U. S. Gov't Standard Specification, No. 86.

DEPARTMENT OF COMMERCE.
BUREAU OF STANDARDS.
George K. Burgess, Director.

CIRCULAR OF THE BUREAU OF STANDARDS, No. 161.

[March 1, 1924.]

UNITED STATES GOVERNMENT SPECIFICATION FOR ASPHALT-SATURATED RAG FELT FOR ROOFING AND WATERPROOFING.

FEDERAL SPECIFICATIONS BOARD.

STANDARD SPECIFICATION No. 86.

This specification was officially adopted by the Federal Specifications Board on December 29, 1923, for the use of the Departments and Independent Establishments of the Government in the purchase of asphalt-saturated rag felt for roofing and waterproofing.

CONTENTS.

1. GENERAL.

This specification applies to asphalt-saturated rag felt intended for use with Asphalt for Mineral Surfaced Roofing (F. S. B. Spec. No. 84), Asphalt for Unsurfaced Built-up Roofing (F. S. B. Spec. No. 88), and Asphalt for Waterproofing and Damp proofing (F. S. B. Spec. No. 85) in the construction of built-up roofing and membrane waterproofing, respectively.

It shall be composed of rag-roofing felt impregnated with an asphaltic saturant, and when tested by the methods contained in this specification must meet the following requirements:

(*a*) APPEARANCE.—It shall be free from visible external defects and uniform throughout. When unrolled at temperatures between 50 and 90° F. it shall not stick to such an extent as to cause tearing.

(*b*) WIDTH.—32 or 36 inches ± one-fourth inch.

(*c*) GROSS WEIGHT OF ROLL.—50 to 80 pounds.

(*d*) WEIGHT OF WRAPPING, PACKING, ETC.—Maximum, one-half pound.

(*e*) WEIGHT PER 100 SQUARE FEET EXCLUSIVE OF PACKING, ETC.—14 pounds ± 1 pound.

(*f*) PLIABILITY AT 77° F.—No cracking on bending flat on itself.

(*g*) AVERAGE BREAKING STRENGTH.—With fiber grain, 30 pounds; across fiber grain, 15 pounds.

(*h*) LOSS ON HEATING AT 221° F.—Maximum, 4 per cent.

(*i*) WEIGHT OF MOISTURE-FREE DESATURATED FELT PER 100 SQUARE FEET.—Minimum, 5.2 pounds.

(*j*) WEIGHT OF SATURANT PER 100 SQUARE FEET.—Minimum, 1.4 times the weight of moisture-free felt per 100 square feet.

(*k*) WEIGHT OF COMMINUTED SURFACING PER 100 SQUARE FEET.—Maximum, 1 pound.

(*l*) ASH OF DESATURATED FELT.—Maximum, 8 per cent.

(*m*) PACKING AND LABELING.—The felt shall be properly wrapped and labeled with the manufacturer's name, brand, grade, weight, area of roll, and type of saturant.

If required, deliveries will, in general, be sampled and tested by the following methods, but the purchaser reserves the right to use any additional available information to ascertain whether the material meets the specification.

2. SAMPLING AND DETERMINATION OF WEIGHT AND WIDTH.

The weight per 100 square feet of the material and its variation in weight can be most accurately determined by the inspector at the time he takes a sample for transmittal to the testing laboratory.

(*a*) From each shipment select at random a number of rolls of felt equivalent to the cube root of the total included in the lot. If the cube root as calculated proves to be a fractional number, express it as the next higher digit.

(*b*) Remove wrappers, cores, and other packing material from each roll selected and weigh the roll and the packing material, etc., separately to the nearest one-fourth pound. Then unwind each roll and measure the length and the width of each end of the roll to the nearest one-fourth inch, and reroll. Observe the appearance of the material while unrolling and rerolling.

The finished material shall be free from visible external defects, such as holes, ragged or untrue edges, breaks, rents, cracks, or

indentations. The rolls shall be capable of being unrolled easily at temperatures between 50 and 90° F. without sticking in a manner that will injure the felt. The surface of the felt shall not be coated or covered with talc or other substances which would tend to interfere with the adhesion between the felt and the plying cement. The use of silica or wood flour will be permitted. The surface shall be uniformly smooth and shall be free from areas or patches of unabsorbed saturant and superficial dry spots.

Compute the weight per 100 square feet of each roll examined, and from these weights compute the average weight of the shipment. In no case shall this be less than 13 pounds per 100 square feet, and any roll examined whose weight is less than 13 pounds per 100 square feet shall be cause for the rejection of the whole shipment. If the average weight is above 15 pounds per 100 square feet, the material shall be paid for on the basis of 15 pounds per 100 square feet.

(*c*) From the rolls examined for sampling, select one the weight of which is near the average weight of the whole lot. Unroll, and at approximately 25 feet from the end cut two samples the full width of the roll and approximately 40 inches long, label, carefully wrap, and transit one to the testing laboratory. Retain the other sample for check analysis in case of dispute.

3. LABORATORY EXAMINATION.

(*a*) APPEARANCE.—Examine both sides of the sheet of felt and note for uniformity of color. The felt shall be thoroughly and uniformly impregnated and shall show no unsaturated spots at any point upon cutting 2-inch strips at random across the entire sheet and splitting them open for their full length.

(*b*) WEIGHT.—Trim the sample so that it is 36 inches long and the full width of the roll. Measure accurately, and weigh to the nearest gram (15 grains). From the measurements and weight so obtained compute the weight per 100 square feet.

(*c*) PLIABILITY.—Cut five strips 1 inch wide and 6 inches long in the direction of the fiber grain and immerse in water at 25° C. (77° F.) for 10 to 15 minutes. Remove the strips from the water and immediately bend each strip flat over a one-sixteenth-inch mandrel through an arc of 180° at a uniform rate in approximately two seconds' time.

(*d*) BREAKING STRENGTH.—Cut 10 strips of the felt 1 inch by 6 inches with the fiber grain and 10 strips of the same size across the fiber grain. Test both sets of strips at 21° C. (70° F.) in a

Scott or similar testing machine of the inclination-balance type having a capacity of 100 to 150 pounds. The test strips shall be gripped 1½ inches on each end, leaving 3 inches between the clamps, and the lower jaw shall travel at the rate of 12 inches per minute. If any strip breaks nearer than one-half inch to either clamp, the reading shall be disregarded and an additional strip tested in its place. The average of the 10 readings from strips cut in one direction shall be taken as the breaking strength of the sample in that direction.

(*e*) Loss on Heating.—Cut two strips of the asphalt-saturated felt 6 inches wide and 12 inches long, weigh each strip, and suspend if for five hours in an oven maintained at 105° C. (221° F.) ±3° C. (5° F.). Remove from the oven, cool in a desiccator, and weigh. Compute the loss in weight and average the results on the two samples.

(*f*) Weight of Desaturated Felt.—Cut a 2-inch strip the full width of the sample, measure accurately, weigh, and extract with carbon tetrachloride or benzol in a suitable extraction apparatus until the solvent runs through colorless. Remove the desaturated felt from the extractor and allow to remain in air until the solvent has evaporated. Brush off any adhering particles of surfacing and retain. Then place the desaturated felt in a tared weighing bottle, dry at 105 to 110° C. (221 to 230° F.) for one-half hour, cool and weigh. Compute the weight per 100 square feet of the desaturated felt.

(*g*) Comminuted Surfacing.—Filter the extract (obtained above in section 3 (*f*)) through a tared Gooch crucible prepared with a mat of asbestos fiber. Wash all sediment from the extraction apparatus into the Gooch crucible with carbon tetrachloride or benzol and transfer also all surfacing brushed from the felt (in section 3 (*f*)) to the Gooch crucible. Wash the insoluble matter on the filter with carbon tetrachloride or benzol until the washings run through colorless. Suction may be used to aid in filtering. Place the crucible with contents in an oven at 105 to 110° C. (221 to 230° F.) for one-half hour. Cool in a desiccator, weigh, and from the weights of the sample taken (in section 3 (*f*)) and the weight of surfacing obtained, compute the weight of comminuted surfacing per 100 square feet.

(*h*) Saturation of Felt.—The weight of asphalt in the saturated felt is the difference in weight between the original sample taken for extraction (in section 3 (*f*)) and the sum of the weights

of the desaturated felt (obtained in 3 (*f*)) plus the weights of the comminuted surfacing (obtained in 3 (*g*)). The percentage saturation is obtained from the following formula:

$$\frac{\text{Weight of asphalt in saturated felt}}{\text{Weight of moisture-free desaturated felt}} \times 100 = \text{percentage saturation.}$$

(*i*) ASH.—Cut the strip of desaturated felt obtained in 3 (*f*) into squares about 1 cm on each side, and thoroughly mix. Select at random pieces amounting to about 10 g, and after drying at 105 to 110° C. (221 to 230° F.) for one-half hour and cooling, weigh accurately and incinerate in a weighed crucible in a muffle or over an open flame until all the carbon is consumed. Cool, weigh, and compute the percentage of ash in the moisture-free desaturated felt.

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