



**United States
Department of
Agriculture**

**Agricultural
Marketing
Service**

**Fruit and
Vegetable
Division**

**Processed
Products
Branch**

United States Standards for Grades of Refiners' Sirup

Effective date June 15, 1957

This is the first issue, as amended, of the United States Standards for Grades of Refiners' Sirup published in the **FEDERAL REGISTER** of June 15, 1967. This issue supersedes the first issue, which has been in effect since January 5, 1952.

Voluntary U.S. grade standards are issued under the authority of the Agricultural Marketing Act of 1946, which provides for the development of official U.S. grades to designate different levels of quality. These grade standards are available for use by producers, suppliers, buyers, and consumers. As in the case of other standards for grades of processed fruits and vegetables, these standards are designed to facilitate orderly marketing by providing a convenient basis for buying and selling, for establishing quality control programs, and for determining loan values.

The standards also serve as a basis for the inspection and grading of commodities by the Federal inspection service, the only activity authorized to approve the designation of U.S. grades as referenced in the standards, as provided under the Agricultural Marketing Act of 1946. This service, available as on-line (in-plant) or lot inspection and grading of all processed fruit and vegetable products, is offered to interested parties, upon application, on a fee-for-service basis. The verification of some specific recommendations, requirements, or tolerances contained in the standards can be accomplished only by the use of on-line inspection procedures. In all instances, a grade can be assigned based on final product factors or characteristics.

In addition to the U.S. grade standards, grading manuals or instructions for inspection of several processed fruits and vegetables are available upon request for a nominal fee. These manuals or instructions contain detailed interpretations of the grade standards and provide step-by-step procedures for grading the product.

Grade standards are issued by the Department after careful consideration of all data and views submitted, and the Department welcomes suggestions which might aid in improving the standards in future revisions. Comments may be submitted to, and copies of standards and grading manuals obtained from:

Chief, Processed Products Branch
Fruit and Vegetable Division, AMS
U.S. Department of Agriculture
P.O. Box 96456, Rm. 0709, So. Bldg.
Washington, D.C. 20090-6456

United States Standards for Grades of Refiners' Sirup

Section	Page No.
§52.6041	Definition. 2
§52.6042	Grades for refiners' sirup. 2
§52.6043	Grade specifications. 2
§52.6044	Quantitative determination of factors. 8
§52.6045	Preparation of basic solutions and RS color standards. 8
§52.6046	Use of RS color standards in determining color factor. 10

Authority: Agricultural Marketing Act of 1946, Secs. 203, 205, 60 Stat. 1087, as amended, 1090, as amended (7 U.S.C. 1622, 1624).

Note: Compliance with the provisions of these standards shall not excuse failure to comply with the provisions of the Federal Food, Drug, and Cosmetic Act, or with applicable State laws and regulations.

§52.6041 Definition.

Refiners' sirup means a liquid product obtained from the refining of cane or beet sugar. The total soluble nonsugar solids content of refiners' sirup exceeds 6 percent of the total soluble solids. All of the sirup constituents have been subjected to the processes of clarification and decolorization, or equivalent purification, and it may be partially or wholly inverted.

§52.6042 Grades for refiners' sirup.

The grades for refiners' sirup are designated as follows:

- (a) **U.S. Fancy or U.S. Grade A** Refiners' Sirup.
- (b) **U.S. Choice or U.S. Grade B** Refiners' Sirup.
- (c) **U.S. Extra Standard or U.S. Grade C** Refiners' Sirup.
- (d) **U.S. Standard or U.S. Grade D** Refiners' Sirup.
- (e) **U.S. Substandard or U.S. Grade E** Refiners' Sirup.

§52.6043 Grade specifications.

Specifications for each grade of refiners' sirup are as follows:

- (a) **U.S. Fancy or U.S. Grade A** Refiners' Sirup consists of refiners' sirup which possesses a flavor characteristic of refiners' sirup of fancy quality; which contains no sediment; which is free of foreign matter; which has a Brix solids content of not less than 72 percent when corrected to 20° C. (68° F.); which has a ratio of total sugars (sucrose plus reducing sugars) to Brix solids of not less than 92 percent; which has a ratio of sulfated ash to Brix solids of not more than 3.0 percent; and which possesses a color no darker than RS Color Standard No. 1.
- (b) **U.S. Choice or U.S. Grade B** Refiners' Sirup consists of refiners' sirup which possesses a flavor characteristic of refiners' sirup of choice quality; which contains no sediment; which is free of foreign matter; which has a Brix solids content of not less than 72 percent when corrected to 20° C. (68° F.); which has a ratio of total sugars (sucrose plus reducing sugars) to Brix solids of not less than 86 percent; which has a ratio of sulfated ash to Brix solids of not more than 6 percent; and which possesses a color no darker than RS Color Standard No. 2.

- (c) **U.S. Extra Standard or U.S. Grade C** Refiners' Sirup consists of refiners' sirup which possesses a flavor characteristic of refiners' sirup of standard quality; which contains no excess of sediment; which is practically free of foreign matter; which has a Brix solids content of not less than 76 percent when corrected to 20° C. (68° F.); which has a ratio of total sugars (sucrose plus reducing sugars) to Brix solids of not less than 78 percent; which has a ratio of sulfated ash to Brix solids of not more than 10 percent; and which possesses a color no darker than RS Color Standard No. 3.
- (d) **U.S. Standard or U.S. Grade D** Refiners' Sirup consists of refiners' sirup which possesses a flavor characteristic of refiners' sirup of standard quality; which contains no excess of sediment; which is practically free of foreign matter; which has a Brix solids content of not less than 76 percent when corrected to 20° C. (68° F.); which has a ration of total sugars (sucrose plus reducing sugars) to Brix solids of not less than 70 percent; and which has a ratio of sulfated ash to Brix solids of not more than 14 percent.
- (e) **U.S. Substandard or U.S. Grade E** Refiners' Sirup consists of refiners' sirup that fails to meet the specifications for U.S. Standard Refiners' Sirup.
- (f) Table of specifications for grades. The specifications for the designated grades of refiners' sirup are set forth in summary form in Table I of this paragraph.

Table I-Table of Specifications for Grades

Factors	Grades and specifications			
	U.S. Fancy or U.S. Grade A refiners' sirup	U.S. Choice or U.S. Grade B refiners' sirup	U.S. Extra Standard or U.S. Grade C refiners' sirup	U.S. Standard or U.S. Grade D refiners' sirup
Brix solids corrected to 20° C. (68° F.)	Not less than 72 percent		Not less than 76 percent	
Ratio of total sugars (sucrose plus reducing sugars) to Brix solids.	Not less than 92 percent.	Not less than 86 percent.	Not less than 78 percent.	Not less than 70 percent.
Ratio of sulfated ash to Brix solids.	Not more than 3 percent.	Not more than 6 percent.	Not more than 10 percent.	Not more than 14 percent.
Color	No darker than RS Color Standard No. 1.	No darker than RS Color Standard No. 2.	No darker than RS Color Standard No. 3.	No color limit.

- (g) Tolerances for certification of officially drawn samples. When certifying samples that have been officially drawn and which represent a specific lot of refiners' sirup, the grade for such lot will be determined by averaging the factors of all the samples representing the lot: **Provided**, that not more than 1/6 of such samples fail to meet the requirements of the grade specifications set forth in Table I: **And further provided**, that each of the samples which represent a specific lot of refiners' sirup meet the limiting specifications set forth in Table II of this paragraph.

Table II-Table of Limiting Specifications for Refiners' Sirup

Factors	Grades and specifications			
	U.S. Fancy or U.S. Grade A refiners' sirup	U.S. Choice or U.S. Grade B refiners' sirup	U.S. Extra Standard or U.S. Grade C refiners' sirup	U.S. Standard or U.S. Grade D refiners' sirup
Ratio of total sugars (sucrose plus reducing sugars) to Brix solids. .	Not less than 91 percent.	Not less than 85 percent.	Not less than 77 percent.	Not less than 69 percent.
Ratio of sulfated ash to Brix solids.	Not more than 3.5 percent.	Not more than 6.5 percent.	Not more than 11 percent.	Not more than 15 percent.
Color	No darker than RS Color Standard No. 2.	No darker than RS Color Standard No. 3.	Darker than RS Color Standard No. 3.	

§52.6044 Quantitative determination of factors.

Quantitative determination of the respective factors other than color is made by methods set forth in this section for the respective factors:²

- (a) **Brix solids.** By Brix hydrometer, correcting to 20° C. (68° F.), using the double dilution method.
- (b) **Total sugars.**
 - (1) **Sucrose.** By the chemical method, using invertase as the inverting agent; the Lane-Eynon volumetric method for reducing sugars before and after inversion; or by Jackson-Gillis double polarization method number IV.
 - (2) **Reducing sugar.** By the Lane-Eynon volumetric method, or by the Munson-Walker gravimetric method.
- (c) **Sulfated ash.** By the sulfation method, with no deduction.

§52.6045 Preparation of basic solutions and RS color standards.

Chemicals of reagent grade, at room temperature, are used in the preparation of the solution described in this section.

- (a) **Preparation of basic solutions.**
 - (1) **Solution A.** Dissolve 10 grams of $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$ in a sufficient quantity of 10 percent hydrochloric acid solution to make 100 milliliters.³
 - (2) **Solution B.** Dissolve 50 grams of $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ in a sufficient quantity of 10 percent hydrochloric acid solution to make 500 milliliters.

² These methods are described in Official Methods of Analysis of the Association of Official Agricultural Chemists, Seventh Edition, 1950, except the Jackson-Gillis double polarization method number IV is described in Circular C440, Nat. Bur. Standards, May 1942, or in the Sugar Analysis, by Browne and Zerban, 3d Edition, 1948, John Wiley & Sons, Inc.

³ Ten percent hydrochloric acid solution is prepared by diluting 242.6 milliliters of reagent grade hydrochloric acid to one liter.

- (3) **Solution C.** Dissolve 50 grams of $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ in a sufficient quantity of 10 percent hydrochloric acid solution to make 500 milliliters.
- (4) **RS stock solution.** Mix 50 milliliters of Solution A and 485 milliliters of Solution C.

(b) Preparation of RS color standards.

- (1) **RS Color Standard No. 1.** Dilute 10 milliliters of the RS stock solution to 100 milliliters with 10 percent hydrochloric acid solution.
- (2) **RS Color Standard No. 2.** Dilute 18 milliliters of the RS stock solution to 100 milliliters with 10 percent hydrochloric acid solution.
- (3) **RS Color Standard No. 3.** Dilute 50 milliliters of RS stock solution to 100 milliliters with 10 percent hydrochloric acid solution.

§52.6046 Use of RS color standards in determining color factor.

(a) Containers required. The containers needed to perform the visual color comparison test set forth in paragraph (c) of this section are:

- (1) A container for a sample of refiners' sirup for which the color factor is to be determined (such container hereinafter called **sample container**); and
- (2) Containers for the respective RS color standards.

(b) Description of containers. The sample container is made of colorless and transparent glass or plastic material and is of such shape and construction as to provide a flat 1/8-inch thickness of the sample to be viewed. The container for each RS color standard is a colorless and transparent 2-ounce French square water sample bottle having outside base dimensions of 1-7/16 inches by 1-7/16 inches.

(c) Visual comparison test. A sample of refiners' sirup is compared in the following manner with the RS color standards to determine whether the sample is darker than one or more of such color standards:

- (1) Place each of the RS Color Standards Nos. 1, 2, and 3 in separate 2-ounce French square water sample bottles;
- (2) Place a sample of the refiners' sirup in a sample container; and

- (3) In order to determine whether the sample is darker than one or more of the RS color standards, visually compare the sample with each of the color standards by looking through them at a light-colored background in diffuse light. The sample is viewed through its 1/8-inch thickness; and each RS color standard is viewed at right angles to one of the sides of its container.

Dated: June 8, 1967.

G.R. Grange,
Deputy Administrator,
Marketing Services.

Published in the Federal Register of January 5, 1952 (17 F.R. 136)
codified in the Code of Federal Regulations of 1953 (7 CFR, 1-209, 44.41-44.46)

These amended standards, with minor modifications in format, were republished in the Federal Register of June 15, 1967 (32 F.R. 8575)