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S. W. STRATTON, Director.

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UNITED STATES GOVERNMENT SPECIFICATION FOR ORDINARY LAUNDRY SOAP.

FEDERAL SPECIFICATIONS BOARD.

STANDARD SPECIFICATION No. 32.

This Specification was officially adopted by the Federal Specifications Board on June 20, 1922, for the use of the Departments and Independent Establishments of the Government in the purchase of materials covered by it.

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1. GENERAL.

The soap desired under this specification is a well-made, uniformly mixed laundry or common soap, made from soda and fats, with no excessive proportion of rosin and a moderate amount of matter insoluble in alcohol, free from objectionable odor or makeweights, suitable for use with moderately hard water for general cleaning and laundry purposes. Bidder shall state size, weight, and number of cakes in each box.

Failure to meet any of the following requirements will be cause for rejection:

Matter volatile at 105° C. shall not exceed 36 per cent. Deliveries which yield more than 36 per cent volatile matter will be rejected without further test.

The sum of free alkali, total matter insoluble in alcohol, and sodium chloride shall be not less than 2 per cent nor more than 10 per cent.

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Free alkali, calculated as sodium hydroxide (NaOH), shall not exceed 0.5 per cent.

Matter insoluble in water shall not exceed 1.0 per cent.

Rosin shall not exceed 25 per cent.

The percentage of matter volatile at 105° C. will be computed on the basis of the soap as received, but all other constituents will be calculated on the basis of material containing 34 per cent of volatile matter.

The material will be purchased by net weight provided the matter volatile at 105° C. does not exceed 34 per cent. With deliveries containing more than 34 per cent, but not exceeding 36 per cent of matter volatile at 105° C., settlement will be made on the basis of 34 per cent of matter volatile at 105° C.; that is, sixty-six one-hundredths of a pound of nonvolatile matter shall be considered 1 pound of soap.

Examples.—1. Yield 33 per cent of matter volatile at 105° C.; pay for net weight.

2. Yield 35 per cent of matter volatile at 105° C.; percentage of net weight to be paid for is calculated as follows:

$$(100-35)\times 100/66 = 98.48 \text{ per cent.}$$

2. SAMPLING.

One cake shall be taken at random from not less than 1 per cent of the vendors' shipping containers, provided such containers contain not less than 50 pounds each. In the case of smaller containers a cake shall be taken at random from each lot of containers totaling not to exceed 5,000 pounds. The total sample shall in all cases consist of not less than three cakes taken at random from separate containers. With very large lots, where the sample drawn as above will amount to more than 20 pounds, the percentage of packages sampled shall be reduced, so that the amount drawn shall not exceed 20 pounds.

Wrap the individual cakes tightly in paraffined paper at once and seal by rubbing the edges with a heated iron. The inspector should accurately weigh each wrapped cake, record its weight and the date of weighing on the wrapper, place the wrapped cakes in an air-tight container, which should be nearly filled, seal, mark, and send to the laboratory for test. Samples should be kept cool until tested. The seller shall have the option of being represented at the time of sampling and when he so requests shall be furnished with a duplicate sample.

3. LABORATORY EXAMINATION.

(*a*) PREPARATION OF SAMPLE.—In case of samples that can be easily disintegrated and mixed, run the entire sample through a suitable chopper, except where the sample is large, when each cake may be quartered and one-quarter of each cake run through the chopper. With samples that can not be handled as above, select a cake of average weight, quarter by cutting at right angles in the center, and shave equally from all freshly cut surfaces sufficient soap for analysis. Mix and weigh out all portions for analysis promptly. Preserve the remainder in an air-tight container in a cool place.

When a determination shows nonconformity with specification, a duplicate shall be run.

(*b*) MATTER VOLATILE AT 105° C.—Weigh 5 g of the sample in a porcelain or glass dish, about 6 to 7 cm in diameter and 4 cm deep, dry to constant weight in a vacuum oven or an inert atmosphere at a temperature not exceeding 105° C. (Time can be saved by having a layer of about 3 mm of ignited sand and a small stirring rod weighed with the dish and dissolving the sample in absolute alcohol, evaporating to dryness, breaking up the sample with the rod, adding more alcohol, again evaporating and completing the drying in the oven as above.) Report loss in weight as matter volatile at 105° C.

(*c*) TOTAL MATTER INSOLUBLE IN ALCOHOL, FREE ALKALI, OR FREE ACID—(1) *Matter Insoluble in Alcohol.*—Digest hot a 10 g sample with 200 cc of freshly boiled neutral ethyl alcohol (94 per cent or higher). Filter through a counterpoised filter paper neutral to phenolphthalein, or a weighed Gooch crucible with suction, protecting the solution during the operation from carbon dioxide and other acid fumes. Wash the residue on the paper or in the crucible with hot neutral alcohol until free from soap. Dry the filter paper or crucible and residue at 100 to 105° C. for three hours, cool, and weigh the total matter insoluble in alcohol.

(2) *Free Alkali or Free Acid.*—Titrate the filtrate from the above, using phenolphthalein as indicator, with standard acid or alkali solution, and calculate the alkalinity to sodium hydroxide (or potassium hydroxide) or acidity to oleic acid.

(3) *Matter Insoluble in Water.*—Proceed as in the determination of matter insoluble in alcohol. After filtering and thoroughly washing the residue extract it with water at 60° C. and wash the filter thoroughly. (When the matter insoluble in water is all inorganic, boiling water may be used for the extraction and

washing.) Dry the filter and residue at 100 to 105° C. for three hours, cool, and weigh matter insoluble in water. The nature of this may be determined by further examination.

(*d*) CHLORIDE.—Dissolve 5 g of the sample in 300 cc of water, boiling if necessary to effect solution of all soluble matter. Add an excess of neutral chlorine-free magnesium nitrate solution (about 25 cc of a 20 per cent Mg $(NO_3)_2.6H_2O$ solution). Without cooling or filtering titrate with standard silver nitrate solution, using potassium chromate as indicator. Calculate the chloride as sodium chloride.

(*e*) ROSIN.—Wolff's Method[1]. Dissolve 5 g of the sample in 100 to 200 cc of hot water, add a slight excess of dilute sulphuric acid, heat until the fatty acids collect in a clear layer, cool to room temperature, extract with a small portion of ether, draw off water layer, and wash ether solution with water until free from mineral acid. Transfer to a 200 cc Erlenmeyer flask, evaporate off the ether and dry one hour at 105° C., cool, and dissolve in 20 cc of absolute alcohol. Then add 10 cc of a solution of one volume of concentrated sulphuric acid (specific gravity = 1.84) and four volumes of absolute alcohol, and boil for four minutes under a reflux condenser. Remove from steam bath and add to the liquid about five times its volume of 7 to 10 per cent sodium chloride solution and extract with ether. Shake out the aqueous portion two or three times with ether. Unite the ether solutions and wash with sodium chloride solution until the washings are neutral to methyl orange. Add 30 cc neutral alcohol and titrate the rosin acids with standard sodium hydroxide solution, using phenolphthalein as indicator. Calculate to rosin or rosin soap, as desired (1 cc normal alkali = 0.346 g rosin or 0.377 g rosin soda soap).

4. REAGENTS.

(*a*) STANDARD SODIUM HYDROXIDE SOLUTION.—0.25 N, or about 10 g. sodium hydroxide dissolved in water and diluted to 1 liter. Standardized against Bureau of Standards benzoic acid.

(*b*) STANDARD SULPHURIC ACID SOLUTION.—0.5 N, or about 25.8 g strong sulphuric acid (specific gravity = 1.84) diluted to 1 liter. Standardized against standard sodium hydroxide solution, (a).

(*c*) STANDARD SILVER NITRATE SOLUTION.—0.10 N, or about 17 g silver nitrate dissolved in water and diluted to 1 liter. Standardized against chemically pure sodium chloride.

(*d*) POTASSIUM CHROMATE SOLUTION.—A 10 per cent solution of potassium chromate (K_2CrO_4) in water.

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[1] Chem.-Ztg., 38, pp. 369–70, 382–3, 430; Chem.-Abstr. 8, p. 2495 (1914).

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