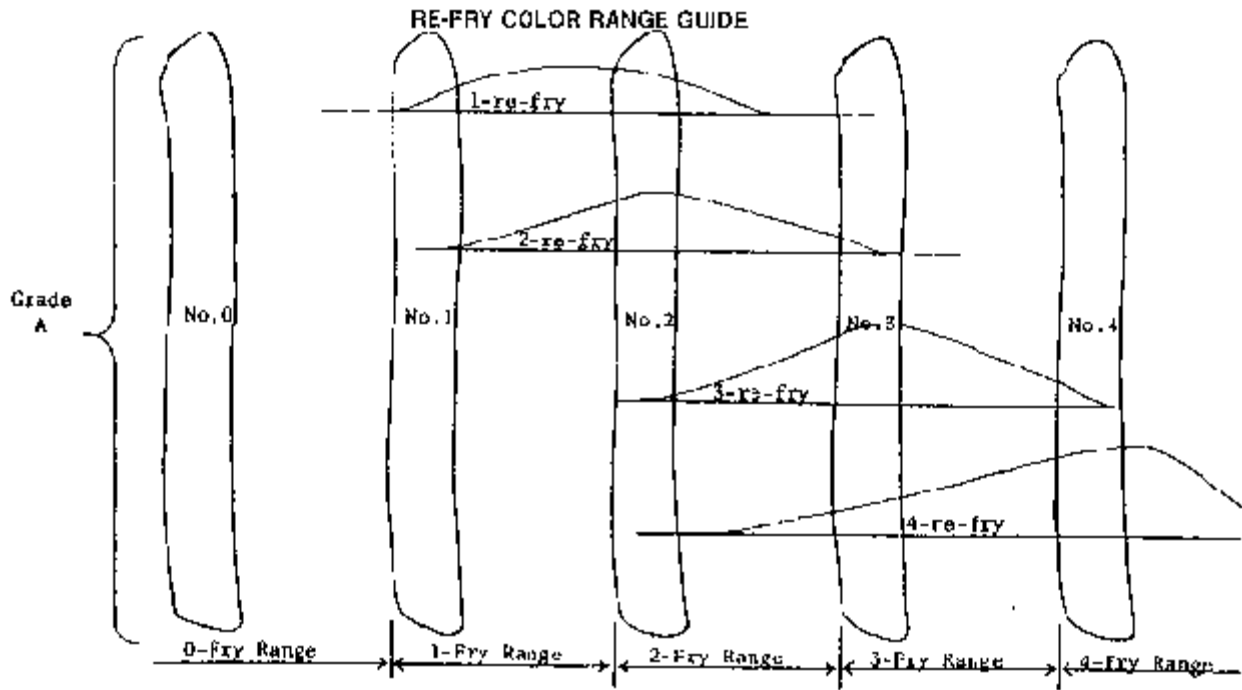
The exact color of good quality potatoes varies considerably because of varietal differences, physical differences, types of fat used, areas of production, and other causes. It also varies because of the amount of color change induced by the frying process. These values are important to buyers because certain markets and certain important customers have strong preferences as to the lightness or darkness of the brown coloring.

Two separate and distinct color determinations are required:

- (1) Classifying the "fry color of the sample unit" as to its value (that is, its lightness or darkness) in order to establish the proper fry color designations; and
- (2) Evaluation and assigning the score points for color in compliance with the standards, giving consideration to color changes in the re-fried product.

Make the following determinations **after** re-frying.

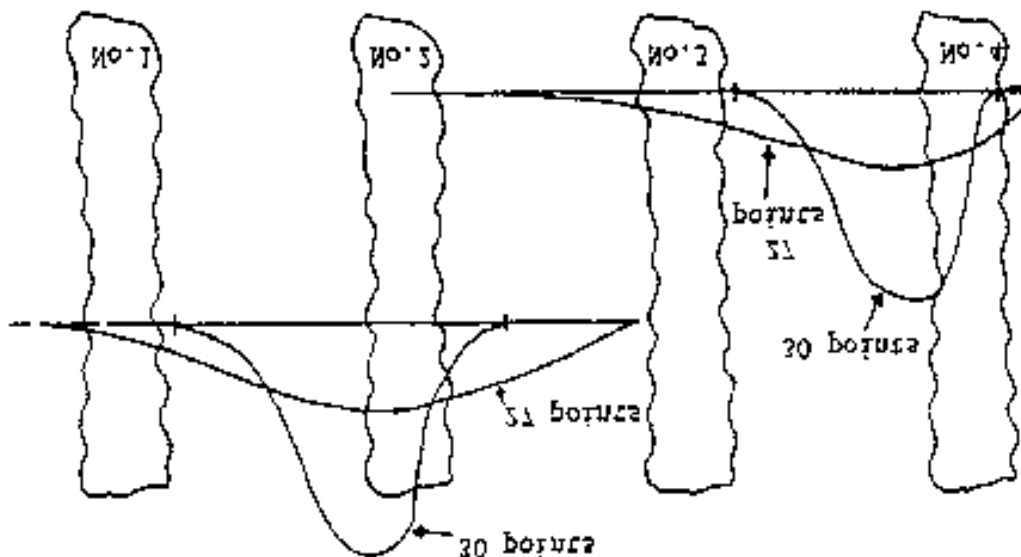
To fall in the Grade A category after heating, the re-fry color of the units conform substantially to the uniformity indicated for #1 re-fry, #2 re-fry, #3 re-fry or #4 re-fry as indicated in the following diagram: Providing that the overall range does not materially detract from the appearance of the product. Mottling: Mottling is permitted providing it does not exceed the intensity or range of the color defined under re-fry #1, #2, #3 & 4 or seriously detract from the overall appearance of the sample unit.



For example, #1 re-fry would include color variations from #1 color to #3 color on the standards - with a very limited number of units of less than color #1 or more than color #3. Adjust the score point if appropriate according to the variation found on the re-fry product, giving the higher score points to the most uniformly colored product.

The following example illustrates a bell shape frequency distribution curve, the distribution of the color present. As the re-fry units become more closely grouped into a single or dominant color, you would assign a higher score, taking into account the overall excellence or uniformity of color.

Grade Classification and Score



Grade Classification and Score

Example: Scoring Guide (Re-fry or after heating).

Grade A, Good Color - 27 to 30 points.

This color is bright and typical of the product and meets the uniformity of **fry color** given for:

- No. 0 - Extra Light
- No. 1 - Light
- No. 2 - Medium Light **or**
- No. 3 - Medium

and meets the uniformity of **re-fry** color given in the Re-Fry Color Range Guide.

Grade B Reasonably Good Color - 24 to 26 points - (Limiting Rule)

This color must be characteristic of french fried potatoes -- not dull or off color. It may exceed the fry color variation given for any of the USDA colors -- including No. 4 - dark. After heating, the variation in the re-fry color may exceed those indicated in the guide but may not **seriously** detract from the appearance of the product.

Substandard - 0 to 23 points (Limiting Rule)

Lots that darken quickly -- before the interiors are cooked, or very irregular would fall into this classification.

Uniformity of Size and Symmetry

Uniformity of length of normal shaped strips is not considered under this factor. Consideration is given to the effect of any "chips" - as defined - on the appearance of the product and the percent by count of "small pieces", "slivers", and/or "irregular pieces". In assigning score points be guided by the following:

GRADE A

20 points - almost no chips and/or:

Strips - no more than 5 percent of small pieces, slivers, and/or irregular pieces.

Other styles - almost perfect uniformity in size and shape of the units.

18 points - chips present but not to materially detract from appearance and/or;

Strips - more than 5 percent to 15 percent of small pieces, slivers, and/or irregular pieces.

Other styles - high degree of uniformity in the size and shape of the units.

19 points - by interpolation.

GRADE B

17 points - chips present materially detract and/or:

Strips - more than 15 percent to 20 percent small pieces, slivers, and/or irregular pieces.

Other styles -- reasonably uniform in size and shape.

16 points - chips present that approach serious appearance, and/or:

Strips - more than 20 percent to 30 percent small pieces, slivers, and/or irregular pieces.

Other styles - variation in the size and shape of the units detracts noticeably from the appearance of the product.

Defects

Defects are carefully defined in the standards as:

Insignificant imperfections, minor defects, and major defects.

Defectives are potato units affected with defects - as defined in the standards as "minor defective" or "major defective". It is **defectives** rather than **defects** which are scored against.

Considerations

For each grade three separate types of deficiencies are considered under this factor. While the principal consideration is major and minor defectives, all three must be considered in assigning the scores for the sample units. They are:

- (1) the total effect of **all** faults which might be present whether specifically mentioned. This is the "overall clause". Among such are extraneous materials, insignificant imperfections and carbon specks or defects (as defined), and obnoxious blemishes which are much worse in appearance than usual major defect;
- (2) the effect of any carbon specks on the appearance of the product; and
- (3) the allowances for minor and major defectives as specified in Table I and II of the standards.

Defect Tables in the Standards

Defectives allowed in these tables are not averages. Sample units that fail the applicable requirement are allowable in the sample only as regular deviants.

Assigning the Score for Defects

Procedure.

- (1) Segregate the minor and major defectives in the sample unit and record them on the score sheet as (1) total (major and minor) and (2) major.
- (2) Assign a tentative score for defects as indicated by the following guide.
- (3) Adjust the score point if appropriate by giving consideration to the "overall clause" and the effect of any carbon specks present. This becomes the defect score for the sample unit.

Guide for assigning tentative score for defects -- subject to adjustment for "overall clause" and for carbon specks.

Table I of Standards - All Styles Except Shoe Strings and Dices

RETAIL TYPE

Grade	Point	Defective	Possible Combinations of Defectives		
A	20	Total	0 - 3		
		Major	0		
	19	Total	4 - 5	1 - 3	
		Major	0	1	
	18	Total	4 - 5		
		Major	1		
B	17	Total	6 - 9	6 - 9	2 - 5
		Major	0	1	2
	16	Total	6 - 9		
		Major	2		

INSTITUTIONAL TYPE

Grade	Point	Defective	Possible Combinations of Defectives			
A	20	Total	0 - 6	1 - 4		
		Major	0	1		
	19	Total	7 - 18	5 - 18	2 - 12	3 - 8
		Major	0	1	2	3
	18	Total	13 - 18	9 - 18	4 - 18	
		Major	2	3	4	
B	17	Total	19 - 28	5 - 23	6 - 18	
		Major	0 - 4	5	6	
	16	Total	24 - 28	19 - 28	7 - 28	
		Major	5	6	7-8	

Table II of Standards - Shoestring, Strips, and Dices

RETAIL TYPE

Grade	Point	Defective	Possible Combinations of Defectives		
A	20	Total	0 - 5	1 - 2	
		Major	0	1	
	19	Total	6 - 9	3 - 5	2 - 5
		Major	0	1	2
	18	Total	6 - 9	6 - 9	
		Major	2	1	
B	17	Total	10 - 18	3 - 15	4 - 8
		Major	0 - 2	3	4
	16	Total	16 - 18	9 - 18	5 - 18
		Major	3	4	5

INSTITUTIONAL TYPE

Grade	Point	Defective	Possible Combinations of Defectives			
A	20	Total	0 - 10	1 - 8		
		Major	0	1 - 2		
	19	Total	11 - 28	9 - 28	3 - 21	5 - 18
		Major	0	1 - 2	3 - 4	5 - 6
	18	Total	22 - 28	19 - 28	7 - 28	
		Major	3 - 4	5 - 6	7 - 8	
B	17	Total	29 - 36	9 - 30		
		Major	0 - 8	9 - 10		
	16	Total	31 - 36	11 - 36		
		Major	9 - 12	11 - 12		

Footnote to Tables - Groups are inclusive i.e - $\frac{3 - 5}{1}$ means $\frac{3}{1} \frac{4}{1}$ or $\frac{5}{1}$ **Total**
Major

Texture

Texture is evaluated within three minutes after heating the product as specified, and while it is well above room temperature.

Heating the Product

Oven Method. The method of reheating specified in the standards is similar to that employed by the housewife. The crumpled foil is placed in the bottom of the pan in order to prevent excessive burning of the potatoes where they touch the metal pan. Fifteen minutes at 400 degrees is a minimum for most potatoes. The time depends on the size of the units, the sugar content, and the type of oven -- whether gas or electric -- the number of samples in the oven, and how well it is ventilated. Trial runs are usually necessary to determine the proper time to cook any lot of potatoes in the available equipment. Potatoes are properly cooked when the interior of the largest units has lost the raw potato taste. This method should be used when it is obvious that the product is intended for home use and cooking directions call for the oven method. Exceptions may be made when test runs have shown that the "deep fat" method gives results comparable to the oven method on the particular potatoes.

Deep Fat Method. Frozen french fried potatoes prepared for institutional use usually have a lighter fry color than those prepared for the retail trade. This is because the institutions using these potatoes will give them a short fry in oil. This additional fry can be adjusted in time and temperature so that the finished french fries will have the desired color. This desired color may be light or fairly dark depending upon the preference of the cooks. Also the directions on some retail packages provide for an additional cook in hot oil rather than an oven cook. For this reason provision is made in the United States standards for heating the product by any other method which will give comparable results.

Deep fat frying is probably preferred for inspection use because of the speed with which the samples can be run. It should always be used where the product is light in color and/or obviously intended for institutional use. Where large numbers of samples are to be inspected a deep fat fryer of the type marketed for household use and provided with an automatic heat control is very useful. If only an occasional sample is to be inspected equally good results may be obtained by using a small stew pan with a wire dipper. With this equipment it is necessary to have an immersion thermometer capable of registering up to 600 degrees Fahrenheit. Also, new automatic frying pans can be obtained with heat control units.

Texture - continuation

Heating the Product - continuation

Deep Fat Method - continuation

Heat at least 100 units to determine the score for character. The temperature of the oil is **very important**. The temperature must be high during the entire re-fry time or the results will be in error. 100 units in a very large tank such as may be available in-plant inspection would not lower the temperature significantly. With a quart or pint of oil only a few units can be fried at a time without lowering the oil temperature.

Good texture varies somewhat with the varieties used and the area of production. It may vary from a somewhat **cheese-like, very fine grained** texture to a **coarse-grained** almost **powdery** texture.

Usual variations from acceptable texture are:

Sogginess. As the name implies this refers to a wet pasty or mushy condition either loaded with water or oil. It may be a basic characteristic of the potatoes or it may be induced by frying at too low a temperature. Often only a portion of the potato becomes soggy. Both the amount of the unit affected and the degree of sogginess must be considered in estimating the effect on texture. Score the unit only if **50%** of its length (or less if very objectionable) is so affected.

Hardness. Interior portions that are very firm, sometimes oily to touch and raw in taste even if well cooked. Often - as with sogginess - only a portion of a strip or slice is hard. Score such units only if 50% (or less if very objectionable) of its length is so affected.

Pull away. Interior portion of a strip that has withdrawn from the outer shell voiding 1/3 of the cross sectional area of a regular strip or 2/3 of the cross section of a shoestring.

Crisp outer surface. Really crisp outer surfaces is a texture fault in any grade. A **slight crispness** is expected in Grade A and the surfaces may be **slightly hard** or **slightly tough** in Grade B. Keep in mind that excessive cooking will increase the crispness of the outer surfaces.

Texture - continuation

Sugary ends. A unit that has a dark and often soft rubbery end, caused by excess sugar.

Excessive oiliness. For reasons which are not always explainable an unusual amount of oil is sometimes retained by the fries. It is very objectionable to buyers as it affects the texture adversely. Excessive oiliness can often be detected by the feel of the units prior to the heating. If excessive oiliness does not disappear with normal preparation, lower the texture score to reflect this condition.

Score Points. The exact score points to assign requires careful preparation of the sample. Consider all the factors affecting texture and assign scores as indicated in the following guide:

Scoring Procedure: Heat 100 strips to determine the Texture Score. The number of points deducted from a possible 30 points will depend on the overall excellence of the sample. Consideration must also be given for those units in a sample that have a soggy or hard texture, or show pull away, or have excessively oily outer surfaces. Sugary ends not serious enough to be considered defects would fall into this category. The sample shall be practically free of such units to score in the Grade A range. Percentages ranging from 0% to 10% by count depending on the seriousness of the defective units, are acceptable in this grade.

Prepared french fried potatoes that are scored 24 to 26 points for texture must be reasonably free from soggy or hard texture, pull away, or sugary ends, or those which do not have a crisp outer surface.

Score 26 points if there are 11 to 15% by count of these scorable units or if the units with slightly soggy or hard interior portions, or soft or slightly hard exterior surfaces materially affect the overall appearance or eating quality of the product.

Score 25 points if there are 16 to 20% by count of the scoreable units and 24 points if there are 21 to 25% by count.

CERTIFICATION

SPECIAL INSTRUCTIONS

Be certain to include the following basic identifying information on all certificates.

Fry Color Classification

Example - Fry Color - "Light (or "Medium Light" or "Dark", or "Extra Light.")

Since a sample unit represents a larger amount of product produced at the same time, show the number of sample units of each fry color if there is any substantial difference between them, as:

Example - Fry Color 12 samples "Light"
2 samples "Medium"

Type

Indicate the type as Retail (or institutional).

Style

Indicate the style as given in the standards as:

Example - Style - Crinkle Cut Strips (approx. 3/8 x 3/8 inch) OR

Example - Rod-like puffs about 1/2 inch in diameter by 2 inches long.

Length Designations

If the sample units meet the criteria for a single length designation as given in the standards, show the length designation as:

Example - Length designation - "Long"

If the criteria for one length designation is exceeded show the number of sample units of each-length designations in the sample as:

Example - Length designation 5 samples "Extra Long"
4 samples "Long"

Requests for Specific Certificate Information

Buyers often 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 minimum score of 28 points for color.

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

Color Score - 28 to 30 points.

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