

PLAINTIFF'S EXHIBIT

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FEDERAL SPECIFICATIONS

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AUGUST 1, 1933

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FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**ROOF-COATING; ASPHALT, BRUSHING-
CONSISTENCY**

This specification was approved for promulgation by the Federal Specifications Board on August 1, 1933, for the use of the departments and independent establishments of the Government in the purchase of this commodity, and shall become mandatory for all departments and independent establishments of the Government not later than February 15, 1934. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. There are no other Federal specifications applicable to this specification.

A-2. Any special requirements of the individual departments of the Government are noted under section H.

B. TYPE

B-1. Asphalt roof coating shall be of one type only.

C. MATERIAL

C-1. The coating shall consist of asphaltic materials, with or without fatty oils, thinned with a volatile solvent to a heavy brushing consistency, and mineral filler.

D. GENERAL REQUIREMENTS

D-1. Basis of purchase.—The material shall be purchased by weight or volume, as specified in the contract.

E. DETAIL REQUIREMENTS

E-1. Condition in container.—The material shall not liver in the container and after slight stirring shall be a smooth homogeneous mixture.

E-2. Consistency.—It shall be of a heavy brushing consistency to insure a film of appreciable thickness and yet not so stiff as to prevent easy application with a 3-knot roof brush at the rate of approximately 1 gallon per 50 square feet over asphalt roofing.

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E-3. Nonvolatile matter.—The roof coating shall yield not less than 60 percent nonvolatile matter when 10 grams are heated in an oven at 105° C. (221° F.) for 24 hours.

E-4. Mineral filler.—The material shall contain not less than 10 percent and not more than 25 percent of a suitable mineral filler. The residue obtained from the ignition of the mineral filler shall be not less than 85 percent.

E-5. Behavior at 60° C. (140° F.).—Test pieces prepared by brushing the coating on smooth-surfaced asphalt prepared roofing and metal at the rate of 1 gallon to 50 square feet, exposed for 60 minutes in a well-ventilated room and then in an oven at 60° C. (140° F.) for 5 hours shall show no blistering, and not more than one-fourth inch sagging or slipping, and no appreciable absorption of the coating by the prepared roofing.

E-6. Behavior at 0° C. (32° F.).—Metal test pieces from E-5, when bent quickly over a 1 inch mandrel immediately after exposure to a temperature of 0° C. (32° F.) for 1 hour shall show no cracking of the coating and no separation of metal and coating.

F. METHODS OF SAMPLING AND TESTING

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

F-1. Sampling.—From each shipment the inspector shall take at random a number of packages equivalent to the one half cube root of the total number of packages in the lot. If this proved to be a fractional number, it shall be expressed as the next higher whole number. The contents of each package taken shall be thoroughly stirred until a homogeneous mixture is obtained. One pint of the coating shall then be immediately drawn from each package and transferred to a clean receptacle of suitable size, which shall be kept tightly covered except while the coating is being introduced. After all the pint samples have been taken the contents of this container shall be thoroughly stirred and two 1-quart samples of the composite sample shall be transferred to a clean dry container, which shall be immediately stoppered, sealed, and distinctly labeled. One sample shall be transmitted to the testing laboratory and the other shall be retained for check analysis in case of dispute.

F-2. Laboratory examination.

F-2a. Condition in container.—Open the container when received at the laboratory and examine its contents.

F-2b. Nonvolatile matter.—Weigh about 10 grams of the sample in a weighed flat-bottom metal dish about 8 cm in diameter, or in a friction-top can plug. Heat the dish with its contents in an oven at 105° to 110° C. (221° to 230° F.) for 24 hours, cool, and weigh. From the weight of the residue left in the dish and from the weight of the original sample taken compute the percentage of nonvolatile matter.

F-2c. Mineral filler.—Weigh from 2 to 5 grams of the coating and transfer to a small beaker. Add 25 to 50 ml of carbon bisulphide, stir until thoroughly mixed, and allow to stand for 15 minutes. Filter the solution through a weighed Gooch crucible prepared with a mat of asbestos, paper pulp, or a paper disc, using suction if necessary

to aid filtration. Wash the residue in the crucible with cold carbon bisulphide until the washings are colorless, dry the crucible with its contents in air at room temperature until the odor of carbon bisulphide has almost disappeared, and then for 1 hour in an oven at 105° to 110° C. (221° to 230° F.), cool, and weigh. From the weight of the insoluble matter in the crucible and the weight of the sample taken compute the percentage of the matter insoluble in carbon bisulphide and consider it as mineral filler. Ignite a weighed portion of the insoluble matter to a red heat for one-half hour, cool, and weigh.

F-2d. Behavior at 60° C. 140° (F.).—Brush the coating at a rate of approximately 1 gallon to 50 square feet on smooth-surfaced asphalt prepared roofing (heavy weight), and clean steel. The steel plates should be about 0.4 mm (0.016 inch) thick. A convenient size for the test pieces is 10 by 15 cm (4 by 6 inches). Note whether the cement spreads easily at room temperature without drawing or pulling. Embed a thread in each coating extending across the coating at a distance of not more than 5 cm (2 inches) from the top of the test piece and measure its distance from the top. After exposing these test pieces for 60 minutes in a horizontal position in a well-ventilated room at a temperature not below 15° C. (59° F.), but not in the direct rays of the sun, suspend them vertically for 5 hours in an oven at 60° C. (140° F.). Remove the test pieces from the oven after 5 hours' heating and examine for blistering and absorption of the coating and for slipping by comparing the distance of the thread from the top of the test piece with its distance at the beginning of the test.

F-2e. Behavior at 0° C. (32° F.).—Cool the metal test pieces from F-2d to room temperature and immerse them in a water bath at 0° C (32° F.) for 1 hour. Immediately after their removal from the bath bend the panels in approximately 2 seconds' time, over a mandrel 1 inch in diameter, with the metal next to the mandrel, dry thoroughly, and examine.

G. PACKAGING, PACKING, AND MARKING

G-1. Packaging.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. Packing.—Unless otherwise specified, the subject commodity shall be delivered in standard commercial containers, so constructed as to insure acceptance by common or other carriers for safe transportation at the lowest rate to the point of delivery.

G-3. Marking.—Each package shall be legibly marked with a description of the contents, the name of the manufacturer, the place of manufacture, the brand (if any), the net weight or net liquid measure of the contents, and some means of identification of "the particular contract on which purchase and shipment were made." Each shipment of the material shall be accompanied by printed directions for its use.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall respectively form a part of this specification.

H-1a. *Army*: United States Army Specification No. 100-2, Standard Specification for Marking Shipments.

H-1b. *Navy*: Navy Department purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, Roofing, Siding, and Sheet Metal Work; Dampproofing and Membrane Waterproofing, copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D.C.

I. NOTES

I-1. Asphalt roof coating is intended for use in the repair and coating of asphalt and metal roofing and for application to concrete, masonry, and steel structures as a dampproofing and protective coating. In the application of this material on concrete and masonry it is advisable to apply a priming coat of asphalt primer.

I-2. While the exact nature of the mineral filler to be used in this coating is not specified, asbestos fiber is considered one of the most suitable mineral fillers.

I-3. It is believed that this specification adequately described the characteristics necessary to secure the desired material and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-4. This specification governs United States Government purchases of this commodity. Users are requested to retain this specification in permanent file until a revision is issued.

I-5. Interested parties are advised that an alphabetical index of Federal specifications may be obtained upon application as noted in paragraph next below, price to be obtained from the Superintendent of Documents.

I-6. Copies of this specification may be obtained upon application, accompanied by money order or coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D.C., Price 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility or any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1941

For sale by the Superintendent of Documents, Washington, D.C. - - - Price 5 cents

SS-W-51a

APRIL 2, 1935

SUPERSEDING
Fed. Spec. SS-W-51
March 3, 1931

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

WALL BOARD; GYPSUM

This specification was approved by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than November 1, 1935. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATION

A-1. There are no other Federal specifications applicable to this specification.

A-2. Special requirements of individual departments of the Government are noted in section H.

B. TYPES

B-1. This specification covers two types of gypsum wall board:

Type A.—Boards with square edges, designed for butted joints.

Type B.—Boards with rounded edges, designed for filled joints.

C. MATERIAL AND WORKMANSHIP

C-1. Gypsum wall board consists of set gypsum plaster, with or without fiber, reinforced on the surfaces with sheets of fibrous material. Without the addition of plaster these boards furnish to interior walls, ceilings, or partitions a surface which may receive decoration.

C-2. The surface of gypsum wall board designed to be exposed on erection shall be true and free from imperfection that would render the wall boards unfit for use, with or without decorations. The edges and ends shall be straight and solid. Boards of Type A shall have corners square and opposite edges parallel. For boards of Type B, a negative variation of $\frac{1}{8}$ inch from parallelism of opposite edges is permissible.

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D. GENERAL REQUIREMENTS

D-1. See section E.

E. DETAIL REQUIREMENTS

E-1. *Thickness.*—Gypsum wall boards shall be nominally $\frac{1}{4}$ inch (6.3 mm), $\frac{3}{8}$ inch (9.5 mm) or $\frac{1}{2}$ inch (12.7 mm) in thickness with permissible variations in the average thickness of $\pm \frac{1}{16}$ inch (0.4 mm) and with permissible local variations of $\pm \frac{1}{32}$ inch (0.8 mm) from the normal thickness.

E-2. *Width and length.*—

E-2a. Type A gypsum wall boards that are to be laid with the joints butted shall have widths of 32 inches (810 mm), 36 inches (910 mm), or 48 inches (1,220 mm), except that a variation of $\frac{1}{32}$ inch (2 mm) under the specified width is permissible.

E-2b. Type B gypsum wall boards that are to be laid with the joints filled shall have widths $\frac{1}{4}$ inch (6.3 mm) less than those specified in paragraph E-2 (a) except that the same variation is permissible.

E-2c. The lengths shall be 4 feet (1.22 m) to 12 feet (3.66 m), inclusive, except that a tolerance of $\frac{1}{4}$ inch (6.3 mm) from the length of the individual boards is permissible. Special boards may be cut to any desired length within the limits prescribed.

E-3. *Weight.*—The weight of gypsum wall board per 1,000 square feet shall conform to the following requirements:

Thickness		Weight, minimum		Weight, maximum	
Inches	Millimeters	Pounds	Kilograms	Pounds	Kilograms
$\frac{1}{4}$	6.3	900	406	1,500	680
$\frac{3}{8}$	9.5	1,350	612	2,000	905
$\frac{1}{2}$	12.7	1,800	816	3,000	1,361

E-4. *Strength.*—Strength test specimens shall be 12 inches (300 mm) wide and approximately 16 inches (410 mm) long. When tested in accordance with the methods described in section F-2 specimens taken from the gypsum wall board shall carry not less than the following loads:

Board thickness (inches)	Load, pounds	
	Knife-edges across fiber of surfacing	Knife-edges parallel to fiber of surfacing
$\frac{1}{4}$	50	24
$\frac{3}{8}$	80	34
$\frac{1}{2}$	106	45

E-5. Bond.—With loads equal to or less than those specified in paragraph E-4 there shall be no breaking of the bond between the fibrous surfacing material and the plaster core.

F. METHOD OF SAMPLING, INSPECTION, AND TESTS

F-1. Sampling.—At least 1 percent of the number of gypsum wall boards in a shipment, but not less than 10 boards, shall be so selected as to be representative of the shipment. Twenty-five percent of such selected boards, but not less than 10 individual boards, shall constitute a sample for test. When a shipment consists of more than one car or carrier load a sample shall be selected from each car or carrier.

F-2. Inspection and tests.—

F-2a. Strength and bond.—

F-2a (1). Two specimens, each 12 inches (300 mm) by approximately 16 inches (406 mm) shall be cut from each board in the sample, one having the 16-inch dimension parallel to the fibers of the surfacing material and the other at right angles to them. Each specimen shall be supported on fixed parallel bearings spaced 14 inches (356 mm) on centers and shall be loaded on a similar bearing midway between the supports. All bearings and load surfaces shall be true, shall engage the full width of the test specimen, and shall be rounded to a radius of $\frac{1}{4}$ inch (3.2 mm).

F-2a (2). Test loads shall be applied at a uniform rate of 60 pounds (27.22 kg) per minute with a permissible variation of ± 10 percent in the rate. The breaking load shall be noted and the bond, as defined under paragraph E-5, shall be observed. The average strength of the 10 specimens cut from the board in each direction shall be computed and compared with representative requirements in paragraph E-4.

G. PACKAGING, PACKING, AND MARKING

G-1. Any special requirements of individual departments are noted under section H.

G-2. Packaging.—Unless otherwise specified commercial packages are acceptable under this specification.

G-3. Packing.—Gypsum wall board shall be packed in such a way as to be kept dry and free from moisture. Unless otherwise specified gypsum wall board shall be delivered in standard commercial containers so constructed as to insure acceptance by common or other carriers, for safe transportation, at the lowest rate, to the point of delivery.

G-4. Marking.—Unless otherwise specified, shipping containers shall be marked with the name of the material, name of the manufacturer, brand, type, size, nominal thickness, and the quantity contained therein, as defined by the contract or order under which the shipment is made; the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications of the issue in effect on the date of invitation for bids shall form a part of this specification.

H-1a. *Army*: United States Army Specification No. 100-2B, Standard Specification for Marking Shipments.

H-1b. *Navy*: Navy Department General Specification for Inspection of Material. (Copies of this specification may be obtained without cost upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D. C.)

H-1c. *Marine Corps*: Instructions issued by the Quartermaster's Department.

I. NOTES

I-1. Gypsum wall boards are sheets or slabs of set gypsum plaster reinforced on the surfaces with sheets of fibrous material and without the addition of plaster furnish to interior walls, ceilings, or partitions a surface which may receive decoration.

I-2. Gypsum wall boards are nominally $\frac{3}{4}$ inch thick.

I-3. Gypsum wall boards $\frac{3}{4}$ inch or $\frac{1}{2}$ inch thick may be had for special purposes.

I-4. Gypsum wall boards may be had in any lengths from 4 to 12 feet, as specified by the purchaser.

I-5. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-6. An alphabetical Index of Federal Specifications may be obtained upon application as noted in paragraph next below, price to be obtained from the Superintendent of Documents.

I-7. Copies of this specification may be obtained upon application, accompanied by money order or coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D. C. Price 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever, and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1935

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents

FEDERAL STANDARD STOCK CATALOGUE

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

VARNISH; ASPHALT

This specification was approved for promulgation by the Federal Specifications Board on April 28, 1931, for the use of the departments and independent establishments of the Government in the purchase of this commodity and shall become mandatory for all departments and independent establishments of the Government not later than November 15, 1931. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS.

A-1. There are no other Federal Specifications applicable to this specification.

A-2. Any special requirements of the individual departments of the Government are noted under section H.

B. GRADES.

B-1. Asphalt varnish shall be of the following grades (the grade or grades desired shall be specified in the invitation for bids):

Grade A.—Normal asphalt varnish.

Grade B.—Asphalt varnish resistant to mineral acids.

C. MATERIAL.

C-1. Asphalt varnish shall be composed of a high grade of asphalt fluxed and blended with properly treated drying oil and thinned to the proper consistency with a volatile solvent.

D. GENERAL REQUIREMENTS.

D-1. See Detail Requirements.

E. DETAIL REQUIREMENTS.

E-1. Grade A.—

E-1a. Appearance.—Smooth and homogeneous; no livering or stringiness.

E-1b. Color.—Jet black.

E-1c. Flash point (closed-cup).—Not below 30° C. (86° F.).

E-1d. Action with linseed oil.—Varnish must mix readily to a homogeneous mixture with an equal volume of raw linseed oil.

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E-1e. *Matter insoluble in carbon bisulphide.*—Not more than 1 per cent.

E-1f. *Nonvolatile matter.*—Not less than 40 per cent by weight.

E-1g. *Fatty matter.*—Not less than 20 per cent of the nonvolatile. Must be liquid and not show a violet coloration by the Liebermann-Storch test.

E-1h. *Set to touch.*—Within five hours.

E-1i. *Dry hard and tough.*—Within 24 hours.

E-1j. *Toughness.*—Film on metal must withstand rapid bending over a rod 3 mm ($\frac{1}{8}$ inch) in diameter.

E-1k. *Working properties.*—Varnish must have good brushing, flowing, covering, and leveling properties.

E-1l. *Resistance to water.*—Dried film must withstand cold water for 18 hours.

E-1m. *Resistance to oil.*—Dried film must withstand lubricating oil for 6 hours.

E-2. *Grade B.*—

E-2a. *Appearance.*—Smooth and homogeneous; no livering or stringiness.

E-2b. *Color.*—Jet black.

E-2c. *Flash point (closed-cup).*—Not below 30° C. (86° F.).

E-2d. *Action with linseed oil.*—Varnish must mix readily to a homogeneous mixture with an equal volume of raw linseed oil.

E-2e. *Matter insoluble in carbon bisulphide.*—Not more than 1 per cent.

E-2f. *Nonvolatile matter.*—Not less than 40 per cent by weight.

E-2g. *Fatty matter.*—Not less than 20 per cent of the nonvolatile. Must be liquid and not show a violet coloration by the Liebermann-Storch test.

E-2h. *Set to touch.*—Within five hours.

E-2i. *Dry hard and tough.*—Within 24 hours.

E-2j. *Toughness.*—Film on metal must withstand rapid bending over a rod 3 mm ($\frac{1}{8}$ inch) in diameter.

E-2k. *Working properties.*—Varnish must have good brushing, flowing, covering, and leveling properties.

E-2l. *Resistance to water.*—Dried film must withstand cold water for 18 hours.

E-2m. *Resistance to oil.*—Dried film must withstand lubricating oil for 6 hours.

E-2n. *Resistance to mineral acids.*—Dried film must withstand action of the following acids for 6 hours: Sulphuric acid, specific gravity 1.25 (about 33 per cent); nitric acid, specific gravity 1.12 (about 20 per cent); hydrochloric acid, specific gravity 1.09 (about 18 per cent).

F. METHODS OF SAMPLING, TESTING, AND BASIS OF PURCHASE.

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.

F-1. *Sampling.*—It is mutually agreed by buyer and seller that a single package out of each lot of not more than 1,000 packages be

taken as representative of the whole. Whenever possible, an original unopened container shall be sent to the laboratory. When for any reason this can not be done, the inspector shall select a package and thoroughly mix its contents. He shall fill a 1-quart, clean, dry container from this package, securely stopper it with a new clean cork or well-fitting cover or cap, seal, and distinctly label it. The inspector shall take a duplicate from the container sampled to be held for check in case of dispute, and when requested shall take a sample for the seller.

F-2. Laboratory examination.—

F-2a. Appearance and color.—Pour some of the thoroughly mixed sample on a clean, clear glass plate and stand in a vertical position until the excess varnish has drained off. Examine the film by transmitted light. The varnish must be smooth and homogeneous and must not show any separation or segregation of the constituents. Examine the film by reflected light. The film must be jet black in color.

F-2b. Flash point.—Determine with either the "Tag" or Elliott closed-cup tester. The former is preferred.¹

F-2c. Action with linseed oil.—Pour 10 ml of the varnish into a test tube and add an equal volume of raw linseed oil. Stopper the test tube and shake vigorously for several minutes. Then pour some of the mixture on a clear glass plate and stand in a vertical position. After the excess varnish has drained off examine the film by transmitted light. There shall be no separation of the oil and varnish.

F-2d. Matter insoluble in carbon bisulphide.—Weigh about 5 g of the varnish into a small beaker, add 25 ml of carbon bisulphide, and allow to stand for 15 minutes. Filter through a weighed Gooch crucible, prepared with a medium thick mat of asbestos, using suction if necessary to aid in filtration. Wash the residue in the crucible with carbon bisulphide until the washings are colorless. Dry in air at room temperature until the odor of carbon bisulphide has almost disappeared, and then for one hour in an oven at 105° to 110° C (221° to 230° F.). Cool and weigh. From the weight of the insoluble left in the crucible and the weight of sample taken calculate the percentage of insoluble in carbon bisulphide.

F-2e. Nonvolatile matter.—Place a portion of the sample in a stoppered bottle or weighing pipette. Weigh the container and sample. Transfer about 1.5 g of the sample to a weighed flat-bottomed metal dish about 8 cm in diameter (a friction-top can plug). Weigh the container again and by difference calculate the exact weight of the portion of sample transferred to the weighed dish. Heat the dish with its contents in an oven at 105° to 110° C. (221° to 230° F.) for three hours. Cool and weigh. From the weight of the residue left in the dish and the weight of the sample taken calculate the percentage of nonvolatile residue.

¹ Directions for using the "Tag" tester may be found in A. S. T. M. Standards D56-21, and directions for using the Elliott cup in Proceedings A. S. T. M., Pt. I, p. 414; 1917.

F-2f. Fatty matter.—

F-2f(1). Place about 5 grams of the varnish, accurately weighed, in a 250 ml, wide-mouthed flask, add 50 ml of benzol, and heat under a reflux condenser on a steam bath until the varnish is completely dissolved. Add 25 ml of ethyl alcohol denatured with methyl alcohol and 25 ml of a 0.5 *N* alcoholic potassium hydroxide solution and continue boiling under the reflux condenser until all of the saponifiable matter is saponified (one hour is usually sufficient). Remove the condenser, evaporate the solution to dryness on the steam bath, and bake in an oven at 105° to 110° C. (221° to 230° F.) for at least 12 hours (overnight). Add to the residue in the flask 150 ml of distilled water and heat until the residue is disintegrated. Filter the water solution of the soaps. Repeat this operation with 75 ml portions of water until the residue is completely disintegrated and the wash water is clear and colorless.

F-2f(2). Combine the filtrates (the soap solution and washings), acidify with hydrochloric acid, and heat until the fatty acids and any emulsified asphalt separate and rise to the top and the water below is clear. Cool, transfer to a separatory funnel, and extract once with 50 ml of ether. Repeat the extraction with 25 ml portions of ether until the aqueous layer is free from fatty matter and asphalt. Combine the ether extracts and wash with water until free from acid. Cool the ether extracts below 25° C. (77° F.) and filter through paper on which has been placed approximately 10 grams of anhydrous sodium sulphate to absorb any water. Wash the residue on the paper with ether cooled below 25° C. (77° F.) until the washings run through colorless. Collect the filtrate and washings in a beaker and evaporate to dryness.

F-2f(3). Add 10 to 15 ml of 95 per cent ethyl alcohol to the residue in the beaker and warm on the steam bath. Cool to room temperature and filter through paper into a tared flask or dish. Repeat this operation with 5 ml portions of 95 per cent ethyl alcohol until the alcohol remains colorless. Finally wash the residue on the paper with 95 per cent ethyl alcohol until the washings run through colorless. Evaporate the alcoholic solution to dryness on a steam bath and heat for an hour in an oven at 105° to 110° C. (221° to 230° F.). Cool and weigh. Calculate the percentage of fatty matter in the nonvolatile matter from the weight of the residue in the flask and the weight of the nonvolatile matter in the sample taken for analysis.

F-2f(4). Sometimes the residue obtained after saponification and the evaporation of the benzol and alcohol from the saponifying mixture is not completely disintegrated by boiling with water. In that case extract with water until nothing further dissolves and then dry. Dissolve in benzol, using heat if necessary, and wash the benzol solution several times with water. Heat the washings until the odor of benzol has disappeared and add to the soap solution before acidifying.

F-2f(5). The fatty matter obtained above must be a clear amber-colored liquid. A fugitive violet color shall not be obtained when the fatty matter is subjected to the following test: Dissolve a small

amount of the fatty matter in 5 ml of acetic anhydride, warming if necessary to aid solution. Cool, draw off the acetic anhydride solution, and add a drop of sulphuric acid, 1.53 specific gravity.

F-2g. Drying time.—Pour the varnish on a clean glass plate not less than 15 cm (6 inches) long and 10 cm (4 inches) wide. Place the plate in a nearly vertical position in a well-ventilated room, but not in the direct rays of the sun. The temperature of the room should be from 21° to 32° C. (70 to 90° F.). Test the film at points at not less than 2.5 cm (1 inch) from the edges of the film by touching lightly with the finger. The varnish is considered to have set to touch when gentle pressure of the finger shows a tacky condition but none of the varnish adheres to the finger. The varnish is considered to have dried hard when the pressure that can be exerted between the thumb and finger does not move the film or leave a mark which remains noticeable after the spot is lightly polished. If rapid light rubbing breaks the surface, the sample is not considered to have satisfactorily dried hard. In case the test shows time of setting to touch or drying hard more than 5 and 24 hours, respectively, two additional tests shall be run on different days, and if the varnish does not meet the above drying and hardening requirements on both of these additional tests it shall be considered unsatisfactory. In cases where different laboratories fail to agree on the drying test, due to different atmospheric conditions, and umpire tests are necessary, such tests shall be made in a well-ventilated room maintained at a temperature of 70° F. and relative humidity of 65 per cent saturation.

F-2h. Toughness.—Flow the varnish on one side of a bright tin panel that has been thoroughly cleaned with benzol immediately before using. These panels shall be cut from bright tin plate weighing not more than 25 g nor less than 19 g per square decimeter (0.51 to 0.39 pound per square foot). (Commercial No. 31 gage bright tin plate should weigh about 0.44 pound per square foot.) A convenient size for these panels is 10 by 15 cm (4 by 6 inches). Let the panel dry in a vertical position, not in the direct rays of the sun, in a well-ventilated room at a temperature not below 21° C. (70° F.) for a period of six days. Now bring the panel to a temperature between 21 and 24° C. (70 to 75° F.) and, with the varnish film on the outside, bend rapidly over a rod 3 mm ($\frac{1}{8}$ inch) in diameter. The film must show no evidence of cracking or flaking.

F-2i. Working properties.—A clean piece of tin plate similar to that used for testing the toughness of the varnish shall be used for determining the working properties. The plate shall be thoroughly cleaned of all grease and dried. It shall then be laid in a horizontal position and one coat of the varnish applied by brushing. The varnish shall work easily under the brush, showing no tendency to draw or pull, and shall flow out to a smooth, glossy, jet-black film, free from brush marks, blisters, pinholes, or other defects. Panels prepared in the above manner and allowed to dry in a horizontal position, not in the direct rays of the sun, in a well-ventilated room, at a temperature not below 21° C. (70° F.) for a period of six days, shall be used for testing the resistance of the varnish to cold water and lubricating oil.

F-2j. Resistance to water.—A panel prepared and dried as under F-2i, shall be inclined at an angle of 45° to the vertical, and a gentle stream of cold tap water with a temperature of about 25° C. (77° F.) allowed to flow for 18 hours down the middle of the varnished surface. After wiping off with a soft cloth or chamois skin any deposit due to the tap water the varnish must show no whitening, dulling, softening, or other visible defects.

F-2k. Resistance to lubricating oil.—A panel prepared and dried as under F-2i shall be laid flat, and in at least two different places several drops of locomotive engine lubricating oil² allowed to stand in contact with the film for six hours. During the test the spots of oil shall be covered with small watch glasses. After wiping off the oil with cotton waste no softening or other deterioration of the film due to the lubricating oil shall be perceptible.

F-2l. Resistance to mineral acid.—A piece of dry tin plate free from rust and grease shall be used for this test. It shall be laid in a horizontal position and one coat of the varnish applied by brushing. This coat of varnish shall then be allowed to dry for 24 to 48 hours, when a second coat shall be applied. The second coat shall be allowed to dry, as in F-2i for a period of six days before testing. The panels shall then be laid flat and in different places several drops each of sulphuric acid, specific gravity 1.25, nitric acid, specific gravity 1.12, and hydrochloric acid, specific gravity 1.09, shall be allowed to remain on the surface of the film for six hours at room temperature, about 21° C. (70° F.). During the test the drops of acid shall be covered with small watch glasses to prevent evaporation. After six hours the acid shall be washed off with tap water, and after drying for one hour the spots previously in contact with the acid examined. They shall show no appreciable change in hardness. The film shall then be allowed to dry for 12 hours, when it shall again be examined. The spots exposed to the acid shall show no disintegration or brown-ing, and their luster shall not be impaired. A slight bloom around the area of the spot exposed to the acid shall not be considered an indication of failure. The film shall then be removed with carbon tetrachloride, chloroform, or carbon bisulphide and the metal examined. It shall show no corrosion.

F-3. Basis of purchase.—Asphalt varnish shall be purchased by volume, the unit being a gallon of 231 cubic inches at 15.5° C. (60° F.). The volume may be determined by measure, or, in case of large deliveries, it may be easier to determine the net weight and specific gravity at $15.5/15.5^{\circ}$ C. ($60/60^{\circ}$ F.) of the delivery. The weight per gallon in pounds can then be determined by multiplying the specific gravity by 8.33. The net weight in pounds divided by the weight per gallon gives the number of gallons.

G. PACKAGING, PACKING, AND MARKING.

G-1. Any special requirements of the individual departments are noted under section H.

G-2. Packaging.—Unless otherwise specified, commercial packages are acceptable under this specification.

² A straight mineral oil having a viscosity (Saybolt Universal) of about 75 sec. at 210° F.

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(Section IV, Part 5)

TT-V-51-7
(Apr., 1931)

G-3. Packing.—Unless otherwise specified, the subject commodity shall be delivered in standard commercial containers, so constructed as to insure acceptance by common or other carriers, for safe transportation, at the lowest rate, to the point of delivery.

G-4. Marking.—Unless otherwise specified, shipping containers shall be marked with the name of the material, the size, type, and the quantity contained therein, as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS.

H-1. The following department specifications of the issue in effect on date of invitation for bids shall respectively form a part of this specification:

H-1a. Army:

United States Army Specification No. 100-2, Standard Specification for Marking Shipments.

United States Army Specification No. 22-42, Supplies, Subsistence, for United States Army. Conditions Governing the Purchase of.

H-1b. Navy:

Navy Department General Specifications for Inspection of Material, copies of which may be obtained without cost upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D. C.

H-2. Navy department purchases.—

H-2a. Packing.—Varnish shall be delivered in 5-gallon tin cans packed two cans per case, or 1-gallon tin cans packed 12 cans per case, as specified.

H-2b. Marking.—

H-2b(1). Each can shall be labeled with the name of the material the quantity and name of the manufacturer.

H-2b(2). Cases shall be marked as covered by paragraph G-4.

I. NOTES.

I-1. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with the specification. If for any particular purpose, samples are desired, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-2. All purchasers and users of specification paint materials should consult Bureau of Standards Technologic Paper No. 274, entitled "Use of United States Government Specification Paints and Paint Materials."

I-3. This specification governs all United States Government purchases of this commodity. Users are requested to retain this specification in permanent file until a revision is issued.

I-4. Interested parties are advised that an Alphabetical Index of Federal Specifications may be obtained upon application as noted in paragraph next below at a cost of 5 cents.

TT-V-51-5
(Rev. 1931) **FEDERAL STANDARD STOCK CATALOGUE**
(Section IV, Part 5)

I-5. Copies of this specification may be obtained upon application accompanied by money order or coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D. C. Price 5 cents.

I-6. Should material be offered by bidders under brand names, catalogue or model numbers, they must signify in the bid that material so offered meets this specification in all respects.

Notice.—When Government drawings, specifications, or other data, are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility or any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded, by implication or otherwise, as in any manner licensing the holder or any other person or corporation or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1931

For sale by the Superintendent of Documents, Washington, D. C. . . . Price 5 cents

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200

UU-W-101a

JULY 3, 1935

SUPERSEDING
Fed. Spec. UU-W-101
Sept. 20, 1932

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

WALLBOARD; COMPOSITION

This specification was approved by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than March 1, 1934. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. There are no other Federal specifications applicable to this specification.

A-2. Any special requirements of the individual departments of the Government are noted under section H.

B. GRADE

B-1. Composition wallboard shall be furnished in but one grade.

C. MATERIAL

C-1. *Material.*—Composition wallboard shall be manufactured of vegetable fiber which has been thoroughly mixed with beater size.

D. GENERAL REQUIREMENTS

D-1. See section E.

E. DETAIL REQUIREMENTS

E-1. *Physical characteristics.*—Wallboard shall have the following physical characteristics.

E-1a. *Weight.*—Weight shall not exceed 45 pounds per cubic foot.

E-1b. *Transverse strength.*—Transverse strength shall be not less in any direction than shown in the following table when tested as described in paragraph F-2b:

Nominal thickness	Transverse strength
<i>Inches</i>	<i>Pounds</i>
3/4	7.00
1	12.00
1 1/4	18.00
1 1/2	27.00

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E-1c. Linear expansion.—Linear expansion shall not exceed 0.75 percent when tested as described in paragraph F-2c.

E-2. Thickness.—Wallboard shall be furnished in the following thicknesses, as specified: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ inch.

E-3. Finish.—Unless otherwise specified, at least one surface shall be finished with a varnish size to take paint and decorations. The other surface may be finished with a water-proof coating, provided such coating is at least as water resistant as varnish size.

E-4. Tolerances.—Unless otherwise specified in proposal tolerances shall be permitted as follows:

Length and width..... plus none, minus $\frac{1}{8}$ inch.
Thickness..... plus or minus 5 percent.

F. METHODS OF SAMPLING, INSPECTION, AND TEST

F-1. Sampling.—Samples shall be taken to give a fair representation of the entire shipment. Pieces from 5 boards of any carload, or one-half of 1 percent of the number of pieces in less-than-carload shipments, but not less than 3 boards of any shipment shall constitute the test sample. From each, a specimen 24 by 30 inches shall be cut, the longer dimension being crosswise the board as it is usually obtained.

F-2. Inspection and tests.—

F-2a. Atmospheric conditions.—Tests for transverse strength shall be made under prevailing atmospheric conditions except in the case of disputes. These tests shall then be made on samples conditioned for at least 24 hours at a relative humidity of 65 percent and at a temperature of 70° to 75° F.

F-2b. Transverse strength.—The transverse strength shall be determined as follows:

A specimen 3 inches wide and 18 inches long is taken for test. The transverse strength is determined by placing the specimen on horizontal parallel supports 12 inches apart and applying the load at mid-span on a bearing parallel to the end supports so that the deflection takes place at 12 inches plus or minus 2 inches per minute until the specimen breaks. The bearing and supports shall be rounded to a radius of approximately $\frac{3}{8}$ inch to prevent injury to the specimen. Three specimens from the long direction of the board and three at right angles thereto shall be tested. The transverse strength in each direction is the average of three specimens taken from that direction.

NOTE.—See Miscellaneous Publication Bureau of Standards No. 132, issued December 1, 1931.

F-2c. Linear expansion.—The maximum linear expansion shall be determined in the following manner from specimens 3 by 12 inches that have been cut parallel with the long direction of the board and from like specimens cut at right angles thereto:

At each of two points approximately 10 inches apart on the center line of each specimen a small area is coated by rubbing with a glass-marking pencil (or a wax crayon). A fine crossmark is made with a razor blade on the center line in each of these two areas as reference points for the length measurements. The specimens are then con-

ditioned for 24 hours at 50 percent relative humidity and measurement are then made of the distance between the two reference points. A scale graduated in hundredths of an inch is used and readings are made with a magnifying lens to the nearest 0.005 inch. The specimens are next conditioned for 24 hours at 97 percent relative humidity, after which the distance between the two reference points is again measured. The measurements shall be made in the conditioned air specified in each case, or as quickly as possible after each specimen is removed therefrom. The linear expansion shall be reported as the increase in the length between reference marks as a percentage of the length at 50 percent relative humidity. (In the absence of other facilities, a convenient means of conditioning the specimens at the specified humidity conditions is to expose them in an enclosed space immediately above saturated solutions of suitable salts—sodium dichromate ($\text{Na}_2\text{Cr}_2\text{O}_7 \cdot 2\text{H}_2\text{O}$) for 50 percent relative humidity, and potassium sulphate (K_2SO_4) for 97 percent relative humidity.)

G. PACKAGING, PACKING, AND MARKING

G-1. *Packaging*.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. *Packing*.—

G-2a. *Domestic shipments*.—Unless otherwise specified the subject commodity shall be delivered in substantial commercial containers so constructed as to insure acceptance by common or other carriers for safe transportation at the lowest rate to the point of delivery.

G-2b. *Export shipments*.—For export or oversea shipment when specified the equivalent of approximately 500 square feet of $\frac{1}{4}$ -inch board shall be bundled, the ends and sides being suitably protected. Each bundle will be strapped with steel bands drawn tight and secured with metal clips at each end and intermediately every 3 feet. Each bundle shall then be securely wrapped with moisture-proof paper and sealed to make an airtight package. Each wrapped bundle shall be packed in a light-weight open crate. The crates shall be made of 2-by-2-inch lumber for the frame and be held together with cross slats of $\frac{1}{2}$ -inch or $\frac{3}{8}$ by 4-inch cross strips. One cross slat shall be placed on both sides at each end and intermediately every foot.

G-3. *Marking*.—Unless otherwise specified, shipping containers shall be marked with the name of the material, size, and the quantity contained therein, as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications of the issue in effect on date of invitation for bids shall, insofar as applicable, form a part of this specification; and contractors should provide themselves with the necessary copies when submitting bids to the respective departments.

H-1a. *Army*.—United States Army Specification No. 100-2 (latest issue) Standard Specification for Marking Shipments.

H-1b. *Navy*.—Navy Department General Specifications for Inspection of Material, copies of which may be obtained without cost upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D. C.

L NOTES

I-1. Purchasers should specify the thickness, width, length, and finish desired. Pebbled or tiled surfaces are commercially available and should be specified, if desired. Standard sizes are 32 and 48 inches wide and 6 to 16 feet long.

I-2. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in other respects.

I-3. Copies of this specification may be obtained upon application, accompanied by cash or money order, to the Superintendent of Documents, Government Printing Office, Washington, D. C. Price 5 cents.

I-4. The Index of Federal Specifications is obtainable upon application, accompanied by cash or money order, to the Superintendent of Documents, Government Printing Office, Washington, D. C., price to be obtained from that office.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related governmental procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever, and the fact that the Government may have formulated or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1935

For sale by the Superintendent of Documents, Washington, D. C. Price 5 cents

UU-P-147

MAY 24, 1948

SUPERSADING
Fed. Spec. UU-P-534
February 5, 1935

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

PAPER; BUILDING, WATERPROOFED

This specification was approved on the above date by the Director, Bureau of Federal Supply, for the use of all departments and establishments of the Government, and shall become effective not later than August 15, 1948, for use in procurement initiated on or after that date. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE SPECIFICATION

A-1. The following Federal Specification, of the issue in effect on date of invitation for bids, shall form a part of this specification:

UU-P-31—Paper; General Specifications.

B. TYPES, CLASSES, AND WIDTHS

B-1. *Types*.—Waterproofed building paper in accordance with this specification shall be furnished in the following types, as specified in the invitation for bids:

Type I.—Uncreped, not reinforced.

Type II.—Uncreped, not reinforced, saturated, or saturated and coated on both sides.

Type III.—Creped one direction, not reinforced.

Type IV.—Uncreped, reinforced.

Type V.—Creped one direction, reinforced.

Type VI.—Creped two directions, or creped in one direction and pleated or corrugated in the other direction, not reinforced.

Type VII.—Creped two directions, or creped in one direction and pleated or corrugated in the other direction, reinforced.

B-2. *Classes*.—Waterproofed building paper in accordance with this specification shall be furnished in the following classes, as specified in the invitation for bids:

Class A.—For uses where a high degree of water-vapor resistance is required.

Class B.—For uses where only a moderate degree of water-vapor resistance or high water resistance is required.

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Class C.—For uses where only a moderate degree of water resistance is required.

Class D.—For uses where high permeability to water vapor is required.

B-3. *Widths*.—Unless otherwise specified, waterproofed building paper shall be furnished in the following widths, as specified in the invitation for bids:

36 inches	72 inches
40 inches	84 inches
48 inches	96 inches
60 inches	

C. MATERIAL AND WORKMANSHIP

C-1. *Material*.—The material shall consist of paper made water-resistant with asphalt, or other treating or combining agents equal in all respects to asphalt. All papers except type II shall be free from groundwood pulp.

C-2. *Workmanship*.—The paper shall be free from visible defects and shall have a uniform appearance. It shall not stick together to an extent that will cause tearing on unrolling.

D. GENERAL REQUIREMENTS

D-1. *Stretch*.—If paper is creped, pleated, or corrugated, it shall have a stretch in each creped, pleated, or corrugated direction of not less than 10 percent.

D-2. *Reinforcing*.—If paper is reinforced, it shall be reinforced with cords or strands of fibers imbedded in the combining agent, running in any two directions of the paper, and averaging not less than 10 or 20 cords or strands per foot in each direction, as specified.

D-3. *Pliability*.—Except for type II, the paper shall not crack when bent. (See par. F-3d.)

D-4. *Basis of purchase*.—Purchase shall be on a basis of 100 square feet. For calculation of the number of square feet in a shipment, the contractor shall inform the purchaser of the tare weight per roll of paper.

D-5. *Tolerance in width*.—A tolerance of plus or minus $\frac{1}{4}$ inch shall be permitted in the width specified.

E. DETAIL REQUIREMENTS

E-1. *Class A*.—Class A paper shall have a minimum tensile strength in each direction of either 35 pounds per inch width or 20 pounds per inch width, as specified in the invitation for bids. Paper of both strengths shall have a minimum water resistance of 24 hours and a maximum water-vapor permeability of 4 grams per square meter per 24 hours.

E-2. *Class B*.—Class B paper shall have a minimum tensile strength in each direction of either 35 pounds per inch width or 20 pounds per inch width, as specified in the invitation for bids. Paper of both strengths shall have a minimum water resistance of 16 hours, and a maximum water-vapor permeability of 6 grams per square meter per 24 hours.

UU-P-147
AMENDMENT 2
AUGUST 24, 1948

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

PAPER, BUILDING, WATERPROOFED

This amendment was approved on the above date by the Director, Bureau of Federal Supply, for the use of all departments and establishments of the Government, and shall become effective not later than November 1, 1948, for use in procurement initiated on or after that date. It may be put into effect, however, at any earlier date after promulgation.

The following changes shall be made in Federal Specification UU-P-147, dated May 24, 1948:

Page UU-P-147-2:

Paragraph E-1:

Line 6. Following "hours" insert: "(0.075 grain per square foot per hour for a calculated pressure differential of 1 inch of mercury)."

Paragraph E-2:

Line 6. Following "hours" insert: "(0.334 grain per square foot per hour for a calculated pressure differential of 1 inch of mercury)."

Page UU-P-147-3:

Paragraph E-4:

Line 6. Following "hours" insert: "(5.0 grain per square foot per hour for a calculated pressure differential of 1 inch of mercury)."

E-3. *Class C.*—Class C paper shall have a minimum tensile strength in each direction of either 35 pounds per inch width or 20 pounds per inch width, as specified in the invitation for bids. Paper of both strengths shall have a minimum water resistance of 8 hours.

E-4. *Class D.*—Class D paper shall have a minimum tensile strength in each direction of 20 pounds per inch width. The paper shall have a minimum water resistance of 10 minutes and a minimum water-vapor permeability of 35 grams per square meter per 24 hours.

F. METHODS OF SAMPLING, INSPECTION, AND TESTS

F-1. *Sampling.*—The samples shall consist of not less than 10 sheets of each type and class delivered. Each sheet shall be not less than 1 square foot, and each shall be taken from a different roll, after removing at least three outer turns.

F-2. *Inspection.*—Deliveries shall be inspected with respect to type, width, and workmanship. (See pars. B-1, B-3, C-2, and D-5.)

F-3. *Tests.*—For additional details of tests, see applicable procedures described in Federal Specification UU-P-31.

F-3a. *Tensile strength and stretch.*—Tensile strength and stretch shall be determined simultaneously in a pendulum type of machine. The stretch shall be recorded at the instant of rupture of the paper under the tensile stress. When stretch is to be determined, care shall be taken to apply no more initial tension to the test strip before clamping it than is required to straighten it. The test strips shall be 2 inches wide. The clamps of the testing machine shall be initially set not less than 5½ inches apart, and the stressing clamp shall be operated at a speed of 12 inches per minute until the test specimen breaks. The stretch is measured either by means of a recording chart attached to the machine or by measuring between reference marks on the specimen with a scale. Not less than 10 specimens shall be tested, and the average of the test values shall be reported as the tensile strength and stretch. The tensile strength average test value is divided by 2 to obtain the value per inch width. Report the stretch as a percentage of the length of the strips between the clamps.

F-3b. *Dry indicator test.*—The water resistance shall be determined by the dry indicator method as follows:

F-3b(1). *Indicator.*—The dry indicator shall be made of pure cane sugar, pure soluble starch, and methyl violet, as follows: Grind each ingredient separately until it passes through a No. 100 screen and completely dry it in a desiccator over CaCl₂ before making the mixture. When dry, weigh and mix the following proportion by weight:

Sugar	45
Soluble starch	5
Dye	1

Mix the ingredients by screening repeatedly through a No. 60 screen until the mixture is uniform. Keep the indicator in a desiccator when it is not being used.

F-3b(2). Procedure.—The indicator reagent shall be sprinkled evenly over approximately a 2-inch-square area in the center of a specimen 2.5 inches square. Care should be taken to apply this reagent as evenly as possible since bunching or piling of the reagent causes different values. A 2-inch water glass shall be needed over the indicator powder using a mixture of 50 percent beeswax and 50 percent rosin. The edges shall be turned up or dipped in wax to prevent contact of the water with the adhesive, and the specimen floated on tap water maintained at $73^{\circ} \pm 1^{\circ}\text{F}$. The time required for a definite development of color to appear in the indicator shall be noted and recorded as the penetration time. Not less than five tests shall be made on each side of the paper, and the average shall be reported as the water resistance.

F-3c. Water-vapor permeability.—The test specimen having an area of at least 50 square centimeters, shall be sealed on the mouth of a dish containing calcium chloride. The seal shall be made with wax composed of 60 percent refined amorphous wax and 40 percent of refined crystalline paraffin wax. The dish shall be exposed to an atmosphere of $73^{\circ} \pm 3.5^{\circ}\text{F}$. and 50 ± 2 percent relative humidity until a constant rate of gain in the weight of the dish is attained. The average constant weight of gain for at least four test specimens shall be reported as the water-vapor permeability of the material in terms of grams per square meter, per 24 hours. Both sides of the material, in equal number, shall be exposed towards the calcium chloride.

F-3d. Pliability test.—The test for pliability shall be made as follows: Cut five strips, 6 inches by 1 inch, in the machine direction of the paper. Bend them over a $\frac{1}{16}$ -inch mandrel at 32°F ., through an arc of 180° at a uniform rate in 2 seconds. All strips shall remain uncracked.

F-3e. Amount in shipment.—The number of square feet in the shipment shall be calculated as follows:

- (1) Obtain percent tare from the weight of 5 rolls of paper taken at random from the shipment and the tare weight stated by the contractor.
- (2) Using this percent tare, obtain net weight of the whole shipment from the gross weight of the whole shipment.
- (3) Obtain average weight per square foot of the paper from the sample sheets.
- (4) Calculate the square feet in the shipment by dividing the net weight of the whole shipment (item 2) by the average weight per square foot (item 3).

G. PACKING AND MARKING FOR SHIPMENT

G-1. Packing.—Unless otherwise specified, the paper shall be furnished in commercial rolls.

G-2. Marking.—The type and class and the contents in square feet shall be plainly marked on the outside of each roll.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications, of the issues in effect on date of invitation for bids, and special requirements,

shall form a part of this specification, and shall be applicable to purchases made under this specification by the respective departments:

H-2. *Army and Air Force.*—U. S. Army Specification 100-2, Standard Specification for Marking Shipments by Contractors, copies of which may be obtained without cost upon application to the procuring agency.

H-3. *Navy.*—

H-3a. *Applicable specification:*—

Navy Department Specification:

General Specifications for Inspection of Material.

Copies of Federal specifications (required for Navy purchases) and Navy Department specifications may be obtained without cost upon application to the Bureau of Supplies and Accounts, Navy Department, Washington 25, D. C., except that Naval activities should make application to the Supply Officer in Command, Naval Supply Center, Norfolk 11, Va. When requesting specifications, refer to both title and number (or symbol).

NAVY: A S Y

I. NOTES

I-1. Purchasers should exercise any desired options offered herein, and should specify the type, class, width, reinforcing, and (for classes A, B, and C) tensile strength of paper required. See pars. B-1, B-2, B-3, D-2, E-1, E-2, E-3, and G-1.)

I-2. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-3. Federal specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, etc., which are suitable for Federal Government requirements.

I-4. An Index of Federal Specifications may be purchased as noted in the paragraph below, price to be obtained from the Superintendent of Documents.

I-5. Copies of this specification and of UU-P-31 may be obtained upon application, accompanied by postal note, money order, coupon, or cash, to the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Price 5 cents each.

UU-P-147-6 FEDERAL STANDARD STOCK CATALOG
(May 1948) (Section IV, Part 5)

Notice.—When Government drawings, specifications, or other data are used for any purpose, other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1948 — 751479(246)

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BIRD 006321

SS-C-153

AUGUST 1, 1933

SUPERSEDING

F.S. No. 380
January 25, 1926

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

CEMENT; BITUMINOUS, PLASTIC

This specification was approved for promulgation by the Federal Specifications Board on August 1, 1933, for the use of departments and independent establishments of the Government in the purchase of this commodity, and shall become mandatory for all departments and independent establishments of the Government not later than February 15, 1934, to effect, however, at any earlier date, after promulgation.

APPLICABLE FEDERAL SPECIFICATIONS

A-1. There are no other Federal specifications applicable to this specification.

A-2. Special requirements of individual departments of the Government are noted under section H.

TYPES

B-1. Bituminous plastic cement shall be of two types.

Type I. Asphaltic base.

Type II. Coal-tar base.

The type or types desired shall be specified in the invitation for bids.

MATERIAL

C-1. Bituminous plastic cement shall be composed of a suitable inorganic filler, a suitable solvent, and a nonvolatile bituminous binder. The binder in type I shall be mainly asphaltic, and in type II mainly coal tar, but the manufacturer may add other organic products to either of these binders to produce a cement of better working and lasting properties.

GENERAL REQUIREMENTS

D-1. Basis of purchase.—Material is to be purchased by net weight.

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E. DETAIL REQUIREMENTS

E-1. *Condition in container.*—The plastic cement shall be a smooth uniform mixture, not thickened or livered, and showing no separation which cannot be easily overcome by stirring.

E-2. *Nonvolatile matter.*—The plastic cement shall yield not less than 70 percent of nonvolatile matter when 10 grams are heated in an oven at 105°–110° C. (221°–230° F.) for 24 hours.

E-3. *Inorganic filler.*—The plastic cement shall yield on ignition not less than 15 percent nor more than 45 percent of ash.

E-4. *Workability.*—The plastic cement shall spread readily without drawing or pulling when applied with a trowel to prepared roofing, asphalt-saturated felt, and to metal surfaces.

E-5. *Behavior at 60° C. (140° F.).*—Test pieces prepared as in E-4 on smooth-surfaced prepared roofing, asphalt-saturated flashing felt and steel, and exposed for 60 minutes in a well-ventilated room and then in an oven at 60° C. (140° F.) for 5 hours shall show no blistering and not more than one fourth inch sagging or slipping, and no appreciable absorption of the cement by the prepared roofing or saturated felt.

E-6. *Behavior at 0° C. (32° F.).*—Metal-test pieces from E-5 when bent quickly over a mandrel 1 inch in diameter, immediately after exposure to a temperature of 0° C. (32° F.) for 1 hour, shall show no cracking of the cement, and no separation of metal and cement.

F. METHODS OF SAMPLING AND TESTING

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

F-1. *Sampling.*—From each shipment the inspector shall take at random a number of packages equivalent to one half the cube root of the total number of packages in the lot. If this proves to be a fractional number it shall be expressed as the next higher whole number. The contents of each package selected shall be thoroughly stirred until a homogeneous mixture is obtained. One pint of the cement shall then be immediately drawn from each package and transferred to a clean receptacle of a suitable size which shall be kept tightly covered except while the cement is being introduced. After all the pint samples have been entered the contents of this container shall be thoroughly stirred and two 1-quart samples of the composite sample shall be transferred to clean dry containers, shall immediately be stoppered with new clean corks or well fitting covers or caps, sealed, and distinctly labeled. One sample shall be transmitted to the testing laboratory and the other retained for check analysis in case of dispute.

F-2. *Laboratory examination.*—

F-2a. *Condition in container.*—The plastic cement should be of a smooth uniform mixture, not thickened or livered, and showing no separation which cannot be easily overcome by stirring.

F-2b. *Nonvolatile matter.*—Weigh about 10 grams of the sample in a weighed flat-bottomed metal dish about 5 to 8 centimeters in diameter or a friction top can plug. Heat the dish with its contents

in an oven maintained at 105°-110° C. (221°-230° F.) for 24 hours, cool and weigh. From the weight of the residue left in the dish and from the weight of the original sample taken compute the percentage of nonvolatile matter.

F-2c. Ash.—Transfer from 5 to 10 grams of the sample (accurately weighed) to a porcelain crucible and heat at a low temperature (not above a dull red) until all carbon is consumed, cool, weigh, and compute the percentage of ash.

F-2d. Workability.—Spread the cement with a trowel to a thickness of 1.5 to 3 millimeters ($\frac{1}{16}$ to $\frac{1}{8}$ inch) upon smooth-surfaced asphalt prepared roofing (heavyweight), asphalt-saturated flashing felt and a plate of clean steel. The steel plates should be about 0.4 millimeters (0.016 inch) thick. A convenient size for all the test pieces is 10 by 15 centimeters (4 by 6 inches). Note whether the cement spreads easily at room temperature without drawing or pulling. Embed a thread in each coating extending across the coating at a distance of not more than 5 centimeters (2 inches) from the top of the test piece and measure its distance from the top.

F-2e. Behavior at 60° C. (140° F.).—After exposing the test pieces prepared in F-2d for 60 minutes in a horizontal position in a well ventilated room at a temperature not below 15° C. (59° F.), but not in the direct rays of the sun, suspend them vertically for 5 hours in an oven at 60° C. (140° F.). Remove the test pieces from the oven after 5 hours' heating and examine for blistering and absorption of cement and for slipping by comparing the distance of the thread from the top of the test piece with its distance at the beginning of the test.

F-2f. Behavior at 0° C. (32° F.).—Cool the metal test pieces from F-2e to room temperature and immerse them in a water bath at 0° C. (32° F.) for 1 hour. Immediately after their removal from the bath bend the panels at a uniform rate, in approximately 2 seconds time, over a mandrel 1 inch in diameter, with the metal next to the mandrel. Dry thoroughly and examine.

G. PACKAGING, PACKING, AND MARKING

G-1. Packaging.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. Packing.—Unless otherwise specified, the subject commodity shall be delivered in standard commercial containers, so constructed as to insure acceptance by common carriers, for safe transportation, at the lowest rate, to the point of delivery.

G-3. Marking.—Each package shall be legibly marked with a description of the contents, the name of the manufacturer, the place of manufacture, the brand (if any), the net weight or net liquid measure of the contents, and some means of identification of "the particular contract on which purchase and shipment were made." Each shipment of the material shall be accompanied by printed directions for its use.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall respectively form a part of this specification.

H-1a. Army.—United States Army Specification No. 100-2, Standard Specification for marking shipments.

H-1b. Navy.—Navy Department purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, roofing, siding, and sheet-metal work; dampproofing and membrane waterproofing, copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D.C.

L NOTES

I-1. Bituminous plastic cement is intended for use in the construction of plastic flashings in conjunction with bituminous roofing, for the repair of asphalt and metal roofing and as an expansion joint material for concrete and masonry.

I-2. The inorganic filler in satisfactory plastic bituminous cement is generally wholly or in part asbestos.

I-3. Type I should be used with Federal specification flashing felt. Either type may be used on coal-tar pitch, for repair of metal roofing, or as expansion joint material for concrete and masonry.

I-4. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally, no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-5. This specification governs all United States Government purchases of this commodity. Users are requested to retain this specification in permanent file until a revision is issued.

I-6. Interested parties are advised that an alphabetical index of Federal specifications may be obtained upon application as noted in paragraph next below, price to be obtained from the Superintendent of Documents.

I-7. Copies of this specification may be obtained upon application, accompanied by money order or coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D.C. Price 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility or any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U S GOVERNMENT PRINTING OFFICE : 1941

For sale by the Superintendent of Documents, Washington, D.C. ----- Price 5 cents

HH-F-191a

AMENDMENT 2

NOVEMBER 22, 1954

SUPERSEDING

Amendment—1

June 25, 1951

FEDERAL SPECIFICATION

FELT; ASPHALT-SATURATED (FOR) FLASHINGS, ROOFING, AND WATERPROOFING

This amendment, which forms a part of Federal Specification HH-F-191a, dated September 29, 1942, was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

Page 2, paragraph E-2, make the following changes in table:

Gross weight of roll (lbs.), Type I, 15-lb. type and Type II, 30-lb. type, Minimum: Delete "61" for each type and substitute "56".

Weight per 100 square feet, exclusive of wrapping, packing, etc. (lbs.), Minimum: Delete "14" for Type I, 15-lb. type and "28" for Type II, 30-lb. type and substitute "12" for Type I, 15-lb. type and "26" for Type II, 30-lb. type.

Weight of moisture-free desaturated felt per 100 square feet (lbs.), Minimum: Delete "10.4" for Type II, 30-lb. type and substitute "10.0".

Page 3, paragraph F-2c:

Line 4: Delete "14" and substitute "13".

Line 5: Delete "28" and substitute "26".

Page 5, paragraph G-2: Delete in its entirety and substitute the following:

G-2. *Packing*.—Unless otherwise specified, the subject commodity shall be prepared for shipment to permit acceptance by carrier for transportation at the lowest applicable rate and to afford maximum protection from normal hazards of transportation.

Page 5, paragraph H-2: Delete in its entirety and substitute the following:

H-2. *Army*.

H-2a. *Applicable specification and standard*.

Military Specification:

MIL-P-3423—Packaging of Roofing, Asphalt-Prepared, Asphalt and Asbestos-Prepared (in Rolls) Including Nails and Cement for Overseas Shipment.

Military Standard:

MIL-STD-122—Marking for Shipment and Storage.

(Copies of specifications, standards, and drawings required by the contractor in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

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GENERAL SERVICES ADMINISTRATION

Business Supply Center

4114 Commerce St., Dallas, Texas

H-2b. Packaging and packing for overseas shipment.—Unless otherwise specified in the contract or order, asphalt-saturated felt shall be packaged in conformance with Specification MIL-P-3423.

H-2c. Marking.

H-2c(1). Interior containers.—Each package and overwrap shall be marked or labeled to indicate the item and quantity contained therein.

H-2c(2). Shipping containers.—In addition to any special marking required by the contract or order, shipping containers shall be marked in accordance with Military Standard MIL-STD-129, Marking for Shipment and Storage.

Page 6, paragraphs I-6 and I-7: Delete and substitute:

(Activities outside the Federal Government may obtain copies of Federal Specifications and Standards as outlined under "General Information" in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.)

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the GSA Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, Seattle, and Washington, D. C.)

(Federal Government activities may obtain copies of Federal Specifications and Standards and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Page 6, following paragraph I-8: Insert new paragraph I-9 as follows:

I-9 Transportation Description.—Transportation Description applicable to this item is:

Roofing, composition or prepared, not otherwise indexed by name.

Carload weight 40,000 pounds.

Truckload weight 40,000 pounds.

Page 6, following Notice, add:

MILITARY INTEREST:

Army—E

Navy—Y S

Air Force

Page 6, bottom of page: Delete "For Sale" statement and substitute:

"Copies of this specification may be purchased for 5 cents."

HH-F-191a

AMENDMENT-1
JUNE 25, 1951

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

FELT; ASPHALT-SATURATED (FOR) FLASHINGS, ROOFING, AND WATERPROOFING

This amendment was approved on the above date by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

The following changes shall be made in Federal Specification FH-F-191a, dated September 29, 1942:

Page HH-F-191a-2:

Paragraph E-2:

Table:

Gross weight of roll (lbs.), Type I, 15-lb. type and Type II, 30-lb. type, Minimum: Delete "61" for each type and substitute "56".

Weight per 100 square feet, exclusive of wrapping, packing, etc. (lbs.), Minimum: Delete "14" for Type I, 15-lb. type and "28" for Type II, 30-lb. type and substitute "13" for Type I, 15-lb. type and "26" for Type II, 30-lb. type.

Weight of moisture-free desaturated felt per 100 square feet (lbs.), Minimum: Delete "10.4" for Type II, 30-lb. type and substitute "10.0".

Page HH-F-191a-3:

Paragraph E-2c:

Line 4: Delete "14" and substitute "13".

Line 5: Delete "28" and substitute "26".

Page HH-F-191a-5:

Paragraph H-2. Delete in its entirety and substitute the following:

H-2. Army.

H-2a. Applicable specifications.

Military Specification:

MIL-P-3423—Packaging of Roofing: Asphalt-Prepared; Asphalt and Asbestos-Prepared (In Rolls) Including Nails and Cement, for Overseas Shipment.

U. S. Army Specification:

100-2—Standard Specification for Marking Shipments by Contractors.

(Copies of specifications should be obtained from the procuring agency or as directed by that agency. Both the title and identifying symbol or number should be stipulated when requesting copies.)

800576-51—(No. 364)

HK-P-191a-
Amend.—1
(June, 1951)

FEDERAL STANDARD STOCK CATALOG
(Section IV, Part 5)

H-2b. *Packaging and packing for overseas shipment.*—Unless otherwise specified in the contract or order, asphalt-saturated felt shall be packaged in conformance with Specification MIL-P-3423.

H-2c. *Marking.*

H-2c (1). *Interior containers.*—Each package and overwrap shall be marked or labeled to indicate the item and quantity contained therein.

H-2c (2). *Shipping containers.*—In addition to any special marking required by the contract or order, shipping containers shall be marked in accordance with Specification 100-2.

U. S. GOVERNMENT PRINTING OFFICE: 1951

MILITARY SPECIFICATION

ADHESIVE, WATER-RESISTANT,
WATERPROOF BARRIER-MATERIAL

This specification was approved by the Departments of the Army, the Navy, and the Air Force for use of procurement services of the respective Departments.

1. SCOPE

1.1 Scope.—The water-resistant adhesive covered by this specification is intended for application to the seams in the manufacture and in the closure of waterproof paper bags, wraps, and case liners.

1.2 Classification.—Water-resistant adhesive shall be furnished in the following types, grades, and classes, as specified (see 6.1):

Type I—For application by machine.

Type II—For application by hand.

Grade A—For subsistence items.

Grade B—For other than subsistence items.

Class 1—Solvent-base adhesive.

Class 2—Water-emulsion adhesive.

Class 3—Hot melt adhesive.

2. APPLICABLE SPECIFICATIONS,
STANDARDS, DRAWINGS, AND PUBLICA-
TIONS

2.1 The following specifications and standard, of the issue in effect on the date of invitation for bids, form a part of this specification:

SPECIFICATIONS

MILITARY

JAN-P-110 —Packaging and Packing for Overseas Shipment—Drums; Metal, 55-Gallon (For Other Than Petroleum Products).

JAN-P-124 —Packaging and Packing for Overseas Shipment—Containers (Cans, Pails, and Drums), Metal (For Other Than Subsistence Items).

JAN-P-125 —Packaging and Packing for Overseas Shipment—Barrier-Materials, Waterproof, Flexible.

NAVY DEPARTMENT

General Specifications for Inspection of Material.

STANDARDS

MILITARY

MIL-STD-129 —Marking of Shipments.

(Copies of specifications, standards, and drawings required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Qualification.—The adhesive shall be a product which has been tested and has

passed the qualification tests specified in 4.4.1 (see 6.2).

3.2 Fungi resistance.—The adhesive shall show no growth of fungi when tested as specified in 4.4.3.

3.3 Low temperature flexibility.—The adhesive bond shall not separate from the paper or fracture when tested as specified in 4.4.4.

3.4 Water penetration.—The adhesive bond shall have a minimum penetration time of 8 hours when tested as specified in 4.4.5.

3.5 Adhesion.

3.5.1 After water immersion.—The bond shall not shear under a tension of less than 10 pounds when tested as specified in 4.4.6.1.

3.5.2 After heat aging.—The bond shall not shear under a tension of less than 7.5 pounds when tested as specified in 4.4.6.2.

3.6 Initial tack (type II only).—The adhesive shall develop sufficient adherence in 90 ± 5 seconds from the time of application to sustain for 60 seconds a suspended load of 12 ounces when tested as specified in 4.4.7.

3.7 Resistance to flow.—The dried adhesive film shall show no separation or flow of adhesive when tested as specified in 4.4.8.

3.8 Stability (type II only).

3.8.1 Resistance to heat.—The adhesive shall conform to 3.4 and 3.6 when tested as specified in 4.4.9.1.

3.8.2 Resistance to freezing (class 1).—The adhesive shall conform to 3.4 and 3.6 when tested as specified in 4.4.9.2.

3.8.3 Shelf life.—The adhesive shall conform to 3.4 and 3.6 when tested as specified in 4.4.9.3.

3.9 Consistency (type II, classes 1 and 2).—The adhesive shall have a consistency at 60 to 100° F. which will permit easy brush application on case liners without heating.

3.10 Odor and toxicity.

3.10.1 Grade A.—The liquid adhesive shall not have an odor which is disagreeable or persistent. A dried film of the adhesive shall be odorless.

3.10.2 Grade B.—The liquid adhesive and dried film shall be free from objectionable or obnoxious odors.

3.10.3 Grades A and B.—The manufacturer shall furnish the contracting officer with a certificate stating the adhesive, when applied in accordance with manufacturer's instructions, is nontoxic for the purpose intended.

3.11 Solids content.—The adhesive, when tested as specified in 4.4.10, shall have a total solids content which does not vary more than 10 percent of the value established for the adhesive at the time of qualification.

3.12 Workmanship.—All work shall be done in a manner consistent with good practice in the manufacture of adhesives.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Lot.—A lot shall consist of the adhesive manufactured from one batch and offered for delivery at one time (see 6.3).

4.2 Sampling.

4.2.1 Sampling for inspection tests (see 4.4.2).—From each lot submitted for acceptance, the Government inspector shall take a 1-pint specimen representative of the adhesive from randomly selected containers in accordance with table I.

TABLE I.—Sampling.

No. of containers in lot	No. containers to be sampled
Up to 100-----	1
101 to 200-----	2
Over 200-----	3

Prior to sampling, the adhesive in the container from which the specimen is taken shall be thoroughly mixed. During mixing the material shall be observed for compliance with sec 3.10. The 1-pint specimens shall be placed in separate wide-mouth glass or metal, multiple-friction-top 1-pint containers, and the containers identified as to the manufacturer, contract, specification number, type, lot, and batch number.

4.3 Inspection.

4.3.1 Packing and marking.—The inspector shall inspect the packing and marking for compliance with section 5.

4.3.2 Inspection procedures.—For Naval purchases, general inspection procedures shall be in accordance with General Specifications for Inspection of Material.

4.4 Tests.

4.4.1 Qualification tests.

4.4.1.1 Type I.—The qualification tests shall consist of tests for all the requirements of this specification, excepting those specified in 3.6, 3.8, and 3.9 (see 6.2).

4.4.1.2 Type II.—The qualification tests shall consist of tests for all the requirements of this specification (see 6.2).

4.4.2 Inspection tests.

4.4.2.1 Type I.—Inspection tests shall consist of the tests specified in 4.4.5, 4.4.8, and 4.4.10, on each 1-pint specimen to insure that the material submitted is essentially the same as previously qualified.

4.4.2.2 Type II.—Inspection tests shall consist of the tests specified in 4.4.5, 4.4.7, 4.4.8, and 4.4.10, on each 1-pint specimen to insure that the material submitted is essentially the same as previously qualified.

4.4.3 Fungi resistance.

4.4.3.1 Test organisms.

- a. *Aspergillus niger* USDA TC-215-4247 or ATCC 6275.
- b. *Aspergillus flavus* ATCC-1003.
- c. *Penicillium* USDA 1336.2.

4.4.3.2 Preparation of inoculum.—Place 40 milliliters (ml.) of the following composition in three 250-ml. Erlenmeyer flasks:

NH ₄ NO ₃ -----	3.0 grams.
K ₂ HPO ₄ -----	2.1 grams.
KH ₂ PO ₄ -----	2.7 grams.
MgSO ₄ ·7H ₂ O -----	2.2 grams.
Glucose -----	20.0 grams.
Agar -----	20.0 grams.

Distilled water—Sufficient to make 1 liter of solution. Stopper with a cotton plug and sterilize with steam at 15 pounds pressure for 15 minutes. When the agar is cool, inoculate each of the three flasks with one of the three pure cultures mentioned above. Incubate the flasks for 1 week at 28 to 30° C., when abundant sporulation should have taken place.

4.4.3.3 Apparatus.

- a. Petri dishes 10 centimeters (cm.) in diameter with tight fitting covers and with a layer of glass beads in the bottom and an amount of water slightly less than is necessary to cover the beads.
- b. Microscopic slides.
- c. Camel's-hair brush.

4.4.3.4 Preparation of test specimens.—Apply a thin (approx. 0.5 millimeter (mm.)) film of the adhesive to one surface of each of three clean microscopic slides. A layer of culture media specified in 4.4.3.2 shall be similarly prepared and used as a control.

4.4.3.5 Test procedure.—Without sterilizing, place each of the glass slides, adhesive film uppermost, on top of the beads in a petri dish. Using a small camel's-hair brush, dust the adhesive surface very lightly with spores of each of the test fungi. Incubate in chamber for 10 days at 28 to 30° C. and relative humidity of 85 to 90 percent.

4.4.3.6 Interpretation.—There shall be no fungus growth perceptible to the naked eye on the surface of the treated test specimens. Unless the control specimen shows an abundant growth of fungi, the test shall be considered inconclusive.

4.4.4 Low-temperature flexibility.

4.4.4.1 Material.—Use types H-3 and L-2 barrier-materials conforming to Specification JAN-P-125. All tests on type H-3 barrier-material shall be made by bonding the two test specimens placed so that the crepe direction is perpendicular to the seam length. All tests on type L-2 barrier-material shall be made with the adhesive applied to the untreated surface, and bonded to the treated surface.

4.4.4.2 Preparation of specimens.—Cut the barrier-material into two 2½- by 8-inch pieces. Apply the adhesive in a smooth continuous film in the thickness recommended by the manufacturer and 1 inch in width along the 8-inch edge of a test strip of barrier-material. Allow to stand for 30 seconds, then place an uncoated similar sheet of the paper over the first sheet so that all edges coincide. Subject the bonded area to a uniform pressure of 0.5 pounds per square inch (p.s.i.) for 24 hours at a temperature of 73 ± 2° F. Remove the pressure and allow to set for an additional 24 hours at a temperature of 73 ± 2° F. and a relative humidity of 50 ± 2 percent. Cut 1 inch from each end of the bonded specimens perpendicularly to the seam and discard. Then cut the remainder into two specimens 3 inches long.

4.4.4.3 Test procedure.—Condition the specimens for at least 2 hours at 0 ± 2° F.

and flex immediately through 180 degrees over a ¼-inch mandrel at 0 ± 2° F., with the length of the seam perpendicular to the mandrel. Straighten and turn the specimen over without changing the direction of the seam. Flex once through 180 degrees and slowly return the specimen to its original position. The flexing operation shall be performed in not less than 3 nor more than 5 seconds with a maximum time interval of 5 seconds between flexures. Observe the bond for separation from the paper and for fracture. If the bonded specimens conform to 3.3, the specimens shall be allowed to set for a minimum of 2 hours at 73 ± 2° F. and used for the water penetration test specified in 4.4.5.

4.4.5 Water penetration.

4.4.5.1 Preparation of specimens.—Open up the specimens used for tests in 4.4.4.3 (for inspection tests, use specimens prepared as specified in 4.4.4.2) to form a 3- by 3-inch specimen having a 1-inch fin seam. A dry indicator reagent which changes color due to the permeation of moisture (see 4.4.5.3) shall be sprinkled evenly over approximately a 2-inch square area in the center of the 3- by 3-inch flat surface of the T-shaped specimen. Care should be taken to apply this reagent as evenly as practicable since bunching or piling of the reagent causes different values. Place a 2-inch watch glass over the reagent and approximately in the center of the 3- by 3-inch surface of the test specimen. Brush away the reagent outside the watch glass and seal the watch glass to the test specimen using a mixture of equal weights of beeswax and resin. The outer ¼ inch of the 3-inch edges shall be coated on both sides with the wax mixture but no wax shall be applied to the cut edges of the adhesive seam.

4.4.5.2 Test procedure.—The specimens shall then be floated on fresh tap water maintained at 70 ± 5° F. with the fin seam down. The test shall be conducted with both type H-3 and L-2 barrier-material. The time required for a definite development of color to appear in the indicator shall be noted and recorded as the penetration time.

4.4.5.3 Dry indicator.—The dry indicator shall be made of cane sugar, soluble starch, and methyl violet as follows:

- a. Grind each ingredient separately until it passes through a No. 100 U. S. Standard sieve and completely dry it in a desiccator over calcium chloride before making the mixture. When dry, mix the following proportions by weight:

Sugar	45
Soluble starch	5
Dye	1

- b. Mix the ingredients by sieving repeatedly through a U. S. Standard No. 60 sieve until the mixture is uniform. Keep the indicator in a desiccator when not in use.

4.4.6 Adhesion.

4.4.6.1 After water immersion.—Conduct separate tests on types H-3 and L-2 barrier-material (see 4.4.4.1) at $73 \pm 2^\circ \text{F.}$, and a relative humidity of 50 ± 2 percent. Cut the barrier-material into two 4- by 12-inch specimens (the 4-inch edge in the direction of the greater tensile strength). Apply the adhesive in a smooth, continuous film, in the thickness recommended by the manufacturer, on an outer 1-inch portion of the untreated side of one 12-inch edge of the specimen. Allow to stand for 30 seconds, then make a lap bond by placing 1 inch (treated side) of an uncoated similar specimen of the barrier-material over the adhesive on the first specimen. Subject the bonded area to a uniform pressure of 0.5 p.s.i. for 24 hours. Remove the weight and allow to stand for an additional 24 hours. Cut the bonded specimens, in a direction perpendicular to the bond, into 12 test specimens. Submerge the specimens in tap water ($70 \pm 5^\circ \text{F.}$), for 4 hours in such a manner that there is no contact between individual specimens. Remove the specimens, one at a time, from the water and immediately absorb the surface water by blotting each specimen for 1 minute with absorbent

paper. Within 3 minutes of the time of removal from the water, test the specimen in a tensile tester. Center 1 inch of each end of the specimen in the flat jaws of the machine; tighten the jaws and separate at a rate of 12 inches per minute. Record the tension, location, and nature of the break. If tension on any specimen falls below 10 pounds, the test shall be repeated on double the number of specimens. If any specimen on retest does not meet the requirement, the material shall be rejected. (Note.—If the barrier-material portion of the wet specimen consistently breaks at less than 10 pounds tension and the bond is undamaged or partly damaged the adhesive shall be considered as meeting the adhesive requirement.)

4.4.6.2 After heat aging.—Prepare 12 dry test specimens from both H-3 and L-2 type barrier-material as specified in 4.4.6.1. Place in a circulating air oven for 30 ± 2 days at $120 \pm 2^\circ \text{F.}$, remove and condition at $73 \pm 2^\circ \text{F.}$ for 24 hours. Examine the specimens for separation and flow of adhesive, then conduct the shear test specified in 4.4.6.1. If tension on any specimen falls below 7.5 pounds, the test shall be repeated on double the number of specimens. If any specimen on retest does not meet the requirements, the material shall be rejected. (Note.—If the barrier-material portion of the dry specimen consistently breaks at less than 7.5 pounds tension and the bond is undamaged or partly damaged, the adhesive shall be considered as meeting the adhesive requirement.)

4.4.7 Initial tack (type II only).—Conduct separate tests on types H-3 and L-2 barrier-material (see 4.4.4.1) at a temperature of $73 \pm 2^\circ \text{F.}$, and a relative humidity of 50 ± 2 percent. By means of a suitable adhesive, securely bonded the waterproof barrier-material to one end of each of two steel cylinders having a diameter of 1 inch and weighing 12 ounces (approx. 3 inches long). The ends of the cylinders shall be squared perpendicularly to their length. Care should be taken to insure that the outer surface of the barrier-material is free from wrinkles and other im-

perfections, exclusive of the creping or pleating. Trim the bonded paper so that a disk is formed having a diameter of 1 inch. With a cylinder in an upright position apply a film of the adhesive as recommended by the manufacturer, to the barrier-material on the end of one of the cylinders and allow to air dry for 30 seconds, the time being determined from the beginning of the adhesive application. Immediately place the second cylinder on top of the first so that the cylinders are aligned and the barrier-material surfaces are in contact with the adhesive film, being careful not to apply any pressure other than the weight of the cylinder. Sixty seconds after placing the cylinders together, raise the upper cylinder so that the bottom cylinder is free from any supporting surface. The lower cylinder shall be sustained by the adhesive for the period of time specified in 3.6. Tests for initial tack on type H-3 barrier-material shall be performed using twice the weight for the upper cylinder by applying an additional load of 12 ounces to the upper cylinder. The crepe direction on the barrier-material on the cylinders shall be in the same direction. For qualification tests, a total of 15 determinations shall be made of which not more than three shall fail to meet the requirements. For inspection tests, a total of five determinations per sample of adhesive shall be made of which not more than one shall fail to meet the requirements.

4.4.8 Resistance to flow.—Following the aging and conditioning period specified in 4.4.6.2, examine the specimens visually for conformance to 3.7. Then prepare an additional 12 dry test specimens from both H-3 and L-2 types of barrier-material as specified in 4.4.6.1 and trim edges of specimens to remove excess adhesive. Attach a paper clip to one free end of the specimen and suspend the specimen by means of the clip in a circulating dry air oven at $140 \pm 2^\circ \text{F}$. for at least 24 hours. Remove specimen from the oven and examine specimen for seam separation and flow of adhesive.

4.4.9 Stability (type II only).

4.4.9.1 Resistance to heat.—Approximately 1 pint of adhesive shall be placed in a wide-mouth glass container, sealed tightly and placed in a circulating air oven for 2 weeks at $120 \pm 2^\circ \text{F}$. It shall then be removed from the oven and allowed to cool to $73 \pm 2^\circ \text{F}$. After the adhesive has cooled, the tests specified in 4.4.5 and 4.4.7 shall be conducted.

4.4.9.2 Resistance to freezing.—Allow a 1-pint specimen of adhesive to cool to $0 \pm 2^\circ \text{F}$. in a closed wide-mouth glass container and condition the specimen at this temperature for a minimum of 16 hours. Allow to stand for 8 hours at $73 \pm 2^\circ \text{F}$. and repeat for a total of 3 cycles. Then condition the specimen for 24 hours at $73 \pm 2^\circ \text{F}$. The adhesive shall be tested as specified in 4.4.5 and 4.4.7.

4.4.9.3 Shelf life.—Approximately 1 pint of adhesive shall be placed in a wide-mouth glass 1-pint container, sealed tightly and shelf-aged at $73 \pm 2^\circ \text{F}$. for a minimum of 12 months from the date of manufacture. The adhesive shall then be thoroughly mixed and tested as specified in 4.4.5 and 4.4.7 during the thirteenth month after the date of manufacture. Adhesive conforming to all other requirements of this specification shall be qualified prior to the completion of this test. Adhesive failing to conform to 3.4 and 3.6 after shelf-aging, shall be removed from the qualified products list.

4.4.10 Solids content.—Transfer approximately 10 grams (gm.) (weighed to the nearest centigram) of each specimen to separate tared weighing bottles. Weigh the bottle and contents, remove cover and heat to a constant weight in an oven maintained at $215 \pm 5^\circ \text{F}$. Cover the bottle, cool in a desiccator at room temperature and reweigh. Calculate the percent solids as follows:

$$\text{Percent total solids} = \frac{100 A}{W}$$

where:

A = weight of residue.

W = weight of sample.

4.5 Rejection and resubmission.—If a specimen of adhesive selected in accordance with 4.2.1 fails to conform to this specification, the entire lot shall be rejected. The contractor may, at no expense to the Government, test each container in a rejected lot, remove non-conforming containers, and resubmit the remaining containers for acceptance. Lots resubmitted for acceptance shall be sampled and tested as specified in 4.2.1 and 4.4.2, respectively. Failure on retest shall result in final rejection of the lot.

5. PREPARATION FOR DELIVERY

5.1 Packing (for domestic or overseas shipment).—The adhesive shall be packed in round 5-gallon metal containers conforming to Specification JAN-P-124 or in 0.0478 ± 0.0050 -inch (18-gage) 55-gallon metal drums conforming to Specification JAN-P-110. Containers shall have a full-removable-head closure, except that when the viscosity of the adhesive is such that it will readily flow from a small opening, a closed top container with a nozzle and screw-cap closure, or flange-and-plug closure may be used. Neither the 5-gallon containers nor the 55-gallon drums require overpacking.

5.1.1 Rubber base solvent adhesives shall be packed only in round 5-gallon metal containers specified in 5.1.

5.2 Marking.—In addition to any special marking required by the contract or order, all shipping containers shall be marked in accordance with Standard MIL-STD-129. In addition the following marking shall appear on each container:

STORE IN A COOL PLACE
KEEP FROM FREEZING
DATE OF MANUFACTURE
MANUFACTURER'S INSTRUCTIONS
FOR USE

TYPE _____ GRADE _____ CLASS _____

Adhesive which does not meet the requirements for grade A adhesive for subsistence items, shall bear the following marking:

WARNING

THIS ADHESIVE IS NOT TO BE USED
ON CASE LINERS FOR SUBSISTENCE
ITEMS

6. NOTES

6.1 Ordering data. — Procurement documents should specify the following:

- (a) The title, number, and date of this specification.
- (b) Type, grade, and class of adhesive (see 1.2).
- (c) Size of container (see 5.1).

6.2 Qualification.—In the procurement of products requiring qualification the right is reserved to reject bids on products that have not been subjected to the required tests and found satisfactory for inclusion on the Military Qualified Products List. The attention of suppliers is called to this requirement and manufacturers are urged to communicate with the Commanding Officer of the Chemical Procurement District in which the supplier is located and arrange to have the products that they propose to offer to the Army, the Navy, or the Air Force, tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. At least 1 gallon of material will be required for qualification tests. Information pertaining to qualification of products covered by this specification may be obtained from the Commanding Officer of the Chemical Procurement District in which the supplier is located.

6.3 Batch. — A batch is defined as that quantity of material which has been subjected to some unit chemical or physical mixing process intended to make the final product substantially uniform.

6.4 Sampling and testing.—When the contractor consistently produces high-quality material and operates under a system of quality control acceptable to the Government, the

MIL-A-140A

Government, at its discretion, may modify, in whole or in part, the sampling and testing procedures specified herein. However, the Government reserves the right to return at any time, without previous notice to the contractor, to the sampling and testing procedures specified in this specification.

6.5 Inspection.—Inspection will not necessarily include all drawing and specification requirements. However, the omission of inspection does not constitute a waiver of these requirements.

Notice.—When Government drawings, specifications, or other data are used for any purpose other

than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

Custodian:

Army—Chemical Corps

Other interest:

Army—QESigCOT

Navy—SAMdOrSHYMC

Air Force.

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

FELT, ASBESTOS; ASPHALT-SATURATED AND
ASPHALT-COATED, FOR BUILT-UP ROOFING

This specification was approved on the above date by the Director, Bureau of Federal Supply, for the use of all departments and establishments of the Government, and shall become effective not later than September 15, 1947 for use in procurement initiated on or after that date. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE SPECIFICATIONS AND OTHER PUBLICATIONS

A-1. There are no other Federal specifications applicable to this specification.

A-2. The following Underwriters' Laboratories, Inc., publication, of the issue in effect on date of invitation for bids, shall form a part of this specification.

List of Inspected Fire Protection Equipment and Materials.

B. CLASSES, WIDTHS, AND GRADE

B-1. *Classes*.—Coated asphalt-saturated asbestos felt in accordance with this specification shall be furnished in the following classes, as specified in the invitation for bids, contract, or purchase order.

Class A.—20-pound (one side coated).

Class B.—50-pound (both sides coated).

B-2. *Width of felt*.—Unless otherwise specified, coated asphalt-saturated asbestos felt in accordance with this specification shall be furnished in rolls 36 inches $\pm$ $\frac{1}{4}$ inch or 32 inches $\pm$ $\frac{1}{4}$ inch wide, as specified in the invitation for bids, contract, or purchase order.

B-3. *Grade*.—Coated asphalt-saturated asbestos felt in accordance with this specification shall be furnished in one grade only.

C. MATERIAL AND WORKMANSHIP

C-1. *Material*.—The material shall be a felt made essentially of asbestos fibers, impregnated with asphalt, and coated (on one side for class A felt and on both sides for class B felt) with asphalt. The coated surfaces may have a light surfacing of silica or other mineral matter which will not interfere with adhesion between the felt and the plying cement, to prevent sticking in the rolls.

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C-2. *Workmanship.*—Coated asphalt-saturated asbestos felt shall be uniform throughout and shall be free from visible defects such as holes, ragged or untrue edges, blisters, breaks, rents, cracks, and indentations. The coating and mineral surfacing shall be uniformly applied and shall extend to the edge of the sheet. The surface shall be free from areas or patches of unabsorbed saturant, unequally distributed coating, and superficial dry spots.

D. GENERAL REQUIREMENTS

D-1. Underwriters' Laboratories requirements.—

D-1a. The contractor shall submit proof to the purchasing agency that the material he furnishes under this specification conforms to the requirements of the Underwriters' Laboratories, Inc., regarding fire and casualty hazards. The label, listing, marker, or certified report of the Underwriters' Laboratories, Inc., will be accepted as evidence of compliance with this requirement.

D-1b. In lieu of Underwriters' Laboratories evidence, the contractor may submit evidence from other sources that his material conforms to the Underwriters' Laboratories requirements. The acceptance or rejection of such proof of conformance shall be decided by the purchasing agency.

D-1c. Compliance with the Underwriters' Laboratories requirements regarding fire and casualty hazards does not absolve the contractor from complete compliance with the requirements of this specification in order to secure the acceptance of his material. In the event of difference between any of the requirements of this specification and those of Underwriters' Laboratories, Inc., the requirements of this specification shall govern.

D-2. *Fabrication.*—The unsaturated felt shall be produced by "felting" at least 85 percent by weight of asbestos fiber.

D-3. *Condition.*—The felt shall not crack or be so sticky as to be damaged when unrolled at temperatures between 50° and 90° F.

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(Section IV, Part 5) (June 1947)

E. DETAIL REQUIREMENTS

E-1. The felt shall comply with the requirements shown in table I.

TABLE I.—Physical requirements.

	Class A, 20-pound		Class B, 50-pound	
	Maximum	Minimum	Maximum	Minimum
Net weight per roll ¹ pounds	70	55	65	54
Saturated and coated felt:				
Weight per 100 square feet (par. F-2a) pounds	...	17	...	50
Pliability at 25° C. (par. F-4e)		Shall pass test.		
Volatile matter (105° to 110° C.) percent by weight	5	...	5	...
Saturation of felt (coating-free basis) percent by weight	...	40	...	50
Desaturated felt:				
Weight per 100 square feet pounds	...	8.5	...	17.5
Ash percent by weight	...	70.0	...	70.0
Thickness inch	...	0.02	...	0.04
Weight of mineral surfacing per 100 square feet pounds	3	...	10	...

¹ The net weight per roll is computed on a basis of 324 square feet per roll of 20-pound felt, and 108 square feet per roll of 50-pound felt.

² Equivalent to an asbestos content of approximately 85 percent by weight.

E-2. Piecing.—

E-2a. *Class A.*—No roll shall contain more than two pieces, and not more than 3 percent of the rolls in any one shipment shall contain two pieces.

E-2b. *Class B.*—Rolls may be scored or cut into pieces approximately 20 feet in length.

F. METHODS OF SAMPLING, INSPECTION, AND TESTS

F-1. Sampling for inspection.—From each shipment or fraction thereof representing a product of the same class, a number of rolls shall be taken at random, equivalent to one-half the cube root of the total number of rolls included in the lot, except that in lots of 1,000 or less five rolls shall be taken. If the cube root as calculated proves to be a fractional number, it shall be expressed as the next higher whole number. For convenience, the following table is given, showing the number of rolls to be taken from shipments of various sizes:

Rolls in shipment:	Number of rolls taken
Up to 1000	5
1001-1728	6
1729-2744	7
2745-4096	8
4097-5832	9
5833-8000	10
8001-10648	11
10649 and over	12

F-2. Inspection.—The sample rolls taken shall be inspected to determine compliance with this specification with respect to workmanship, condition, width, and weight.

F-2a. Net weight of roll.—Each sample roll taken shall be weighed intact to the nearest $\frac{1}{4}$ pound, numbered, and its weight recorded.

F-2b. Weight per 100 square feet of saturated and coated felt.—The width and length of each sample roll taken shall be measured to the nearest $\frac{1}{4}$ inch. From these measurements and the weight obtained in paragraph F-2a, calculate the weight per 100 square feet of saturated and coated felt by the following formula:

$$\frac{\text{Weight in pounds}}{\text{Length in feet} \times \frac{\text{width in inches}}{12}} \times 100 = \text{Weight per 100 square feet}$$

If the calculated weight per 100 square feet of saturated and coated felt of any sample roll is less than 17 pounds for the 20-pound class (class A) or less than 50 pounds for the 50-pound class (class B), additional rolls equal to twice the number originally sampled shall be inspected. If the calculated weight per 100 square feet of any of these additional rolls is less than the minimum specified, the entire lot shall be rejected by the inspector and no samples taken for laboratory examination.

F-3. Sampling for laboratory examination.—From the sample rolls, examined in sampling for inspection, select one the weight of which is nearest the average weight of the whole lot. Unroll, and at approximately 10 feet from the outside end cut two samples the full width of the roll and approximately 40 inches long. The sheet shall be cut at right angles to the edge of the roll. Measure and weigh the strips and calculate the weight per 100 square feet of each. Discard any strip whose weight varies by more than 0.5 pound from the weight obtained in paragraph F-2b. Divide each strip into four equal parts, identifying the inside of the roll and

the direction of the fiber grain on each section. (The direction of the fiber grain is parallel to the edge of the roll.) Label and pack flat between supports wide and stiff enough to prevent crushing. Transmit one sample (the four sections cut from one sheet) to the testing laboratory and retain the other for check tests if necessary.

F-4. Laboratory examination.

F-4a. Weight.—Assemble the pieces and 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 by the following formula:

$$\text{Weight in grams} \times 31.7 \div \text{Area in square inches} = \text{Weight in pounds per 100 square feet.}$$

The weight so determined is to be used in selecting samples for laboratory examination and shall not be used as a basis for acceptance or rejection. (See par. F-2b.)

F-4b. Appearance.—Examine both sides of the sample to determine compliance with the requirements of paragraph C-2.

F-4c. Pliability.—At a distance not less than 3 inches from the edge of the sample cut five strips 1 inch wide and 6 inches long in the direction of the fiber grain, and immerse them in water at 25° C. (77° F.) for 10 to 15 minutes. Remove the strips individually from the water and immediately bend each strip, with the surface corresponding to the inside of the roll uppermost, through an arc of 90° over the rounded corner of a block (radius as specified below) at a uniform speed in approximately 2 seconds' time. Dry thoroughly and examine. If one or more of these five strips crack on this test, cut 10 strips from another part of the sample and repeat the test. If one or more of these strips crack, the material shall be reported as failing in the pliability test. Cracks less than 1/8 inch in length at the edge of the test strip shall be disregarded.

Class A—1/8-inch radius.

Class B—1/4-inch radius.

F-4d. Volatile matter at 105° to 110° C. (221° to 230° F.).—Cut two strips of the felt 6 inches wide and 12 inches long, weigh the strips separately to the nearest 0.1 gram and suspend them for 5 hours in an oven at 105° to 110° C. (221° to 230° F.). Remove from the oven, cool in a desiccator, and weigh. Compute the loss in weight for each strip and report the average as the percentage of volatile matter in the sample.

F-4e. Weight of desaturated felt.—Cut a strip 2 inches wide representing the full width of the sample, measure to the nearest 1/8 inch, and weigh to the nearest milligram. From this data calculate the weight of 100 square feet of material. If this weight varies by more than 0.5 pound from that determined in paragraph F-4a, discard and cut additional strips until one within this limit is obtained.

F-4e(1). Extract with benzol (carbon tetrachloride, chloroform, or carbon bisulfide will usually give the same result, but benzol shall be used in case of dispute) in a suitable extractor until the solvent runs through colorless. Remove the desaturated felt from the extraction apparatus, dry in air until free from solvent, and carefully brush off any adhering particles of foreign matter. Place the desaturated felt in a tared weighing bottle, heat in an oven at 105° to 110° C. (221° to 230° F.) for not less than 1 hour, cool in a desiccator, and weigh. Compute the weight of the moisture-free desaturated felt by the following formula:

$$\frac{\text{Weight of desaturated felt in grams} \times 31.7}{\text{Area in square inches}} = \frac{\text{Weight in pounds per 100 square feet}}{100}$$

F-4f. *Ash content of moisture-free desaturated felt.*—Incinerate 10 grams of desaturated felt as obtained in paragraph F-4e(1) to constant weight in a weighed crucible in a muffle furnace or over an open flame at a temperature of not less than 800° C. Cool in a desiccator, weigh, and compute the percentage ash in the desaturated felt.

F-4g. *Thickness of moisture-free desaturated felt.*—Determine the thickness of the desaturated felt as obtained in F-4e(1) at not less than 10 points equally spaced along the strip by any acceptable method. Report the average of these readings.

F-4h. *Saturation of felt.*—Cut three strips 2 inches wide and 8 inches long at random from the sheet and warm in an oven at about 80° C. (176° F.) until the coating asphalt can be easily stripped from the saturated felt. In removing the coating asphalt care should be taken to remove as little felt as possible and that none of the coating asphalt remains on the felt. Weigh the coating-free felt and extract with benzol (carbon tetrachloride, chloroform or carbon bisulfide will usually give the same results, but benzol should be used in case of dispute) in a suitable extraction apparatus until the solvent runs through colorless. Place the desaturated felt in a tared weighing bottle, heat in an oven at 105° to 110° C. (221° to 230° F.) for not less than 1 hour, cool in a desiccator, and weigh. The percentage saturation of the moisture-free felt is calculated as follows:

$$\text{Percentage saturation} = \frac{\text{Weight of extracted material}}{\text{Weight of moisture-free desaturated felt}} \times 100$$

F-4i. *Mineral surfacing.*—Cut a strip 2 inches wide representing the full width of the sample, measure to the nearest 1/8 inch, and weigh to the nearest milligram. From this data calculate the weight of 100 square feet of material. If this weight varies by more than 0.5 pound from that determined in paragraph F-4a, discard and cut additional strips until one within the limit is obtained.

F-4i(1). Incinerate in a 3-inch evaporating dish in a muffle furnace or over an open flame until all organic matter is destroyed. Brush adhering mineral from the felt, taking care to exclude any asbestos fiber. Combine all mineral matter (other than felt) and weigh. Calculate its weight per 100 square feet by the following formula:

$$\frac{\text{Weight of mineral matter in grams} \times 31.7}{\text{Area in square inches}} = \text{Weight of mineral surfacing in pounds per 100 square feet}$$

G. PACKAGING, PACKING, AND MARKING FOR SHIPMENT

G-1. *Packaging*.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. *Packing*.—Unless otherwise specified, the rolls shall be securely taped or some other equally protective wrapping shall be employed. A standard label shall be attached to each roll to identify the material. The ends of the rolls need not be covered.

G-3. *Marking*.—Unless otherwise specified, each package shall be marked with the name of the material, the class, width, and quantity contained therein, as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications and other publications, of the issues in effect on date of invitation for bids, and special requirements, shall form a part of this specification and shall be applicable to purchases made under this specification by the respective departments.

H-2. *Army*.—U. S. Army Specification No. 100-2, Standard Specification for Marking Shipments by Contractors, copies of which may be obtained without cost upon application to the procuring agency.

H-3. *Navy*.—

H-3a. *Applicable specifications and other publications*.—

Joint Army-Navy Specifications:

JAN-P-106—Packaging and Packing for Overseas Shipment—Boxes; Wood, Nailed.

JAN-P-132—Packaging and Packing for Overseas Shipment—Crates, Unsheathed, Wood, Nailed (for Maximum Net Load of 2,500 Pounds).

Navy Department Specification:

General Specifications for Inspection of Material.

Bureau of Supplies and Accounts Publication:

Navy Shipment Marking Handbook.

Copies of Federal and Joint Army-Navy specifications (required for Navy purchases), Navy Department specifications, and the Navy Shipment Marking Handbook may be obtained without cost upon application to the Bureau of Supplies and Accounts, Navy

Department, Washington 25, D. C., except that Naval activities should make application to the Supply Officer in Command, Naval Supply Depot, Bayonne, N. J.

H-3b. Packing.—

H-3b(1). For domestic shipment.—Unless otherwise specified, felt packaged as described in paragraph G-1 shall be packed in substantial commercial containers of the type, size, and kind commonly used for the purpose, so constructed as to insure acceptance and safe delivery by common or other carriers, at the lowest rate, to the point of delivery.

H-3b(2). For overseas shipment.—Unless otherwise specified, felt packaged as described in paragraph G-1 shall be packed in nailed wood boxes or unsheathed nailed wood crates conforming to the requirements of Joint Army-Navy Specifications JAN-P-106 and JAN-P-132, respectively.

H-3b(3). For domestic and overseas shipment.—Where practicable, shipping containers shall be of uniform size, and shall contain the same number of items. Containers shall be designed to fit the contents in a compact manner.

H-3c. Marking.—In addition to any special marking required by the contract or order, marking of interior packages and shipping containers shall conform to the requirements of the Navy Shipment Marking Handbook.

H-3d. Ordering information.—Requests, requisitions, schedules, and contracts or orders should specify whether the subject commodity is to be packed and shipping containers marked for domestic or overseas shipment. (See pars. H-3b and H-3c.)

L. NOTES

L-1. Purchasers should exercise any desired options offered herein, and should specify the class and width required. (See pars. B-1, B-2, G-1, G-2, G-3, H-3b(1), and H-3b(2).)

L-2. Basis of purchase should be by the roll or the weight as may be agreed between purchaser and seller. (See par. E-1.)

L-3. Coated asphalt-saturated asbestos felt is intended for use with asphalt in the construction of built-up roofing.

L-4. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

L-5. Federal specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, etc., which are suitable for Federal Government requirements.

FEDERAL STANDARD STOCK CATALOG **HH-F-182-6**
(Section IV, Part 5) (June 1947)

I-6. An Index of Federal Specifications may be purchased as noted in the paragraph below, price to be obtained from the Superintendent of Documents.

I-7. Copies of the listings of the Underwriters' Laboratories, Inc., referred to herein, may be obtained without cost from the Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago 11, Illinois.

I-8. Copies of this specification may be obtained upon application, accompanied by postal note, money order, coupon, or cash, to the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Price 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**FELT, ASBESTOS; ASPHALT-SATURATED,
UNCOATED, FOR FLASHINGS, ROOFING,
AND WATERPROOFING**

This specification was approved on the above date by the Director, Bureau of Federal Supply, for the use of all departments and establishments of the Government, and shall become effective not later than September 15, 1947 for use in procurement initiated on or after that date. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE SPECIFICATIONS AND OTHER PUBLICATIONS

A-1. There are no other Federal specifications applicable to this specification.

A-2. The following Underwriters' Laboratories, Inc., publication, of the issue in effect on date of invitation for bids, shall form a part of this specification:

List of Inspected Fire Protection Equipment and Materials.

B. TYPES, CLASSES, WIDTHS, AND GRADE

B-1. *Types and classes.*—Uncoated asphalt-saturated asbestos felt in accordance with this specification shall be furnished in the following types and classes, as specified in the invitation for bids, contract, or purchase order.

Type I.—Perforated.

Class A.—15-pound.

Type II.—Plain.

Class A.—15-pound.

Class B.—35-pound.

B-2. *Widths of felt.*—Uncoated asphalt-saturated asbestos felt in accordance with this specification shall be furnished in widths of 36 inches $\pm$ $\frac{1}{4}$ inch or 32 inches $\pm$ $\frac{1}{4}$ inch, as specified in the invitation for bids, contract, or purchase order.

B-3. *Grade.*—Uncoated asphalt-saturated asbestos felt in accordance with this specification shall be furnished in one grade only.

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C. MATERIAL AND WORKMANSHIP

C-1. Material.—The material shall be a roofing felt made essentially of asbestos fibers, impregnated with asphalt. The use of silica or wood flour to prevent sticking in the rolls will be permitted.

C-2. Workmanship.—The asphalt-saturated asbestos felt shall be uniform throughout, and shall be free from visible defects such as holes (other than perforations in type I felt), ragged or untrue edges, breaks, rents, cracks, or indentations. The surface shall be uniformly smooth and free from areas or patches of unabsorbed saturant and superficial dry spots.

D. GENERAL REQUIREMENTS

D-1. Underwriters' Laboratories' requirements.—

D-1a. The contractor shall submit proof to the purchasing agency that the material he furnishes under this specification conforms to the requirements of the Underwriters' Laboratories, Inc., regarding fire and casualty hazards. The label, listing, marker, or certified report of the Underwriters' Laboratories, Inc., will be accepted as evidence of compliance with this requirement.

D-1b. In lieu of Underwriters' Laboratories evidence, the contractor may submit evidence from other sources that his material conforms to the Underwriters' Laboratories requirements. The acceptance or rejection of such proof of conformance shall be decided by the purchasing agency.

D-1c. Compliance with the Underwriters' Laboratories requirements regarding fire and casualty hazards does not absolve the contractor from complete compliance with the requirements of this specification in order to secure the acceptance of his material. In event of difference between any of the requirements of this specification and those of Underwriters' Laboratories, Inc., the requirements of this specification shall govern.

D-2. Fabrication.—The unsaturated felt shall be produced by "felting" at least 85 percent by weight of asbestos fiber. Type I felt shall be perforated with holes $\frac{1}{8}$ inch or less in diameter spaced approximately on $\frac{1}{2}$ -inch centers. The holes in adjacent lines shall be staggered.

D-3. Condition.—The felt shall not crack or be so sticky as to be damaged when unrolled at temperatures between 50° and 90° F.

D-4. Piecing.—No roll shall contain more than two pieces, and not more than 3 percent of the rolls in any one shipment may contain two pieces.

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D. DETAIL REQUIREMENTS

E-1. The felt shall meet the requirements shown in table I.

TABLE I.—Physical requirements.

	Class A, 15-pound		Class B, 35-pound	
	Maximum	Minimum	Maximum	Minimum
Net weight per roll pounds	60	42	70	64
Saturated felt:				
Weight per 100 square feet				
(par. F-2b) pounds	...	13	...	30
PHability at 25° C. (par. F-4c)		Shall pass test.		
Breaking strength:				
With fiber grain pounds	...	20	...	40
Across fiber grain do	...	10	...	20
Volatile matter at 105° to 110°				
C. percent by weight	5	...	5	...
Saturation of felt do	...	40	...	60
Desaturated felt:				
Weight per 100 square feet				
.....pounds	...	8.5	...	17.5
Ash percent by weight	...	70	...	40
Thickness inch	...	0.02	...	0.04

* The net weight per roll is computed on a basis of 324 square feet per roll of 15-pound felt, and 216 square feet per roll of 35-pound felt.

* Equivalent to an asbestos content of approximately 85 percent by weight.

F. METHODS OF SAMPLING, INSPECTION, AND TESTS

F-1. *Sampling for inspection.*—From each shipment or fraction thereof representing a product of the same type and class, a number of rolls shall be taken at random, equivalent to one-half the cube root of the total number of rolls included in the lot, except that in lots of 1,000 or less five rolls shall be taken. If the cube root as calculated proves to be a fractional number, it shall be expressed as the next higher whole number. For convenience, the following table is given, showing the number of rolls to be taken from shipments of various sizes:

Rolls in shipment:	Number of rolls taken
Up to 1000	5
1001-1728	6
1729-2744	7
2745-4096	8
4097-5832	9
5833-8000	10
8001-10648	11
10649 and over	12

F-2. *Inspection.*—The sample rolls taken shall be inspected to determine compliance with this specification with respect to workmanship, condition, width, and weight.

F-2a. *Net weight of roll.*—Each sample roll taken shall be weighed intact to the nearest ¼ pound, numbered, and its weight recorded.

F-2b. Weight per 100 square feet of saturated felt.—The width and length of each sample roll taken shall be measured to the nearest ¼ inch. From these measurements and the weight obtained in paragraph F-2a, calculate the weight per 100 square feet of saturated felt by the following formula:

$$\frac{\text{Weight in pounds}}{\text{width in inches} \times \frac{\text{Length in feet} \times 12}{100}} \times 100 = \text{Weight per 100 square feet}$$

If the calculated weight of 100 square feet of saturated felt of any sample roll is less than 13 pounds for the 15-pound class or less than 30 pounds for the 35-pound class, additional rolls equal to twice the number originally sampled shall be inspected. If the calculated weight per 100 square feet of any of these additional rolls is less than the minimum specified, the entire lot shall be rejected by the inspector and no samples taken for laboratory examination.

F-3. Sampling for laboratory examination.—From the sample rolls examined in sampling for inspection, select one the weight of which is nearest the average weight of the whole lot. Unroll, and at approximately 10 feet from the outside end cut two samples the full width of the roll and approximately 40 inches long. The sheet shall be cut at right angles to the edge of the roll. Measure and weigh the strips and calculate the weight per 100 square feet of each. Discard any strip whose weight varies by more than 0.5 pound from the weight obtained in paragraph F-2b. Divide each strip into four equal parts, identifying the inside of the roll and the direction of the fiber grain on each section. (The direction of the fiber grain is parallel to the edge of the roll.) Label and pack flat between supports wide and stiff enough to prevent crushing. Transmit one sample (the four sections cut from one sheet) to the testing laboratory and retain the other sample for check tests if necessary.

F-4. Laboratory examination.—

F-4a. Weight.—Assemble the pieces and 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 in the following manner:

$$\frac{\text{Weight in grams} \times 31.7}{\text{Area in square inches}} = \text{Weight in pounds per 100 square feet.}$$

The weight so determined is to be used in selecting samples for laboratory examination and shall not be used as a basis for acceptance or rejection. (See par. F-2b.)

F-4b. Appearance.—Examine both sides of the sheet for uniformity of saturation throughout and freedom from visible defects, such as holes (other than perforations in type I felt), ragged or untrue edges, patches of unabsorbed saturant, and superficial dry spots.

F-4c. Pliability.—At a distance not less than 3 inches from the edge of the sample cut five strips 1 inch wide and 6 inches long in the direction of the fiber grain, and condition them in water at $25^{\circ} \pm 1^{\circ}$ C. ($77^{\circ} \pm 1.8^{\circ}$ F.) for 10 to 15 minutes. Remove the strips individually from the water and immediately bend each strip, with the surface corresponding to the inside of the roll uppermost, through an arc of 90° over the rounded corner of a block (radius as specified below) at a uniform rate in approximately 2 seconds' time. Dry thoroughly and examine. If one or more of the five strips crack on this test, cut 10 additional strips from another part of the sample and repeat the test. If one or more of these strips crack, the material shall be reported as failing in the pliability test. Cracks less than $\frac{1}{8}$ inch in length at the edge of the test strip or any slight lifting of the surface fibers shall be disregarded.

Class A— $\frac{1}{2}$ -inch radius.

Class B— $\frac{3}{4}$ -inch radius.

F-4d. Breaking strength.—At a point not less than 3 inches from the edge of the sample, 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. Condition both sets of strips at a temperature of $25^{\circ} \pm 1^{\circ}$ C. ($77^{\circ} \pm 1.8^{\circ}$ F.) and a relative humidity of 50 ± 5 percent for not less than 5 hours before testing.

F-4d(1). Test both sets of strips at $25^{\circ} \pm 1^{\circ}$ C. ($77^{\circ} \pm 1.8^{\circ}$ F.) and relative humidity of 50 ± 5 percent in a Scott or similar testing machine of the inclination-balance type having a capacity of not less than 150 pounds. The test strip shall be gripped $1\frac{1}{2}$ inches from 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 $\frac{1}{2}$ inch to either clamp it shall be discarded and an additional strip tested in its place. The average of the 10 readings in each direction shall be taken as the breaking strength in that direction.

F-4e. Volatile matter at 105° to 110° C. (221° to 230° F.).—Cut two strips of the asphalt-saturated felt 6 inches wide and 12 inches long, weigh the strips separately to the nearest 0.1 gram, and suspend them for 5 hours in an oven at 105° to 110° C. (221° to 230° F.). Remove from the oven, cool in a desiccator, and weigh. Compute the loss in weight for each strip and report the average as the percentage of volatile matter in the sample.

F-4f. Weight of desaturated felt.—Cut a strip 2 inches wide, representing the full width of the sample, measure to the nearest $\frac{1}{8}$ inch, and weigh to the nearest milligram. From this data calculate the weight of 100 square feet of saturated felt. If this weight varies by more than 0.5 pound from that determined in paragraph F-4a, discard and cut additional strips until one within the limit is obtained.

F-4f(1). Extract with benzol (carbon tetrachloride, chloroform, or carbon bisulfide will usually give the same result, but benzol shall be used in case of dispute) in an extractor that will retain finely divided surfacing material if present. Continue the extraction until the solvent runs through colorless. Remove the desaturated felt from the extraction apparatus, dry in air until free from

solvent, and brush off any adhering particles of foreign matter. Place the desaturated felt in a tared weighing bottle and heat in an oven at 105° to 110° C. (221° to 230° F.) for not less than 1 hour, then cool in a desiccator, and weigh. Compute the weight of moisture-free desaturated felt per 100 square feet by the following formula:

$$\frac{\text{Weight of moisture-free desaturated felt in grams} \times 31.7}{\text{Area in square inches}} = \frac{\text{Weight in pounds per 100 square feet.}}$$

F-4g. Saturation of moisture-free felt.—The weight of saturant in the felt is the difference in weight between the original sample taken for extraction (see par. F-4f) and the weight of the desaturated felt (plus any surfacing material present). The percentage saturation of the moisture-free felt is calculated as follows:

$$\text{Percentage saturation} = \frac{\text{Weight of extracted material}}{\text{Weight of moisture-free desaturated felt}} \times 100$$

F-4h. Ash content of desaturated felt.—Incinerate 10 grams of the desaturated felt as obtained in paragraph F-4f(1) to constant weight at a temperature of not less than 800° C. in a weighed crucible in a muffle furnace or over an open flame. Cool in a desiccator, weigh, and compute the percentage ash in the desaturated felt.

F-4i. Thickness of moisture-free desaturated felt.—Determine the thickness of the desaturated felt as obtained in paragraph F-4f(1), at not less than 10 points equally spaced along the strip. Report the average of these readings.

G. PACKAGING, PACKING, AND MARKING FOR SHIPMENT

G-1. Packaging.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. Packing.—Unless otherwise specified, the corners of the felt on the outside of each roll shall be turned in and the rolls shall be taped, or some other equally protective wrapping shall be employed. A standard label shall be attached to each roll to identify the material. The ends of the rolls need not be covered.

G-3. Marking.—Unless otherwise specified, each package shall be marked with the name of the material, the type, class, width, and quantity contained therein, as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications and other publications, of the issues in effect on date of invitation for bids, and special requirements, shall form a part of this specification, and shall be applicable to purchases made under this specification by the respective departments:

H-2. *Army.*—U. S. Army Specification No. 100-2, Standard Specification for Marking Shipments by Contractors, copies of which may be obtained without cost upon application to the procuring agency.

H-3. *Navy.*—

H-3a. *Applicable specifications and other publications.*—

Joint Army-Navy Specifications:

JAN-P-106—Packaging and Packing for Overseas Shipment—Boxes; Wood, Nailed.

JAN-P-132—Packaging and Packing for Overseas Shipment—Crates; Unsheathed, Wood; Nailed (for Maximum Net Load of 2,500 Pounds).

Navy Department Specification:

General Specifications for Inspection of Material.

Bureau of Supplies and Accounts Publication:

Navy Shipment Marking Handbook.

Copies of Federal and Joint Army-Navy specifications (required for Navy purchases), Navy Department specifications, and the Navy Shipment Marking Handbook may be obtained without cost upon application to the Bureau of Supplies and Accounts, Navy Department, Washington 25, D. C., except that Naval activities should make application to the Supply Officer in Command, Naval Supply Depot, Bayonne, N. J.

H-3b. *Packing.*—

H-3b(1). *For domestic shipment.*—Unless otherwise specified, felt packaged as described in paragraph G-1 shall be packed in substantial commercial containers of the type, size, and kind commonly used for the purpose, so constructed as to insure acceptance and safe delivery by common or other carriers, at the lowest rate, to the point of delivery.

H-3b(2). *For overseas shipment.*—Unless otherwise specified, felt packaged as described in paragraph G-1 shall be packed in nailed wood boxes or unsheathed nailed wood crates conforming to the requirements of Joint Army-Navy Specifications JAN-P-106 and JAN-P-132, respectively.

H-3b(3). *For domestic and overseas shipment.*—Where practicable, shipping containers shall be of uniform size, and shall contain the same number of items. Containers shall be designed to fit the contents in a compact manner.

H-3c. *Marking.*—In addition to any special marking required by the contract or order, marking of interior packages and shipping containers shall conform to the requirements of the Navy Shipment Marking Handbook.

H-3d. *Ordering information.*—Requests, requisitions, schedules, and contracts or orders should specify whether the subject commodity is to be packed and shipping containers marked for domestic or overseas shipment. (See pars. H-3b and H-3c.)

I. NOTES

I-1. Purchasers should exercise any desired options offered herein and should specify the type, class, and width desired. (See pars. B-1, B-2, G-1, G-2, G-3, H-3b(1) and H-3b(2).)

I-2. Basis of purchase should be by the roll or by the weight as may be agreed upon between buyer and seller. (See par. E-1.)

I-3. Class A, 15-pound, asphalt-saturated asbestos felt is intended for use with asphalt in the construction of built-up roofing and membrane waterproofing.

I-4. Class B, 35-pound, asphalt-saturated asbestos felt is intended for use with asphalt in the construction of built-up roofing and flashings, and under slate.

I-5. It is believed that this specification adequately describes the characteristics necessary to secure the desired material and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid samples should be definitely stated, the specification to apply in all other respects.

I-6. Federal specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, etc., which are suitable for Federal Government requirements.

I-7. An Index of Federal Specifications may be purchased as noted in the paragraph below, price to be obtained from the Superintendent of Documents.

I-8. Copies of the listings of the Underwriters' Laboratories, Inc., referred to herein, may be obtained without cost from the Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago 11, Illinois.

I-9. Copies of this specification may be obtained upon application, accompanied by postal note, money order, coupon, or cash, to the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Price 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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For sale by the Superintendent of Documents, Washington 25, D. C.
Price 5 cents

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**FELT; ASPHALT-SATURATED (FOR) FLASHINGS,
ROOFING, AND WATERPROOFING**

This specification was approved on the above date by the Director of Procurement for the use of all departments and establishments of the Government, and shall become effective not later than March 1, 1943. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE SPECIFICATIONS

A-1. There are no other Federal Specifications applicable to this specification.

A-2. Non-Governmental Specifications or Standards.

A-2a. *Underwriters' Laboratories, Inc.:*

Standard for Rag-Felt Roof Covering Materials for Use in Construction of Built-Up Roof Coverings.

List of Inspected Fire Protection Equipment and Materials. (See I-8.)

A-2a (1). The bidder shall submit to the purchasing agency proof that the material he proposes to supply under this specification conforms to the standards of the Underwriters' Laboratories for asphalt-saturated felt for use in the construction of built-up roof coverings, as regards fire and casualty hazards. The label or listing of the Underwriters' Laboratories will be accepted as conforming to this requirement.

A-2a (2). In lieu of the label or listing the bidder may submit independent proof satisfactory to the purchasing agency that his material conforms to the published standard, including methods of test, of the Underwriters' Laboratories.

A-2a (3). Compliance with the above preliminary requirements, as regards fire and casualty hazards, does not absolve the bidder from complete compliance with the other requirements of this specification in order to secure the acceptance of his material.

A-3. Any special requirements of the individual agencies of the Government are noted under Section H.

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GENERAL SERVICES ADMINISTRATION
Business Service Center
1114 Commerce St. Dallas, Texas

B. TYPES AND GRADE

B-1. Asphalt-saturated felt shall be of the following types (the type or types desired shall be stated in the invitation for bids):

Type I, 15-lb. Type—Asphalt-saturated felt for mineral-surfaced built-up roofing and for membrane water-proofing.

Type II, 30-lb. Type—Asphalt-saturated felt for built-up roofing and flashings.

B-2. Material shall be of but one grade.

C. MATERIAL AND WORKMANSHIP

C-1. *Material*.—Shall be composed of roofing felt made of organic fibers, impregnated with an asphaltic saturant.

C-2. *Workmanship*.—See paragraph E-1.

D. GENERAL REQUIREMENTS

D-1. See E, Detail Requirements.

E. DETAIL REQUIREMENTS

E-1. *Appearance*.—Asphalt-saturated felt of both types shall be free from visible external defects, such as holes, ragged or untrue edges, breaks, rents, cracks, or indentations, and shall be uniform throughout. The felt shall not crack or be so sticky as to cause injury when unrolled at temperatures of 50° and 90° F. The surface of the felt shall not be coated or covered with 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.

E-2. *Physical and chemical requirements*.—Material shall meet the following requirements:

Width (inches) 36 ± 1/4 or 32 ± 1/4, as called for	Type I, 15-lb. type		Type II, 30-lb. type	
	Maximum	Minimum	Maximum	Minimum
Gross weight of roll (lbs.)	80	56 1/2	80	141 5/6
Weight of wrapping, packing, etc. (lb.)	1/2		1/2	
Weight per 100 square feet, exclusive of wrapping, packing, etc. (lbs.)		13 1/2		26 3/4
Pilability at 25° C. (77° F.). No cracking or bending 90° over a rounded corner of radius (inch)	1/4		1/4	
Average breaking strength:				
With fiber grain (lbs.)		30		40
Across fiber grain (lbs.)		15		20
Volatile matter at 105-110° C. (221-230° F.) (percent by weight)	4		4	
Weight of moisture-free desaturated felt per 100 square feet (lbs.)		5.2		10.6 1/2
Saturation of moisture-free felt (percent by weight)		140		150
Ash of desaturated felt (percent by weight)	10		10	

¹ The gross weight of roll is based on 432 square feet per roll of 15-pound felt and 216 square feet per roll of 30-pound felt. Where the production of rolls containing less than 432 square feet of 15-pound felt or 216 square feet of 30-pound felt is standard commercial practice, these will be acceptable under Government contracts. In such cases the minimum weight per roll shall be decreased proportionately.

F. METHODS OF SAMPLING, INSPECTION, AND TESTS

F-1. Sampling for inspection.—From each shipment of more than 1,000 rolls, take at random a number of rolls of felt equivalent to one-half the cube root of the total included in the lot. If this proves to be a fractional number, express it as the next higher digit. From each shipment of 1,000 rolls or less take five rolls at random.

F-2. Determination of weight, width, and appearance.—The weight per 100 square feet of material, and its variation in weight; the width and its variation must be determined by the inspector and the results transmitted to the testing laboratory with the sample. Material which does not conform to the specification in these respects shall be rejected by the inspector and only deliveries which conform in these respects sampled for laboratory tests.

F-2a. Remove wrappers, cores, and other packing material from each roll taken and weigh the roll and the packing material, etc., separately, to the nearest one-fourth pound. Then unwind each roll and measure the length of the roll and the width at each end of the roll to the nearest one-fourth inch, and reroll. Observe the appearance of the material while unrolling and rerolling.

F-2b. The finished material shall be free from visible external defects, such as holes, ragged or untrue edges, breaks, rents, cracks, or indentations. The surface shall be uniformly smooth and shall be free from areas or patches of unabsorbed saturant and superficial dry spots. The rolls shall be capable of being unrolled easily at 50° and 90° F. without cracking or sticking to such an extent as to cause injury. The surface of the felt shall not be coated or covered with 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.

F-2c. Compute the weight per 100 square feet of each roll examined, and from these weights compute the average weight of the shipment. If the calculated weight per 100 square feet of any roll examined is less than ~~14~~ pounds per 100 square feet for type I, 15-lb. type, and less than ~~28~~ pounds for type II, 30-lb. type, this shall be cause for the rejection of the whole shipment.

F-3. Sampling for laboratory examination.—From the rolls examined in sampling for inspection, select one the weight of which is nearest the average weight of the whole lot. Unroll, and at approximately 15 feet from one end cut two samples the full width of the roll and approximately 40 inches long. The sheet shall be cut at right angles to the edge of the roll. Measure and weigh the strips and calculate the weight per 100 square feet of each. Discard all strips whose weight varies by more than 0.5 pound from that obtained in F-2a. Divide each strip into four equal parts, marking the surface on the inside of the roll and the direction of the fiber grain on each section. (The direction of the fiber grain is always parallel to the edge of the sheet.) Label, and pack flat between supports wide enough to prevent crushing. Transmit one sample (four sections) to the testing laboratory and retain the other for check tests in case of dispute.

F-4. Laboratory Examination.—

F-4a. Appearance.—Examine both sides of the sheet of felt and note for uniformity of color and texture. The felt shall be thoroughly and

uniformly impregnated and shall show no unsaturated spots at any point.

F-4b. Weight.—Trim the sample so that it can be measured accurately, and weigh to the nearest gram (15 grains). From the measurements and weight so obtained compute the weight per 100 square feet. The weight so determined is only to be used in making the laboratory calculations and shall not be used as a basis for acceptance or rejection. (See F-2).

F-4c. Pliability.

F-4c (1). Type I, 15-lb. type.—At a point not less than 3 inches from the edge of the roll, cut 10 strips 1 inch wide and 6 inches long in the direction of the fiber grain and condition them for 10 to 15 minutes in a water bath at $25^{\circ} \pm 1^{\circ}$ C. Remove the strips from the water individually, and bend each strip immediately over the rounded corner of a block (rounded to a radius of $\frac{1}{2}$ inch) in approximately 2 seconds time. The surface of the test piece corresponding to the inside of the roll shall be uppermost when making the test. Dry thoroughly and examine. If one or more of these strips crack the material is reported as failing in the pliability test. Any crack less than $\frac{1}{4}$ inch in length originating at the edge of the test strip, or any slight lifting of the surface fibers, shall be disregarded.

F-4c (2). Type II, 30-lb. type.—Use the same procedure as described under F-4c (1), type I, 15-lb. type above, except that the corner of a block that has been rounded to a radius of $\frac{3}{4}$ inch shall be used.

F-4d. Breaking Strength.—At a point not less than 3 inches from the edge of the roll, 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. Condition both sets of strips at a temperature of 25° C. $\pm 1^{\circ}$ C for not less than 4 hours before testing.

F-4d (1). Test both sets of strips at 25° C. (77° F) $\pm 1^{\circ}$ C. in a Scott or similar testing machine of the inclination-balance type having a capacity of not less than 150 pounds. The test strip shall be gripped $1\frac{1}{4}$ 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.

F-4e. Volatile matter.—Cut two strips of the asphalt-saturated felt 6 inches wide and 12 inches long, weigh the strips separately to the nearest 0.1 gram, and suspend them for 5 hours in an oven at 105° to 110° C. (221° to 230° F.). Remove from the oven, cool in a desiccator, and weigh. Compute the percentage loss in weight for each sample and report as volatile matter the average loss of the two samples.

F-4f. Weight of desaturated felt.—Cut a strip 2 inches wide representing the full width of the sample, measure accurately and weigh to the nearest milligram. From this data calculate the weight of 100 square feet of saturated felt. If this weight varies by more than 0.5 pound from that calculated in F-4b, discard and cut additional strips until a sample within the limit is obtained. Extract with benzol (carbon tetrachloride, chloroform, or carbon bisulfide will usually give the same results but benzol shall be used in case of dispute)

in a suitable extraction apparatus until the solvent runs through colorless. Remove the desaturated felt from the extraction apparatus, dry in air until free from the odor of solvent, and brush off any adhering particles of foreign matter. Place the desaturated felt in a tared weighing bottle and heat in an oven at 105° to 110° C. (221° to 230° F.) for one-half hour, cool in a desiccator, and weigh. Calculate the percentage of moisture-free felt in the sample taken for extraction and compute the weight of moisture-free desaturated felt per 100 square feet from the weight obtained in F-4b.

F-4g. *Saturation of moisture-free felt.*—The weight of saturant in the felt is the difference in weight between the original sample taken for extraction in F-4f and the weight of the desaturated felt (plus any surfacing material present). The percentage saturation of the moisture-free felt is obtained by the following formula:

$$\frac{\text{Weight of saturant}}{\text{Weight of moisture-free desaturated felt}} \times 100 = \text{percentage saturation}$$

F-4g (1). *Nature of saturant.*—Test to identify the saturant as asphalt.

F-4h. *Ash of moisture-free desaturated felt.*—Incinerate the felt obtained in F-4f in a weighed crucible in a muffle furnace or over an open flame until all of the organic matter is consumed. Cool, weigh, and compute the percentage ash of the moisture-free desaturated felt.

G. PACKAGING, PACKING AND MARKING FOR SHIPMENT

G-1. *Packaging.*—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. *Packing.*—The rolls of saturated felt shall be securely wrapped in a substantial grade of paper of the same width as the fabric. The wrapper shall completely encircle the roll and shall be pasted at the overlap in a manner which will prevent it shifting from position. The ends of the rolls need not be covered. No roll shall contain more than two pieces and there shall not be more than three percent of rolls containing two pieces in any shipment. *see adm't 2*

G-3. *Marking.*—Each package shall be legibly marked with a description of the contents, the name of the manufacturer, the place of manufacture, the brand (if any), the net weight of the contents, and some means of identification of "the particular contract on which purchase and shipment were made." Each shipment of the material shall be accompanied by printed directions for its use.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications of the issue in effect on date of invitation for bids, and special requirements, shall form a part of this specification, and shall be applicable to purchases made under this specification by the respective departments:

H-2. *Army.*—United States Army Specification No. 100-2, Standard Specification for Marking Shipments. *see adm't 2*

H-3. *Navy.*—For administrative reasons Navy purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y—Roofing, Siding, Sheet-Metal Work; Dampproofing and Membrane Waterproofing, copies of which may be obtained, without cost, upon application to the Bureau

of Yards and Docks, Navy Department, Washington, D. C. The technical requirements of the Bureau of Yards and Docks specification conform in detail with the technical requirements of this Federal specification.

I. NOTES

I-1. Type I, 15-lb. type, asphalt-saturated felt is intended for use with asphalt for mineral-surfaced roofing and asphalt for waterproofing and dampproofing in the construction of built-up roofing and membrane waterproofing respectively.

I-2. Type II, 30-lb. type, asphalt-saturated felt is intended for use in the construction of built-up roofing, for flashings, and as an underlay material under slate, tile, etc.

I-3. Basis of purchase should be by the roll of not less than 432 square feet for type I, 15-lb. type and of not less than 216 square feet for type II, 30-lb. type; or by the square (100 square feet); or by weight, according to agreement between the purchaser and the seller.

I-4. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-5. Federal Specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, etc., which are suitable for Federal Government requirements.

I-6. An index of Federal Specifications may be purchased as noted in the paragraph below, price to be obtained from the Superintendent of Documents. *see admit 2.*

I-7. Copies of this specification may be obtained upon application, accompanied by money order, coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D. C. Price 5 cents.

I-8. Copies of the standard and listings of the Underwriters' Laboratories, Inc., referred to herein, may be obtained without cost from the Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago, Ill.

I-9 — *see admit 2.*

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE : O—1949

For sale by the Superintendent of Documents, Washington, D. C. Price 5 cents

HH-F-191a

SEPTEMBER 29, 1942

**SUPERSEDING
FED. SPEC. HH-F-191
August 1, 1933**

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**FELT; ASPHALT-SATURATED (FOR) FLASHINGS,
ROOFING, AND WATERPROOFING**

This specification was approved on the above date by the Director of Procurement for the use of all departments and establishments of the Government, and shall become effective not later than March 1, 1943. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE SPECIFICATIONS

A-1. There are no other Federal Specifications applicable to this specification.

A-2. Non-Governmental Specifications or Standards.

A-2a. *Underwriters' Laboratories, Inc.:*

Standard for Rag-Felt Roof Covering Materials for Use in Construction of Built-Up Roof Coverings.

List of Inspected Fire Protection Equipment and Materials. (See I-8.)

A-2a (1). The bidder shall submit to the purchasing agency proof that the material he proposes to supply under this specification conforms to the standards of the Underwriters' Laboratories for asphalt-saturated felt for use in the construction of built-up roof coverings, as regards fire and casualty hazards. The label or listing of the Underwriters' Laboratories will be accepted as conforming to this requirement.

A-2a (2). In lieu of the label or listing the bidder may submit independent proof satisfactory to the purchasing agency that his material conforms to the published standard, including methods of test, of the Underwriters' Laboratories.

A-2a (3). Compliance with the above preliminary requirements, as regards fire and casualty hazards, does not absolve the bidder from complete compliance with the other requirements of this specification in order to secure the acceptance of his material.

A-3. Any special requirements of the individual agencies of the Government are noted under Section H.

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B. TYPES AND GRADE

B-1. Asphalt-saturated felt shall be of the following types (the type or types desired shall be stated in the invitation for bids):

Type I, 15-lb. Type—Asphalt-saturated felt for mineral-surfaced built-up roofing and for membrane water-proofing.

Type II, 30-lb. Type—Asphalt-saturated felt for built-up roofing and flashings.

B-2. Material shall be of but one grade.

C. MATERIAL AND WORKMANSHIP

C-1. *Material*.—Shall be composed of roofing felt made of organic fibers, impregnated with an asphaltic saturant.

C-2. *Workmanship*.—See paragraph E-1.

D. GENERAL REQUIREMENTS

D-1. See E, Detail Requirements.

E. DETAIL REQUIREMENTS

E-1. *Appearance*.—Asphalt-saturated felt of both types shall be free from visible external defects, such as holes, ragged or untrue edges, breaks, rents, cracks, or indentations, and shall be uniform throughout. The felt shall not crack or be so sticky as to cause injury when unrolled at temperatures of 50° and 90° F. The surface of the felt shall not be coated or covered with 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.

E-2. *Physical and chemical requirements*.—Material shall meet the following requirements:

Width (inches) $36 \pm \frac{1}{4}$ or $32 \pm \frac{1}{4}$, as called for	Type I, 15-lb. type		Type II, 30-lb. type	
	Maximum	Minimum	Maximum	Minimum
Gross weight of roll (lbs.)	80	61	80	61
Weight of wrapping, packing, etc. (lb.)	$\frac{1}{4}$		$\frac{1}{4}$	
Weight per 100 square feet, exclusive of wrapping, packing, etc. (lbs.)		12.14		28
Flexibility at 25° C. (77° F.). No cracking or bending 90° over a rounded corner of radius (inch)	$\frac{1}{4}$		$\frac{1}{4}$	
Average breaking strength:				
With fiber grain (lbs.)		30		40
Across fiber grain (lbs.)		15		20
Volatile matter at 105-110° C. (221-230° F.) (percent by weight)	4		4	
Weight of moisture-free desaturated felt per 100 square feet (lbs.)		5.24		10.4
Saturation of moisture-free felt (percent by weight)		140		150
Ash of desaturated felt (percent by weight)	10		10	

¹ The gross weight of roll is based on 432 square feet per roll of 15-pound felt and 216 square feet per roll of 30-pound felt. Where the production of rolls containing less than 432 square feet of 15-pound felt or 216 square feet of 30-pound felt is standard commercial practice, these will be acceptable under Government contracts. In such cases the minimum weight per roll shall be decreased proportionately.

F. METHODS OF SAMPLING, INSPECTION, AND TESTS

F-1. *Sampling for inspection.*—From each shipment of more than 1,000 rolls, take at random a number of rolls of felt equivalent to one-half the cube root of the total included in the lot. If this proves to be a fractional number, express it as the next higher digit. From each shipment of 1,000 rolls or less take five rolls at random.

F-2. *Determination of weight, width, and appearance.*—The weight per 100 square feet of material, and its variation in weight; the width and its variation must be determined by the inspector and the results transmitted to the testing laboratory with the sample. Material which does not conform to the specification in these respects shall be rejected by the inspector and only deliveries which conform in these respects sampled for laboratory tests.

F-2a. Remove wrappers, cores, and other packing material from each roll taken and weigh the roll and the packing material, etc., separately, to the nearest one-fourth pound. Then unwind each roll and measure the length of the roll and the width at each end of the roll to the nearest one-fourth inch, and re-roll. Observe the appearance of the material while unrolling and re-rolling.

F-2b. The finished material shall be free from visible external defects, such as holes, ragged or untrue edges, breaks, rents, cracks, or indentations. The surface shall be uniformly smooth and shall be free from areas or patches of unabsorbed saturant and superficial dry spots. The rolls shall be capable of being unrolled easily at 50° and 90° F. without cracking or sticking to such an extent as to cause injury. The surface of the felt shall not be coated or covered with 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.

F-2c. Compute the weight per 100 square feet of each roll examined, and from these weights compute the average weight of the shipment. If the calculated weight per 100 square feet of any roll examined is less than ~~14~~ pounds per 100 square feet for type I, 15-lb. type, and less than ~~26~~ pounds for type II, 30-lb. type, this shall be cause for the rejection of the whole shipment.

F-3. *Sampling for laboratory examination.*—From the rolls examined in sampling for inspection, select one the weight of which is nearest the average weight of the whole lot. Unroll, and at approximately 15 feet from one end cut two samples the full width of the roll and approximately 40 inches long. The sheet shall be cut at right angles to the edge of the roll. Measure and weigh the strips and calculate the weight per 100 square feet of each. Discard all strips whose weight varies by more than 0.5 pound from that obtained in F-2a. Divide each strip into four equal parts, marking the surface on the inside of the roll and the direction of the fiber grain on each section. (The direction of the fiber grain is always parallel to the edge of the sheet.) Label, and pack flat between supports wide enough to prevent crushing. Transmit one sample (four sections) to the testing laboratory and retain the other for check tests in case of dispute.

F-4. *Laboratory Examination.*—

F-4a. *Appearance.*—Examine both sides of the sheet of felt and note for uniformity of color and texture. The felt shall be thoroughly and

uniformly impregnated and shall show no unsaturated spots at any point.

F-4b. *Weight*.—Trim the sample so that it can be measured accurately, and weigh to the nearest gram (15 grains). From the measurements and weight so obtained compute the weight per 100 square feet. The weight so determined is only to be used in making the laboratory calculations and shall not be used as a basis for acceptance or rejection. (See F-2).

F-4c. *Pliability*.

F-4c (1). *Type I, 15-lb. type*.—At a point not less than 3 inches from the edge of the roll, cut 10 strips 1 inch wide and 6 inches long in the direction of the fiber grain and condition them for 10 to 15 minutes in a water bath at $25^{\circ} \pm 1^{\circ}$ C. Remove the strips from the water individually, and bend each strip immediately over the rounded corner of a block (rounded to a radius of $\frac{1}{4}$ inch) in approximately 2 seconds time. The surface of the test piece corresponding to the inside of the roll shall be uppermost when making the test. Dry thoroughly and examine. If one or more of these strips crack the material is reported as failing in the pliability test. Any crack less than $\frac{1}{4}$ inch in length originating at the edge of the test strip, or any slight lifting of the surface fibers, shall be disregarded.

F-4c (2). *Type II, 30-lb. type*.—Use the same procedure as described under F-4c (1), type I, 15-lb. type above, except that the corner of a block that has been rounded to a radius of $\frac{1}{4}$ inch shall be used.

F-4d. *Breaking Strength*.—At a point not less than 3 inches from the edge of the roll, 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. Condition both sets of strips at a temperature of 25° C. $\pm 1^{\circ}$ C for not less than 4 hours before testing.

F-4d (1). Test both sets of strips at 25° C. (77° F) $\pm 1^{\circ}$ C. in a Scott or similar testing machine of the inclination-balance type having a capacity of not less than 150 pounds. The test strip shall be gripped $1\frac{1}{2}$ 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.

F-4e. *Volatile matter*.—Cut two strips of the asphalt-saturated felt 6 inches wide and 12 inches long, weigh the strips separately to the nearest 0.1 gram, and suspend them for 5 hours in an oven at 105° to 110° C. (221° to 230° F.). Remove from the oven, cool in a desiccator, and weigh. Compute the percentage loss in weight for each sample and report as volatile matter the average loss of the two samples.

F-4f. *Weight of desaturated felt*.—Cut a strip 2 inches wide representing the full width of the sample, measure accurately and weigh to the nearest milligram. From this data calculate the weight of 100 square feet of saturated felt. If this weight varies by more than 0.5 pound from that calculated in F-4b, discard and cut additional strips until a sample within the limit is obtained. Extract with benzol (carbon tetrachloride, chloroform, or carbon bisulfide will usually give the same results but benzol shall be used in case of dispute)

in a suitable extraction apparatus until the solvent runs through colorless. Remove the desaturated felt from the extraction apparatus, dry in air until free from the odor of solvent, and brush off any adhering particles of foreign matter. Place the desaturated felt in a tared weighing bottle and heat in an oven at 105° to 110° C. (221° to 230° F.) for one-half hour, cool in a desiccator, and weigh. Calculate the percentage of moisture-free felt in the sample taken for extraction and compute the weight of moisture-free desaturated felt per 100 square feet from the weight obtained in F-4b.

F-4g. Saturation of moisture-free felt.—The weight of saturant in the felt is the difference in weight between the original sample taken for extraction in F-4f and the weight of the desaturated felt (plus any surfacing material present). The percentage saturation of the moisture-free felt is obtained by the following formula:

$$\frac{\text{Weight of saturant}}{\text{Weight of moisture-free desaturated felt}} \times 100 = \text{percentage saturation}$$

F-4g (1). Nature of saturant.—Test to identify the saturant as asphalt.

F-4h. Ash of moisture-free desaturated felt.—Incinerate the felt obtained in F-4f in a weighed crucible in a muffle furnace or over an open flame until all of the organic matter is consumed. Cool, weigh, and compute the percentage ash of the moisture-free desaturated felt.

G. PACKAGING, PACKING AND MARKING FOR SHIPMENT

G-1. Packaging.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. Packing.—The rolls of saturated felt shall be securely wrapped in a substantial grade of paper of the same width as the fabric. The wrapper shall completely encircle the roll and shall be pasted at the overlap in a manner which will prevent it shifting from position. The ends of the rolls need not be covered. No roll shall contain more than two pieces and there shall not be more than three percent of rolls containing two pieces in any shipment.

G-3. Marking.—Each package shall be legibly marked with a description of the contents, the name of the manufacturer, the place of manufacture, the brand (if any), the net weight of the contents, and some means of identification of "the particular contract on which purchase and shipment were made." Each shipment of the material shall be accompanied by printed directions for its use.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications of the issue in effect on date of invitation for bids, and special requirements, shall form a part of this specification, and shall be applicable to purchases made under this specification by the respective departments:

H-2. Army.—United States Army Specification No. 100-2, Standard Specification for Marking Shipments.

H-3. Navy.—For administrative reasons Navy purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y—Roofing, Siding, Sheet-Metal Work; Dampproofing and Membrane Waterproofing, copies of which may be obtained, without cost, upon application to the Bureau.

FEDERAL STANDARD STOCK CATALOG
(Section IV, part 5)

of Yards and Docks, Navy Department, Washington, D. C. The technical requirements of the Bureau of Yards and Docks specification conform in detail with the technical requirements of this Federal specification.

I. NOTES

I-1. Type I, 15-lb. type, asphalt-saturated felt is intended for use with asphalt for mineral-surfaced roofing and asphalt for waterproofing and dampproofing in the construction of built-up roofing and membrane waterproofing respectively.

I-2. Type II, 30-lb. type, asphalt-saturated felt is intended for use in the construction of built-up roofing, for flashings, and as an underlay material under slate, tile, etc.

I-3. Basis of purchase should be by the roll of not less than 432 square feet for type I, 15-lb. type and of not less than 216 square feet for type II, 30-lb. type; or by the square (100 square feet); or by weight, according to agreement between the purchaser and the seller.

I-4. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-5. Federal Specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, etc., which are suitable for Federal Government requirements.

I-6. An index of Federal Specifications may be purchased as noted in the paragraph below, price to be obtained from the Superintendent of Documents.

I-7. Copies of this specification may be obtained upon application, accompanied by money order, coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D. C. Price 5 cents.

I-8. Copies of the standard and listings of the Underwriters' Laboratories, Inc., referred to herein, may be obtained without cost from the Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago, Ill.

F Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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HH-F-201

JUNE 6, 1933

SUPERSADING

F.S. No. 81

December 29, 1933

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**FELT; COAL-TAR-SATURATED (FOR) ROOFING
AND WATERPROOFING**

This specification was approved for promulgation by the Federal Specifications Board on June 6, 1933, for the use of the departments and independent establishments of the Government in the purchase of this commodity, and shall become mandatory for all departments and independent establishments of the Government not later than December 1, 1933. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. There are no other Federal specifications applicable to this specification.

A-2. Any special requirements of the individual departments of the Government are noted under section H.

B. TYPES

B-1. Coal-tar saturated felt shall be of but one type.

C. MATERIAL

C-1. Material shall be composed of roofing felt made of organic fibers, impregnated with a coal-tar saturant.

D. GENERAL REQUIREMENTS

D-1. Basis of purchase shall be by the roll or by the square (100 square feet) according to agreement between purchaser and the seller.

E. DETAIL REQUIREMENTS

E-1. Appearance.—Coal-tar saturated felt shall be free from visible external defects, such as holes, ragged or untrue edges, breaks, rents, cracks, or indentations, and shall be uniform throughout. When unrolled at temperatures between 50° and 90° F., it shall not stick to such an extent as to cause injury. The surface

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FEDERAL STANDARD STOCK CATALOG

(Section IV, Part 5)

of the felt shall not be coated or covered with talc or other substances which might tend to interfere with the adhesion between the felt and the plying cement. The surface shall be uniformly smooth and shall be free from areas or patches of unabsorbed saturant and superficial dry spots.

E-2. Physical and chemical requirements shall meet the following requirements:¹

	Maxi- mum	Mini- mum
Gross weight of roll.....pounds..	80	45
Weight of wrapping, packing, etc.....do..	15	13
Weight per 100 square feet, exclusive of wrapping, packing, etc.....do..	15	13
Flexibility at 25° C. (77° F.), (cracking on bending over a 1/8-inch mandrel, through an arc of 180°).....do..		None.
Average breaking strength:		
With the fiber grain.....pounds..		30
Across the fiber grain.....do..		15
Thickness of desaturated felt.....inch..		0.025
Ash of desaturated felt.....percent..	10	

F. METHODS OF INSPECTION, DETERMINATION OF WEIGHT AND WIDTH, SAMPLING, AND TESTING

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

F-1. *Sampling for inspection.*—From each shipment of more than 1,000 rolls take at random a number of rolls of felt equivalent to one half the cube root of the total included in the lot. If this proves to be a fractional number, express it as the next higher digit. From each shipment of 1,000 rolls or less take at random five in each case.

F-2. *Determination of weight and width.*—The weight per 100 square feet of material, and its variation in weight; the width and its variation must be determined by the inspector and the results transmitted to the testing laboratory with the sample. Material which does not conform to the specification in these respects should be rejected by the inspector and only deliveries which conform in these respects sampled for laboratory tests.

F-2a. 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 also the appearance of the material while unrolling and rerolling.

The finished material should be free from visible external defects, such as holes, ragged or untrue edges, breaks, rents, cracks, or indentations. The rolls should be capable of being unrolled at temperatures between 50 and 90° F. without sticking to such an extent as to cause injury.

¹ Width (inches) 36+1/4 inch or 32+1/4 inch as called for.

HH-F-201

AMENDMENT--1
SEPTEMBER 14, 1943

SUPERSEDING EMERGENCY
ALTERNATE FED. SPEC.
E-HH-F-201
April 1, 1943

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

FELT; COAL-TAR-SATURATED, (FOR) ROOFING AND WATERPROOFING*

This amendment was approved on the above date by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than Nov. 15, 1943. It may be put into effect, however, at any earlier date after promulgation.

The following changes shall be made in Federal Specification HH-F-201, dated June 6, 1933:

Page 1:

Paragraph B-1. Delete paragraph and substitute:

B-1. Coal-tar-saturated felt shall be of the following types, as specified in the invitation for bids:

Type I, 15-lb. type.

Type II, 30-lb. type.

*Certain provisions of this amendment are intended to conserve critical or strategic materials. When the present emergency is over, this amendment will be considered for revision.

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Page HH-F-201-2:

Paragraph E-2. Delete paragraph in its entirety and substitute:

E-2. *Physical and chemical requirements:*

	Type I, 15-lb. type		Type II, 30-lb. type	
	Maxi- mum	Mini- mum	Maxi- mum	Mini- mum
(Width (inches) $36 \pm \frac{1}{4}$ inch or $32 \pm \frac{1}{4}$ inch as called for)				
Gross weight of roll.....pounds.	40	15	80	56
Weight of wrapping, packing, etc.....do.	15	13	24	26
Weight per 100 square feet, exclusive of wrapping, pack- ing, etc.....pounds.				
Pliability at 26° C. (77° F.) (cracking on bending, Type I, over a $\frac{1}{16}$ -inch mandrel, through an arc of 180°, and Type II, through an arc of 90° over a rounded corner of $\frac{1}{4}$ -inch radius, respectively)		None		None
Average breaking strength:				
With the fiber grain.....pounds.		30		
Across the fiber grain.....do.		15		
Thickness of desaturated felt (Type I).....inch.		0.025		
Thickness of saturated felt (Type II).....do.				0.030
Ash of desaturated felt (Type I).....percent.	10			
Ash of saturated felt (Type II).....do.			4	

Page HH-F-201-3:

Paragraph F-2a:

Lines 8, 9, and 10. Delete sentence beginning "In no case," and substitute, "If the calculated weight per 100 square feet of any roll examined is less than 13 pounds for Type I, 15-pound type, or less than 26 pounds for Type II, 30-pound type, the whole shipment does not meet the specification and this may be made the cause for rejection."

Paragraph F-4c:

Line 1. After "Pliability" insert "Type I, 15-pound type." Insert subparagraph F-4c (1) as follows:

F-4c (1). *Pliability, Type II, 30-pound type.*—Use the same procedure as described under F-4c, except that the strips shall be bent through an arc of 90° over the rounded corner of a block (rounded to a radius of $\frac{1}{4}$ inch). The surface of the test piece corresponding to the inside of the roll shall be uppermost in making this test. If one or more of these strips crack, the material is reported as failing in the pliability test.

Paragraph F-4e:

Line 1. After "Thickness of desaturated felt," insert "Type I, 15-pound type."

FEDERAL STANDARD STOCK CATALOG
(Section IV, part 5)

HH-F-201
Amend. 1-3
(Sept. 1949)

Page HH-F 201- 4:

Paragraph F-4e: Insert subparagraph F-4e (1) as follows:

F-4e (1). *Thickness of saturated felt, Type II, 30-pound type.*—Cut a 2-inch strip the full width of the roll and calliper it at 15 equally spaced points through the center of the strip with a micrometer having flat bearing surfaces at each contact point. Average the readings.

Paragraph F-4f:

Line 1. After "*Ash of moisture-free desaturated felt,*" insert "*Type I, 15-pound type.*"

Insert subparagraph F-4f (1) as follows:

F-4f (1). *Ash of saturated felt, Type II, 30-pound type.*—Weigh accurately the 2-inch strip of saturated felt obtained in F-4e (1), and incinerate it in a weighed crucible in a muffle furnace or over an open flame until all of the organic matter is consumed. Cool, weigh and compute the percentage ash of the saturated felt.

Paragraph G-2a. Delete paragraph and substitute:

G-2a. The corners of the felt on the outside of each roll shall be turned in and the rolls shall be taped, or some other equally protective wrapping employed, which will insure acceptance and safe delivery by common or other carriers at the lowest rate to the point of delivery called for in the contract or purchase order. A standard label shall be attached to each roll to identify the material. The ends of the rolls need not be covered. No roll shall contain more than two pieces and there shall not be more than 3 percent of rolls containing two pieces in any shipment.

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The surface of the felt should not be coated or covered with talc or other substances which might tend to interfere with the adhesion between the felt and the plying cement. The surface should be uniformly smooth and should 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 should this weight be less than 13 pounds per 100 square feet, and any roll examined whose weight per 100 square feet is less than 13 pounds shall be cause for the rejection of the whole shipment.

F-3. Sampling for laboratory examination.—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, roll carefully but do not crease, wrap, and transmit one to the testing laboratory. Retain the other sample for check analysis in case of dispute.

F-4. Laboratory examination.—

F-4a. Appearance.—Examine both sides of the sheet of felt and note for uniformity of color. The felt should be thoroughly and uniformly impregnated and should show no unsaturated spots at any point.

F-4b. 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. The weight so determined is only to be used in making the laboratory calculations and shall not be used as a basis for acceptance or rejection. (See F-2.)

F-4c. 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 over a mandrel one-sixteenth inch in diameter through an arc of 180° at a uniform rate in approximately two seconds time. Dry thoroughly and examine. If one or more of these five strips crack on this test, cut ten strips from another part of the sample and repeat the test. If one or more of these strips crack the material is reported as failing on the pliability test.

F-4d. 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.

F-4e. Thickness of desaturated felt.—Cut a 2-inch strip the full width of the sample and extract with carbon bisulphide or benzol in

a suitable extraction apparatus until the solvent contains not more than a trace of soluble matter. Remove the desaturated felt from the extractor, allow to stand in air until the odor of the solvent has disappeared, and brush off the carbonaceous matter and other insoluble matter adhering to the felt. Caliper the felt at 15 equally spaced points, at least three fourths inch from a cut edge, with a micrometer having flat bearing surfaces at each contact point. Average the readings.

In case an extraction apparatus of sufficient size to accommodate the whole strip is not available, the felt may be cut into squares approximately one inch on each side. In this case extract and air-dry as described above, mix thoroughly and take at random 15 pieces of felt. Caliper each piece at its center with a micrometer having flat bearing surfaces at each contact point. Average the readings.

F-4f. Ash of moisture-free desaturated felt.—Cut the desaturated felt obtained in F-4e into squares about 1 cm on each side and mix thoroughly. Take at random enough pieces to weigh about 10 grams, dry in an oven at 105 to 110° C. (221 to 230° F.) for one half hour, cool in a desiccator, weigh accurately, and incinerate in a weighed crucible in a muffle furnace or over an open flame until all of the carbon is consumed. Cool, weigh, and compute the percentage ash of the moisture-free desaturated felt.

G. PACKAGING, PACKING, AND MARKING

G-1. Packaging.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. Packing.—

G-2a. The rolls of saturated felt shall be securely wrapped in a substantial grade of paper of the same width as the fabric. The wrapper shall completely encircle the roll and shall be pasted at the overlap in a manner which will prevent it shifting from position. The ends of the rolls need not be covered. No roll shall contain more than two pieces, and there shall not be more than three percent of rolls containing two pieces in any shipment.

G-3. Marking.—Each package shall be legibly marked with a description of the contents, the name of the manufacturer, the place of manufacture, the brand (if any), the net weight of the contents, and some means of identification of "the particular contract on which purchase and shipment were made." Each shipment of the material shall be accompanied by printed directions for its use.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall respectively form a part of this specification.

H-1a. Army.—United States Army Specification No. 100-2, standard specification for marking shipments.

H-1b. Navy department purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, Roofing, Siding, and Sheet Metal Work; Damp-

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proofing and Membrane Waterproofing, (copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D.C.

I. NOTES

I-1. Coal-tar saturated felt is intended for use with coal-tar pitch for roofing and coal-tar pitch for waterproofing and dampproofing in the construction of built-up roofing and membrane waterproofing, respectively.

I-2. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-3. This specification governs all United States Government purchases of this commodity. Users are requested to retain this specification in permanent file until a revision is issued.

I-4. Interested parties are advised that an alphabetical index of Federal specifications may be obtained upon application, as noted in paragraph next below, price to be obtained from the Superintendent of Documents.

I-5. Copies of this specification may be obtained upon application, accompanied by money order or coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D.C. Price 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility or any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

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For sale by the Superintendent of Documents, Washington, D.C. - - - Price 5 cents

BIRD 006375

UU-P-271a

MAY 7, 1943

SUPERSEDING
Fed. Spec. UU-P-271
Sept. 30, 1936, and
EMERGENCY ALTERNATE
E-UU-P-271
November 20, 1942

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

PAPER; KRAFT, WRAPPING, WATERPROOFED*

This specification was approved on the above date by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than July 15, 1943. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE SPECIFICATION.

A-1. The following Federal Specification of the issue in effect on date of invitation for bids shall form a part of this specification:
UU-P-31-Paper; General Specifications

B. TYPES AND GRADES.

Type designation:

Construction

A-----	Duplexed-creped one direction.
B-1-----	Duplexed-creped both directions, or creped in one direction and pleated or corrugated in the other direction.
B-2-----	
B-3-----	
B-4-----	
C-----	Duplexed-uncreped.
D-1-----	Duplexed-reinforced one direction, uncreped.
D-2-----	Duplexed-reinforced one direction, creped one direction.
E-1-----	Duplexed-reinforced any two directions, uncreped.
E-2-----	Duplexed-reinforced any two directions, creped one direction.
F-----	Coated, cotton scrim-lined, uncreped.
G-1A-----	Coated, 10 ounces burlap-lined, uncreped.
G-1B-----	Coated, 7½ ounces burlap-lined, uncreped.
G-1C-----	Coated, 40 inches, 2.05 yards Osnaburg-lined, uncreped.
G-1D-----	Coated, 40 inches, 7 ounces Osnaburg-lined, uncreped.

*Certain provisions of this specification are intended to conserve critical or strategic materials. When the present emergency is over, this specification will be considered for revision.

527712-43

Type designation:	Construction
G-2A-----	Coated, 10 ounces burlap-lined, creped one direction.
G-2B-----	Coated, 7½ ounces burlap-lined, creped one direction.
G-2C-----	Coated, 40 inches 2.05 yards Osnaburg-lined, creped one direction.
G-2D-----	Coated, 7 ounces 40 inches Osnaburg-lined, creped one direction.
G-3A-----	Coated, 10 ounces burlap-lined, creped in two directions, or creped in one direction and pleated or corrugated in the other direction.
G-3B-----	Coated, 7½ ounces burlap-lined, creped in two directions, or creped in one direction and pleated or corrugated in the other direction.
G-3C-----	Coated, 40 inches 2.05 yards Osnaburg, creped in two directions or creped in one direction and pleated or corrugated in the other direction.
G-3D-----	Coated, 7 ounces 40 inches Osnaburg, creped in two directions or creped in one direction and and pleated or corrugated in the other direction.
H-1}-----	Triplexed-creped both directions, or creped one direction and pleated or corrugated in the other direction.
H-2}-----	
I-----	Triplexed-creped in one direction.
J-1}-----	Quadruplexed-creped in both directions, or creped in one direction and pleated or corrugated in the other direction.
J-2}-----	
K-1-----	Single sheet uncreped, coated, saturated or infused on one side with asphalt.
K-2-----	Single sheet uncreped, coated, saturated or infused on both sides with asphalt.
K-3-----	Single sheet creped, coated, saturated or infused on one side with asphalt.
K-4-----	Single sheet creped, coated, saturated or infused on both sides with asphalt.
L-1}-----	Duplexed-uncreped, one sheet coated, saturated or infused with asphalt.
L-2}-----	
L-3-----	Duplexed-creped, one sheet coated, saturated or infused with asphalt.
L-4-----	Duplexed-creped, coated, saturated or infused on both sides with asphalt.
M-----	Triplexed-uncreped.

C. MATERIAL AND WORKMANSHIP

C-1. Shall be free from visible defects and have a uniform appearance. The paper shall not stick together to an extent that will cause tearing when unrolled.

D. GENERAL REQUIREMENTS.

D-1. *Stock*.—Shall be 100 percent unbleached sulphate fibers.

D-2. *Purchase basis*.—Shall be 100 square feet.

D-3. *Cut*.—Shall be in rolls or flat cuts as specified in invitation for bids.

D-4. *Sizes*.—Widths, 36, 48, 54, 60, 72, 84 and 96 inches or as specified in invitation for bids.

D-5. *Bleeding*.—When specified in the inquiry for bid or on procurement orders, all types of paper except types F and G, and except any types which are coated, saturated, or infused on an exposed surface, shall show no substantial bleeding of asphaltum when heated to 170° Fahrenheit for 5 hours under the conditions specified in paragraph F-6. (See par. I-1.)

E. DETAIL REQUIREMENTS.

E-1. *Construction*.—Shall be as follows:

E-1a. *Type A*.—Type A paper shall consist of two sheets of paper cemented together with asphaltum and creped in one direction.

E-1b. *Type B-1, B-2, B-3, and B-4*.—Types B-1, B-2, B-3, and B-4 papers shall consist of two sheets of paper cemented together with asphaltum and creped in both directions of the paper, or creped in one direction and pleated or corrugated in the other direction.

E-1c. *Type C*.—Type C paper shall consist of two sheets of paper cemented together with asphaltum.

E-1d. *Type D-1*.—Type D-1 paper shall consist of two sheets of paper cemented together with asphaltum in which are imbedded cords or strands of fiber running the long direction of the paper. The distance between the cords or strands shall be specified by the purchasing officer as either not more than $\frac{1}{2}$ inch or not more than $1\frac{1}{4}$ inches.

E-1e. *Type D-2*.—Type D-2 paper, same as type D-1, but with paper creped one direction.

E-1f. *Type E-1*.—Type E-1 paper shall consist of two sheets of paper cemented together with asphaltum in which are imbedded cords or strands of fiber running in any two directions of the paper as specified. The distance between the cords or strands shall be specified by the purchasing officer as either not more than $\frac{1}{2}$ inch or not more than $1\frac{1}{4}$ inches, unless otherwise specified.

E-1g. *Type E-2*.—Type E-2 paper, same as type 1, but with paper creped one direction.

E-1h. *Type F*.—Type F paper shall consist of a single sheet of paper, coated on one side with asphaltum in which is imbedded cotton scrim, having not less than eight strands to the inch in each direction.

E-1i. *Types G-1A, G-1B, G-1C, and G-1D*.—Types G-1A, G-1B, G-1C, and G-1D papers shall consist of a single sheet of uncreped paper, coated on one side with asphaltum in which is imbedded one of the types of burlap or osnaburg listed in paragraphs E-1k (1), E-1k (2), E-1k (3), and E-1k (4).

E-1j. *Types G-2A, G-2B, G-2C and G-2D*.—Types G-2A, G-2B, G-2C, and G-2D papers shall consist of a single sheet of paper, creped in one direction, coated on one side with asphaltum in which is imbedded one of the types of burlap or osnaburg listed in paragraphs E-1k (1), E-1k (2), E-1k (3), and E-1k (4).

E-1k. Types G-3A, G-3B, G-3C, and G-3D.—Types G-3A, G-3B, G-3C, and G-3D papers shall consist of a single sheet of paper, creped in two directions or creped in one direction and pleated or corrugated in the other direction, coated on one side with asphaltum in which is imbedded one of the types of burlap or osnaburg listed in paragraphs E-1k (1), E-1k (2), E-1k (3), and E-1k (4).

E-1k (1).—Grade A shall be burlap of 10 ounces per linear yard (40-inch basis) with commercial tolerance (other widths prorated to 40 inches).

E-1k (2).—Grade B shall be burlap of 7½ ounces per linear yard (40-inch basis) with commercial tolerance (other widths prorated to 40 inches).

E-1k (3).—Grade C shall be 40-inch 2.05-yard Osnaburg (other widths prorated to 40 inches) with commercial tolerance.

E-1k (4).—Grade D shall be 7-ounce 40-inch Osnaburg (other widths prorated to 40 inches) with commercial tolerance.

E-1l. Types H-1 and H-2.—Types H-1 and H-2 papers shall consist of three sheets of paper cemented together with asphaltum and creped in both directions of the paper, or creped in one direction and pleated or corrugated in the other direction.

E-1m. Type I.—Type I paper shall consist of three sheets cemented together with asphaltum and creped in one direction of the paper.

E-1n. Types J-1 and J-2.—Types J-1 and J-2 papers shall consist of four sheets of paper cemented together with asphaltum and creped in both directions of the paper, or creped in one direction and pleated or corrugated in the other direction.

E-1o. Type K-1.—Type K-1 paper shall consist of a single sheet of uncreped paper coated, saturated or infused on one side with asphalt.

E-1p. Type K-2.—Type K-2 paper shall consist of a single sheet of uncreped paper coated, saturated or infused on both sides with asphalt.

E-1q. Type K-3.—Type K-3 paper shall consist of a single sheet of creped paper coated, saturated, or infused on one side with asphalt.

E-1r. Type K-4.—Type K-4 paper shall consist of a single sheet of creped paper coated, saturated or infused on both sides with asphalt.

E-1s. Types L-1 and L-2.—Types L-1 and L-2 papers shall consist of two sheets of paper uncreped, cemented together with asphaltum and having one sheet coated, saturated, or infused with asphalt.

E-1t. Type L-3.—Type L-3 paper shall consist of two sheets of paper cemented together with asphalt, having one sheet coated, saturated, or infused with asphalt, and creped in one direction.

E-1u. Type L-4.—Type L-4 paper shall consist of two sheets of creped paper cemented together with asphalt coated, saturated or infused on both sides with asphalt.

E-1v. Type M.—Type M paper shall consist of three sheets of paper cemented together with asphaltum.

E-2. Average tensile strength, water resistance, and stretch.—Shall be as follows:

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(Section IV, part 5) (May 1943)

Type	Tensile strength per inch width, minimum each direction	Water resistance, dry-indicator method (minimum)	Stretch in each creped or pleated direction (minimum)	Basis weight of asphaltum 24 x 36-600, per ply of paper before combining or creping ¹ (minimum)	Basis weight of paper 24 x 36-600, per ply of paper before combining or creping ² (minimum)
	<i>Pounds</i>	<i>Hours</i>	<i>Percent</i>	<i>Pounds</i>	<i>Pounds</i>
A.....	15	10	30	15	30
B-1.....	12	8	30	15	30
B-2.....	12	8	15	15	30
B-3.....	12	48	20	50	30
B-4.....	15	48	15	50	60
C.....	20	15	none	15	30
D-1.....	20	24	none	30	30
D-2.....	15	12	10	30	30
E-1.....	30	24	none	30	30
E-2.....	30	12	10	30	30
F.....	20	4	none	30	30
G-1A.....	85	24	none	30	30
G-1B.....	65	24	none	30	30
G-1C.....	75	24	none	30	30
G-1D.....	65	24	none	30	30
G-2A.....	85	24	(G)	30	30
G-2B.....	65	24	(G)	30	30
G-2C.....	75	24	(G)	30	30
G-2D.....	65	24	(G)	30	30
G-3A.....	85	24	(G)	30	30
G-3B.....	65	24	(G)	30	30
G-3C.....	75	24	(G)	30	30
G-3D.....	65	24	(G)	30	30
H-1.....	18	48	20	50	30
H-2.....	25	48	15	50	60
I.....	20	24	15	20	30
J-1.....	24	48	20	50	30
J-2.....	35	48	15	60	60
K-1.....	13	4	none	5	40
K-2.....	13	12	none	10	40
K-3.....	8	4	30	5	40
K-4.....	8	4	30	10	40
L-1.....	20	24	none	20	30
L-2.....	40	48	none	27	60
L-3.....	16	12	10	20	30
L-4.....	20	24	10	20	40
M.....	30	48	none	20	30

¹ Wherever asphaltum is specified as a combining agent, any other combining agent equal in all respects to asphaltum may be substituted. Any of the papers specified herein may be additionally impregnated or coated with any suitable material. Any substitute material must meet all the requirements specified herein.

² This does not require that the double coating process be used. A single coat of asphaltum of double the weight specified may be used.

³ These are included as a matter of information only and are not requirements.

⁴ The papers of Types G-2A, G-2B, G-2C, and G-2D shall have sufficient stretch that when the tensile test is applied, in the creped direction, the paper shall not break before the burlap or osnaburg breaks.

⁵ The papers of Types G-3A, G-3B, G-3C and G-3D shall have sufficient stretch that when the tensile test is applied in each direction parallel with the strands, the paper shall not break before the burlap or osnaburg breaks in either direction.

F. METHODS OF SAMPLING, INSPECTION, AND TESTS.

F-1. All tests not herein specified shall be made in accordance with Federal Specification UU-P-31, Paper; General Specifications.

F-2. Each sample shall consist of not less than five sheets, each not less than three square feet, and each taken from a different roll.

F-3. Water resistance shall be determined by the dry-indicator method as specified in T. A. P. I. standard method T-433-m-41 using the method specified in Paragraph 1 of Procedure B. The time for transudation shall be reported as the point for the appearance over the entire area of the indicator of an easily perceptible color change of the dry indicator particles when compared with a similar specimen prepared in the same way but not exposed to the water. Five tests shall be made on each side of the paper and the average time for the 10 specimens shall be reported.

F-4. The number of square feet in the shipment shall be calculated from the weight of the entire shipment, the net weight of the sample rolls, and the weight per foot of paper calculated from the weight of the sample sheets.

F-5. Tensile strength and stretch shall be determined simultaneously with a pendulum type of instrument having a device for indicating the amount of stretch. The stretch shall be recorded at the instant of rupture of the paper under the tensile stress. When stretch is to be determined, care must be taken to apply no more initial tension to the test strip before clamping it than is required to straighten it. Strips 2 inches wide and not less than 5½ inches between jaws, shall be used for these tests. The test values for tensile strength are divided by 2 to obtain the values per inch width.

F-6. The test for bleeding of the asphalt will be as follows: When specified in the inquiry for bid or on procurement orders, the paper shall show no substantial bleeding due to asphalt penetration when tested by suspension for 5 hours in air uniformly heated to 170° F.

G. PACKAGING, PACKING, AND MARKING FOR SHIPMENT.

G-1. Packaging.—Unless otherwise specified, paper shall be furnished in commercial rolls or containers.

G-2. Packing.—If containers are used for packing, they shall be of the type, size, and kind commonly used for the purpose, so constructed as to insure acceptance and safe delivery by common or other carriers, at the lowest rate, to point of delivery called for in the contract or purchase order.

G-3. Marking.—The rolls or containers shall be marked with the name of the material, size, type, and quantity contained therein as defined by the contract or order under which shipment is made, the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS.

H-1. The following departmental specifications of the issue in effect on date of invitation for bids, and special requirements, shall form a part of this specification, and shall be applicable to purchases made under this specification by the respective departments:

H-2. Army.—U. S. Army Specification No. 100-2, Standard Specification for Marking Shipments, insofar as the terms are applicable.

copies of which may be obtained on application to the Quartermaster General, War Department, Washington, D. C.

H-3. *Navy*.—Navy Department General Specification for Inspection of Material, copies of which may be obtained without cost upon application to Bureau of Supplies and Accounts, Navy Department, Washington, D. C.

H-4. *Marine Corps*.—Instructions issued by the Quartermaster's Department, U. S. Marine Corps, 1100 South Broad Street, Philadelphia, Pa.

I. NOTES.

I-1. For shipment in climates or for use under conditions where high temperatures are to be encountered, the requirement under paragraph D-5 is recommended. Wherever the product packed may be damaged by asphalt, an underwrap of suitable material should be used.

I-2. Federal Specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, etc., which are suitable for Federal Government requirements.

I-3. An Index of Federal specifications may be purchased as noted in the paragraph below, price to be obtained from the Superintendent of Documents.

I-4. Copies of this specification and of UU-P-31 may be obtained upon application, accompanied by money order, coupon or cash, to Superintendent of Documents, Government Printing Office, Washington, D. C., Price 5 cents each.

Notice.—When Government drawings, specifications, or other data are used for any purpose, other than in connection with a definitely related Government Procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded, by implication or otherwise, as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

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FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**SHEETS (CORRUGATED) AND SHAPES;
CEMENT-ASBESTOS**

This specification was approved on the above date by the Director of Procurement, for the use of all departments and establishments of the Government and shall become effective not later than March 15, 1945. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE SPECIFICATIONS.

A-1. There are no other Federal specifications applicable to this specification.

B. TYPES.

B-1. This specification covers corrugated cement-asbestos sheets of two types as specified in the invitation for bids:

Type I. Pitch of corrugations, 4.2 inches.

Type II. Pitch of corrugations, 2.625 inches.

C. MATERIALS AND WORKMANSHIP.

C-1. Each sheet and supplementary shape (corner roll, ridge roll, louver, etc.) shall be composed of a uniform mixture of portland cement and asbestos fiber, with or without the addition of a curing agent, formed under pressure and thoroughly cured. At least one side shall be smooth. The sheets shall be free from defects which detract from their serviceability or the appearance of the smooth side.

D. GENERAL REQUIREMENTS.

D-1. *Fasteners.*—Unless otherwise specified, fasteners shall be furnished. These shall be of ferrous metal, zinc coated or cadmium coated after fabrication or of non-ferrous metal, as specified. Lead washers and metal washers of the same materials as the fasteners shall be furnished for use under the heads of all fasteners. When lead-headed fasteners are furnished, the lead washers may be omitted. Allowance shall be made for at least 3 percent waste of fasteners and washers.

E. DETAIL REQUIREMENTS.

E-1. *Color.*—The color of the sheets shall be normal cement gray or buff.

E-2. *Size*.—Each sheet shall be not less than 41 $\frac{3}{4}$ inches nor more than 42 $\frac{1}{4}$ inches wide. The length of each sheet shall be one of the customary commercial lengths as specified in the invitation for bids.

E-3. *Thickness*.—The thickness of each sheet shall be not less than $\frac{1}{32}$ inch at the crest and vale and not less than $\frac{1}{64}$ inch midway between crest and vale.

E-4. *Corrugations*.—The depth of the corrugations from the top of the crest to the bottom of the vale shall be uniform and as follows:

Type I sheets, minimum $1\frac{1}{16}$ inches (nominal $1\frac{1}{2}$ inches).

Type II sheets, minimum $\frac{1}{16}$ inch (nominal 1 inch).

E-5. *Absorption*.—The average absorption shall not exceed 20 percent and the absorption of any one sheet shall not exceed 25 percent. (See F-3).

E-6. *Strength, dry*.—The maximum load supported by each dry specimen in the transverse strength test shall be not less than 300 pounds per foot of width for Type I sheets, and not less than 250 pounds per foot of width for Type II sheets. (See paragraph F-4).

E-7. *Strength, saturated*.—The maximum load supported by each saturated specimen in the transverse strength test shall be not less than 180 pounds per foot of width for Type I sheets, and not less than 150 pounds per foot of width for Type II sheets. (See F-4a).

F. METHODS OF SAMPLING, INSPECTION, AND TESTING.

F-1. *Sampling*.—From each lot of 1,000 sheets or fraction thereof of the same type, 10 specimens shall be selected by the inspector. Not more than two specimens shall be taken from the same sheet. Each specimen for a strength test shall be 36 inches long and from 12 to 18 inches wide. The longer edges shall be parallel to the corrugations and at the bottom of a vale, so that each specimen is symmetrical about its longitudinal axis. Additional specimens may be taken at the discretion of the inspector.

F-2. *Preparation of specimens*.—Immediately before testing, each specimen shall be dried for 24 hours in a ventilated oven or room at a temperature between 220° and 230° F.

F-3. *Absorption test*.—Specimens for the absorption test shall be sound pieces having an area of $\frac{1}{4}$ to 1 square foot and may be cut from undamaged portions of specimens previously subjected to the strength test. Five of the dried specimens shall be weighed separately. Weighings shall be accurate within 0.5 percent. These specimens shall be submerged for 24 hours in tap water at 60° to 80° F. They shall then be removed from the water, wiped with a damp cloth and again weighed. The difference between the weight after immersion and the weight when dry, multiplied by 100 and divided by the dry weight, shall be taken as the absorption in percent.

F-4. *Strength test*.—The transverse strength of each of five of the dried specimens shall be determined by placing the specimen on a span of 30 inches on supports which cannot exert longitudinal constraint on the specimen (rocker-type knife edges, rollers, etc.) and applying the load at midspan through a similar edge bearing against the smooth side of the specimen. The load line and supports shall be parallel. The load shall be applied at a uniform rate such as to result in failure of the specimen in 1 to 2 minutes. The error in the load reading shall not exceed 2 percent of the specified minimum load. (See E-6 and E-7). The maximum load in pounds

divided by the width in feet of the specimen at midspan shall be reported.

F-4a. The transverse strengths of the other five specimens shall be determined in a similar manner following their immersion in water for 24 hours.

G. PACKING AND MARKING FOR SHIPMENT.

G-1. *Packing*.—Unless otherwise specified, the subject commodity shall be so packed or bundled as to insure acceptance and safe delivery by common or other carriers, at the lowest rate, to the point of delivery called for in the contract or purchase order.

G-2. *Marking*.—Unless otherwise specified each delivery shall be identified with the name of the material, the thickness, type, and the quantity contained therein, as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS.

H-1. The following departmental specifications of the issue in effect on date of invitation for bids, and special requirements, shall form a part of this specification, and shall be applicable to purchases made under this specification by the respective departments:

H-2. *Army*.—Standard Specifications No. 100-2 for Marking Shipments (copies of which may be obtained, without cost, upon application to the Quartermaster General, Washington, D. C.).

H-3. *Navy*.—

H-3a. *Navy Department specifications*.—

General Specifications for Inspection of Material.

39P16—General Specification for Packaging and Packing for Overseas Shipment.

Copies of these specifications and of the Navy Shipment Marking Handbook may be obtained without costs upon application to the Bureau of Supplies and Accounts, Navy Department, Washington 25, D. C.

H-3b. *Packing*.—

H-3b (1). *For domestic shipments*.—

H-3b (1)a. Unless otherwise specified, the subject commodity if shipped in quantities of less than 10,000 pounds, shall be packed in unsheathed crates made of well-seasoned lumber, free from defects which would tend to weaken the crate. Sufficient number of sheets shall be packed per crate so that the depth shall be not less than 3 inches. The minimum thickness of the framing members forming the sides and ends of the crates shall be 1½ inches and the minimum dimensions of the top and bottom sheathing members shall be 3½ inches wide by ¾-inch thick. Cement-coated or chemically-etched cooler or sinker nails shall be used. The nails used to attach the sides to the ends shall be not less than 12D. Not less than 7D nails shall be used to attach the sheathing members to the sides and ends. Sufficient straight slots or diagonals shall be used to adequately protect the contents. The gross weight shall not exceed approximately 1,500 pounds.

H-3b (1)b. Unless otherwise specified, the subject commodity if shipped in quantities of 10,000 pounds or more, shall be shipped loose, or crated as described in paragraph H-3b (1)a. If shipped loose, the sheets shall be so loaded in the car or truck as to prevent damage in transit.

H-3b (2). *For overseas shipment.*—Unless otherwise specified, the subject commodity shall be packed in usheathed crates made of well-seasoned lumber free from defects which would tend to weaken the crate. Sufficient number of sheets shall be packed per crate so that the depth shall not be less than 8 inches. The minimum thickness of the framing members forming the sides and ends of the crate shall be 1½ inches and the minimum dimensions of the top and bottom sheathing members shall be 5½ inches wide by ¾-inch thick. Only cement-coated or chemically etched cooler or sinker nails shall be used. Not less than sixteenpenny nails shall be used to attach the sides to the ends. Not less than eightpenny nails shall be used to attach the sheathing members to the sides and ends. The maximum open space between the sheathing members shall be 14 inches. Containers shall be strapped in conformance with the requirements of the appendix of Section VI of Navy Department Specification 39P18 except that not more than four straps will be required. Straps shall be stapled to the sheathing members at intervals of not more than 12 inches. In addition to the foregoing, four short straps shall be used per crate. They shall be placed at approximately 3 inches from the extremities of each end and shall extend over the adjoining sheathing member and be securely nailed to it. The gross weight shall not exceed approximately 1,500 pounds.

H-3b (3). *For domestic or overseas shipment.*—Where practicable, shipping containers shall be of the same uniform size and contain the identical number of items of one type and size. Containers shall be designed to fit the contents in a compact manner.

H-3c. *Marking.*—Unless otherwise specified, each shipping container shall be plainly marked in black with the following information completed:

Material _____
Size _____
Type _____
Quantity _____
Contractor _____
Manufacturer _____
Contract No _____
Gross weight _____

In addition to the foregoing, marking shall conform to the requirements of the latest issue of the Navy Shipment Marking Handbook.

I. NOTES.

I-1. Purchases should specify the following:

- (a) Either the number of sheets of each size (see E-2) or the area to be covered.
- (b) Type of corrugated sheet. (See B-1).
- (c) Kind of fasteners. (See D-1).
- (d) Kind and amount of supplementary shapes, including the lengths of corner and ridge rolls and of filler strips.
- (e) Samples required, if any, and purpose.

I-2. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose,

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samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-3. Federal specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, etc., which are suitable for Federal Government requirements.

I-4. An Index of Federal specifications and also a Quarterly Supplement Index of Emergency Alternate Federal Specifications may be purchased as noted in the paragraph below, price to be obtained from the Superintendent of Documents.

I-5. Copies of this specification may be obtained upon application accompanied by money order, coupon, or cash, to the Superintendent of Documents, Government Printing Office, Washington, D. C. Price 5 cents.

Notice.—When Government drawings, specifications, or other data, are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder, or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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FEDERAL STANDARD STOCK CATALOG**Section IV****(Part 5)****FEDERAL SPECIFICATION****FOR****SHINGLES; ROOFING, CEMENT-ASBESTOS**

This specification was approved on the above date by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than March 15, 1945. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE SPECIFICATION.

A-1. The following Federal Specification of the issue in effect on date of invitation for bids shall form a part of this specification:

FF-N-101-Nails; Spikes; Staples; and Tacks.

B. TYPES.

B-1. This specification covers five types of cement-asbestos shingles for roofing, as may be specified in the invitation for bids.

B-1a. *Type I*.—Shingles are tapered in thickness from butt to head, rectangular in shape, have smooth, granular or textured exposed surface and even or irregular edges, and are designed to be laid with head lap according to the "American" method.

B-1b. *Type II*.—Shingles are uniform in thickness from butt to head, rectangular in shape, have smooth, granular, or textured exposed surface and even or irregular edges, and are designed to be laid with head lap according to the "American" method.

Class A. Individual units.

Class B. Duplex units.

Individual units (Class A) shall be furnished, unless otherwise specified.

B-1c. *Type III*.—Shingles are uniform in thickness, square or rectangular in shape, have smooth, granular, or textured exposed surface and straight, square, or irregular edges, and are designed to be laid with combined head and side lap according to the "Dutch" or "Scotch" method. They may have one clipped corner.

B-1d. *Type IV*.—Shingles are uniform in thickness, square in shape, have smooth, granular, or textured exposed surface and straight, square edges, and are designed to be laid according to the "hexag-

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onal" or "French" method. Not less than three corners shall be cut to give the desired pattern.

B-1a. *Types V.*—Shingles are uniform in thickness from butt to head, irregular in shape, have smooth, granular, or textured exposed surfaces and are designed to be laid according to the "American" method so as to give a finished appearance similar to that of individually laid shingles.

C. MATERIAL AND WORKMANSHIP.

C-1. Each unit shall be composed of a uniform mixture of portland cement and asbestos fiber, with or without the addition of a curing agent, pigments, mineral granules, or mineral fillers as may be necessary to produce specified colors, formed under pressure and thoroughly cured. The shingles shall be free from defects which detract from their serviceability or the appearance of the exposed face.

D. GENERAL REQUIREMENTS.

D-1. *Breakage.*—Shingles shall be whole and clean. Rejection or replacement may be required if more than 2 percent of the shingles are broken.

D-2. *Supplementary shapes.*—Materials for starters and rolls used as hip and ridge finish shall have the same characteristics as those of the shingles.

D-3. *Nails and fastenings.*—Nails, storm nails, clips, and other fastenings for shingles, starters and rolls shall be supplied in proper quantity and size. Allowance shall be made for at least 5 percent waste of these items. The nails shall be diamond-point slating nails with flat heads and shall be long enough for properly securing the shingles to the construction. Unless otherwise specified, the nails shall be zinc-coated (hot-dipped) steel. Storm nails for shingles and clips for ridge or hip rolls shall be of copper.

D-4. *Color and finish.*—

D-4a. The color or colors shall be as specified. Colors other than the normal cement gray or buff shall be obtained by embedding lime-proof mineral pigments or mineral granules, or both in the exposed face, or by chemical impregnation. The color shall cover butt edges which are $\frac{1}{4}$ inch (nominal) or more in thickness.

D-4b. The exposed shingle surface shall be smooth, granular or textured by pits or ridges as specified. Granular surfacing shall be obtained with mineral granules embedded to give a rough surface. Shingles having mineral granules embedded but presenting a smooth exposed surface shall be considered as smooth-surfaced.

E. DETAIL REQUIREMENTS.

E-1. Dimensions.—Shingles shall conform to the dimensional requirements of table I, except as noted in E-1b and E-1c.

TABLE I.—*Dimensions*

Type	Width (horizontal)	Length	Nominal thickness	Minimum average thickness of any one shingle ¹	
				Butt	Head
	<i>Inches</i>	<i>Inches</i>	<i>Inch</i>	<i>Inch</i>	<i>Inch</i>
I.....	8 or 9.....	16 or 18.....	$\frac{3}{4}$ (head)..... $\frac{3}{4}$ (butt).....	0.23	0.12
II (Class A).....	8 or 9.....	16 or 18.....	$\frac{3}{4}$	.15	.15
II (Class B).....	16.....	18.....	$\frac{3}{4}$	.15	.15
III.....	16 or 18.....	16 or 18.....	$\frac{3}{4}$	.15	.15
IV.....	16.....	16.....	$\frac{3}{4}$	.15	.15
V.....	16, 24, 30, or 32.....	Variable.....	$\frac{3}{4}$	.15	.15

¹ The thickness of rough-surfaced shingles shall be taken as the weighted average at projections and depressions.

E-1a. The average thickness of any one shingle shall not differ by more than 0.03 inch from the average thickness for the lot.

E-1b. The average width and the average length of each shingle shall be within $\frac{1}{8}$ inch of the specified dimensions.

E-1c. Where optional dimensions are permitted (table 1), the roof area that can be covered by the shingles shall be not less than for the ordered quantity of shingles of specified size.

E-1d. Duplex units (Type II, Class B) shall be designed to simulate in appearance individual shingles of Type II, Class A.

E-2. Holes for fastening and laps.—Shingles, starters, and rolls shall be furnished with holes for fastening.

E-2a. The holes in Type I and Type II shingles shall be located to give head laps in the range 2 to 3 inches.

E-2b. Holes in Type III shingles shall be located to give overlap at the head of at least 3 inches and a side lap of $\frac{1}{4}$ or $\frac{1}{2}$ of the width, as specified.

E-2c. Holes in Type IV shingles shall be located so that they will be laid with a 3-inch overlap on two edges to give a 12- by 12-inch exposed surface.

E-2d. Holes in Type V shingles shall be so located that an overlap of at least 2 inches is obtained at the head.

E-3. Absorption.—The average absorption shall be not more than 17½ percent, except for Type V shingles the average absorption shall be not more than 22½ percent. (See F-3.)

E-4. *Strength*.—Shingles shall conform to the strength requirements of table II.

TABLE II.—*Flexural strength*

Condition when tested (See F-4)	Minimum modulus of rupture (pounds per square inch)	
	Average of four speci- mens	Any one specimen
Dry.....	3,000	2,500
Saturated.....	1,500	1,250
After heat test.....	3,000	2,500

F. METHODS OF SAMPLING, INSPECTION, AND TESTS.

F-1. *Sampling*.—From each lot of 50,000 shingles or fraction thereof of the same type, 12 shingles shall be selected by the inspector. Additional shingles may be taken at the discretion of the inspector.

F-2. *Preparation of specimens*.—Six pairs of specimens shall be prepared for testing. Each specimen shall be approximately 3 inches wide and from 8 to 12 inches long; the longer dimension of one of the specimens of each pair shall be parallel to the length of the shingle and that of the other at right angles thereto. Immediately before testing, each specimen shall be dried to constant weight in a ventilated oven at a temperature between 220° and 230° F.

F-3. *Absorption test*.—Two pairs of the dried specimens shall be weighed, each specimen separately. Weighings shall be accurate within 0.5 percent. These specimens shall be submerged for 24 hours in tap water at 60° to 80° F. They shall then be removed from the water, wiped with a damp cloth and again weighed. The difference between the weight after immersion and the weight when dry, multiplied by 100 and divided by the dry weight, shall be taken as the absorption in percent.

F-4. *Strength test*.—The modulus of rupture of each specimen of two pairs of the dried specimens shall be determined by placing the specimen on supports which cannot exert longitudinal constraint (rocker type knife edges, rollers, etc.) and applying the load at midspan through a similar edge bearing against the finished surface of the specimen. The span shall be not less than 7 inches nor more than 10 inches, and the load line and supports shall be parallel. The load shall be applied at a uniform rate such as to result in failure of the specimen in 1 to 2 minutes. The error in the load reading shall not exceed 2 percent of the specified minimum load.

F-4a. The modulus of rupture shall be computed by the formula:

$$R = \frac{3WL}{2BD^2}$$

R=Modulus of rupture, pounds per square inch.

W=Maximum load, pounds.

L=Span, inches.

B=Width of specimen, inches.

D=Weighted average thickness of specimen at midspan, inch.

F-4b. The modulus of rupture of each of the four specimens, previously tested for absorption, shall be determined in a similar manner while the specimens are saturated.

F-4c. The remaining four specimens (two pairs) shall be heated for 4 hours in a muffle furnace at a temperature of 600° F. plus or minus 20° F. The specimens shall be shielded from direct radiation of the heating element or flames. After cooling to room temperature, the modulus of rupture shall be determined as described above.

G. PACKING AND MARKING FOR SHIPMENT.

G-1. *Packing.*—Unless otherwise specified, the subject commodity shall be so packed or bundled as to insure acceptance and safe delivery by common or other carriers, at the lowest rate, to the point of delivery called for in the contract or purchase order.

G-2. *Marking.*—Unless otherwise specified, each package or bundle shall be marked with the name of the material and type as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS.

H-1. The following departmental specifications of the issue in effect on date of invitation for bids, and special requirements, shall form a part of this specification, and shall be applicable to purchases made under this specification by the respective departments.

H-2. *Army.*—Standard Specifications No. 100-2 for Marking Shipments (copies of which may be obtained, without cost, upon application to the Quartermaster General, Washington, D. C.).

H-3. *Navy.*—

H-3a. *Navy Department specifications.*—

General Specifications for Inspection of Material.

39P16—General Specification for Packaging and Packing for Overseas Shipment.

Copies of these specifications and of the Navy Shipment Marking Handbook may be obtained without cost upon application to the Bureau of Supplies and Accounts, Navy Department, Washington 25, D. C.

H-3b. *Packing.*—

H-3b (1). *For domestic shipment.*—Unless otherwise specified, the subject commodity shall be bundled or palletized as follows:

H-3b (1) a. Bundles shall have sufficient wire ties of an annealed wire of not less than 0.0915±0.003 inch (13 gage) or shall be strapped with not less than ½ by 0.020 inch flat metal strapping to form a compact rigid bundle. The top and bottom shall have suitable slats of wood of not less than ¼ inch thickness and extending the full width of the shingles or a suitable fiberboard folder to protect edges. The gross weight shall not exceed 150 pounds. Nails and fastenings shall be packed in a suitable cloth bag and attached securely to each bundle.

H-3b (1) b. Bundles whose lengths are 48 inches or less may be palletized. All bundles shall be stacked flat, with not more than one type, color, shape, or length on any one pallet. The palletizing shall conform to the requirements of the Navy Handbook on Packaging and Materials Handling entitled Palletizing for Overseas Shipment.

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H-3b (2). *For overseas shipment.*—Unless otherwise specified, the subject commodity, bundled as described in paragraph H-3b (1) a, shall be palletized as described in paragraph H-3b (1) b, or shall be packed in unsheathed crates made of well seasoned lumber, free from knots and other defects which would tend to weaken the crate. Three-way corner construction shall be used. The minimum size of edge members and intermediate struts shall be $\frac{3}{4}$ by 2 $\frac{1}{2}$ inches for gross weights of approximately 250 pounds; or $\frac{3}{4}$ by 3 $\frac{1}{2}$ inches for heavier weights. Crates of gross weight exceeding approximately 400 pounds shall be of the heavy duty type with suitable slats, diagonals and skid construction. Only cement-coated, chemically-etched box, cooler, or sinker nails of not less than 8D shall be used. On crates of less than 400 pounds gross weight, at least one diagonal brace shall be placed on each face, except that diagonals shall not be required on two faces if the outside width of face does not exceed 16 inches. In no case shall the angle between the edge members and diagonals be less than 30° nor more than 60°. No waterproof paper liners will be required. Crates shall be strapped in accordance with the appendix of section VI of Navy Department Specification 39P16. Nails and fastenings shall be packed as described in paragraph H-3b (1) a. The gross weight shall not exceed 500 pounds.

H-3b (3). *For domestic and overseas shipment.*—Where practicable, shipping containers shall be of uniform size and contain the same number of items of one type, class, size, and color. Containers shall be designated to fit the contents in a compact manner.

H-3c. *Marking.*—Unless otherwise specified, each bundle and crate shall be plainly marked in black with the following information completed as indicated:

MATERIAL _____
TYPE _____
CLASS _____
SIZE _____
COLOR _____
QUANTITY _____
CONTRACTOR _____
CONTRACT NO. _____
GROSS WEIGHT _____
CUBE _____

In addition to the foregoing, marking shall conform to the requirements of the latest issue of the Navy Shipment Marking Handbook.

L NOTES.

L-1. Purchasers should specify the following:

- (a) Quantity of shingles and of accessories and supplementary shapes of each kind and lengths of hips and ridges, if any.
- (b) Type and class of shingles. (See B-1).
- (c) Butt edge, even or irregular. (See B-1).
- (d) Method of laying, "American", "Dutch", "Scotch", "hexagonal" or "French". (See B-1).
- (e) Color. (See D-4a).
- (f) Finish, smooth, granular or textured (rough). (See D-4b).
- (g) Kind of nails, zinc-coated (hot-dipped) steel, hard copper, bronze, copper-clad steel or cadmium-plated steel. (See D-3).

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(h) Either the lengths of the nails or the use (siding, roofing, etc.) and the base (wood sheathing, gypsum sheathing, old shingles, insulation board, etc.).

(i) Amounts of head and side laps. (See E-2.)

(j) Samples required, if any, and purpose.

I-2. Manufacturers' lists should be consulted to ascertain whether or not the contemplated requirements for shape, color, and finish would unduly restrict competition.

I-3. To avoid discoloration, shingles should be kept dry until laid.

I-4. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-5. Federal specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, etc., which are suitable for Federal Government requirements.

I-6. An Index of Federal Specifications and also a Quarterly Supplement-Index of Emergency Alternate Federal Specifications may be purchased as noted in the paragraph below, price to be obtained from the Superintendent of Documents.

I-7. Copies of this specification and of FF-N-101 may be obtained upon application, accompanied by money order, coupon, or cash to the Superintendent of Documents, Government Printing Office, Washington, D. C. Price 5 cents, FF-N-101, 10 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility or any obligation whatsoever; and the fact that the Government may have formulated, furnished or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

SHINGLES; ROOFING, CEMENT-ASBESTOS

This specification was approved by the Director of Procurement for the use of all departments and establishments of the Government and shall become effective not later than December 1, 1935. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. Federal Specification FF-N-101 for nails is applicable to this specification.

A-2. Any special requirements of individual departments of the Government are noted in section H.

B. TYPES

B-1. This specification covers four general types of cement-asbestos shingles determined by variations in thickness and method of laying:

Type A.—Shingles of type A are tapered in thickness from butt to head, rectangular in shape, have smooth or rough exposed surface and even or irregular edges, and are designed to be laid with head lap according to the "American" method.

Type B.—Shingles of type B are uniform in thickness from butt to head, rectangular in shape, have smooth or rough exposed surface and even or irregular edges, and are designed to be laid with head lap according to the "American" method.

Type C.—Shingles of type C are uniform in thickness, square in shape, have smooth, granular, or rough exposed surface and straight, square edges, and are designed to be laid with combined head and side lap according to the "Dutch" or "Scotch" method. They may have one clipped corner.

Type D.—Shingles of type D are uniform in thickness, square in shape, have smooth, granular, or rough exposed surface and straight, square edges, and are designed to be laid according to the "hexagonal" or "French" method. Not less than three corners shall be cut to give the desired pattern.

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C. MATERIAL AND WORKMANSHIP

C-1. Cement-asbestos shingles shall be made of portland cement and asbestos fibers or these with the addition of such pigments and/or mineral granules as may be necessary to produce specified colors. They shall have a dense, hard structure. They shall be thoroughly seasoned.

D. GENERAL REQUIREMENTS

D-1. *Breakage.*—Shingles shall be whole and clean. Not more than 2 percent of broken shingles will be accepted.

D-2. *Supplementary shapes.*—Starters and shapes and rolls used as hip and ridge finish shall be of the same materials as the shingles.

D-3. *Holes for fastening and laps.*—

D-3a. Shingles, starters, and rolls shall be furnished with holes for fastening. The holes in type A and type B shingles shall be located to give head laps in the range 1 to 3 inches.

D-3b. Holes in type C shingles shall be located to give overlap at the head of 3 inches and a side lap of one-fourth or one-third of the width of the shingles as specified.

D-3c. Holes in type D shingles shall be located so they will be laid with a 3-inch overlap on two edges to give a 13 by 13 inch exposed surface.

D-4. *Nails and fastenings.*—Nails for shingles and rolls ("needle-point") shall be furnished in proper quantity and length. They shall have flat heads and shall be long enough to properly secure the shingles to the sheathing. Nails shall be either hard copper, copper-clad, zinc-coated, or cadmium plated steel as specified, conforming with Federal specifications. Copper storm anchors or hooks shall be provided for type C and type D shingles. Copper clips shall be supplied for ridge rolls.

D-5. *Color and finish.*—

D-5a. The color or colors shall be as specified. Colors other than the normal gray shall be obtained by embedding lime-proof mineral pigments or mineral granules, or both, in the exposed face, or by chemical impregnation. The color shall cover butt edges that are $\frac{1}{4}$ inch or over in thickness. The colors shall not fade appreciably on exposure to light and atmospheric conditions.

D-5b. The exposed shingle surface may be smooth or slightly roughed by pits or ridges. Granular surfacing shall be obtained with mineral granules embedded to give a rough surface. Shingles having mineral granules embedded but presenting a smooth exposed surface, shall be considered as smooth-surfaced.

D-6. *Sizes.*—The standard sizes shall be as specified below. A plus tolerance of not more than $\frac{1}{16}$ inch and a minus tolerance of $\frac{1}{16}$ inch shall be allowed for individual shingles on all thicknesses. The average thickness of the butts for a given sample shall not be less than the specified thickness. For the rough-surfaced shingles, the thickness shall be taken as the average at projections and depressions. The thickness at the top of tapered shingles shall not be less than $\frac{1}{8}$ inch. A plus-or-minus tolerance of $\frac{1}{8}$ inch will be permitted in the widths and lengths supplied without requiring adjust-

ment in number of shingles or area covered. Type A and type B shingles exceeding the specified width by not more than $1\frac{1}{2}$ inches and the length by not more than $2\frac{1}{2}$ inches, and type C exceeding by not more than 1 inch in both dimensions, shall be accepted, but both the total area of the number of shingles supplied and the roof area that can be covered shall be not less than those for the number requisitioned of standard size.

D-6a. Type A shingles shall have butt thickness of either $\frac{1}{4}$ inch or $\frac{3}{8}$ inch, as specified. They shall be 8 inches in width by 16 inches in length.

D-6b. Type B shingles shall be $\frac{5}{16}$ or $\frac{1}{4}$ inch in thickness, as specified. They shall be 8 inches in width by 16 inches in length.

D-6c. Type C shingles shall be $\frac{5}{16}$ inch thick and 16 by 16 inches.

D-6d. Type D shingles shall be $\frac{5}{16}$ inch in thickness and 16 by 16 inches.

E. DETAIL REQUIREMENTS

E-1. *Absorption.*—The average absorption of the shingles shall be not more than $17\frac{1}{2}$ percent of their dry weight as determined by the test described in paragraph F-2.

E-2. *Strength.*—The average modulus of rupture of the shingles shall not be lower than 3,000 pounds per square inch as tested dry according to paragraph F-3a, 1,250 pounds per square inch as tested after immersion according to paragraph F-3b, and not lower than 3,000 pounds per square inch as tested dry after subjection to the heat test described in paragraph F-3c.

F. METHODS OF SAMPLING, INSPECTION, AND TESTS

F-1. *Sampling.*—Ten shingles selected so as to be representative of a quantity not exceeding 50,000 pieces shall constitute a sample. Additional samples representative of the material as delivered may be taken at any time or place at the discretion of the inspector. Immediately before test the sample shall be dried to constant weight at a temperature between 212° and 220° F.

F-2. *Absorption test.*—Three shingles or representative pieces thereof, previously dried, shall be weighed separately on scales sensitive to within one-half of 1 percent of their weight. Pieces from the modulus of rupture test on dry or saturated shingles may be used. They shall then be completely immersed in soft, distilled, or rain water at room temperature (60° to 80° F.) for 24 hours. They shall then be removed from the water and again weighed separately after wiping the surface with a damp cloth. The difference between the weight after immersion and the weight when dry, multiplied by 100 and divided by the dry weight shall be taken as the absorption in percent.

F-3. *Modulus of rupture test.*—The loads shall be applied without impact by means of equipment having accuracy and sensitivity within 1 pound or 2 percent of the minimum breaking load. The specimen for each type of transverse test shall consist of not less than 4 pieces 3 inches wide, taking 2 from each shingle at right angles, and shall be tested on a span of not less than 7 or more than 10 inches. The test piece shall be supported on 2 knife edges of

the rocker type adjusted perpendicular to its long dimension. The load, W , shall be applied through the third knife edge at the middle of the specimen along a line parallel to the supporting knife edges, the finished surface of the specimen to face downward. The modulus of rupture R is computed by the formula,

$$R = \frac{3WL}{2BD^2}$$

where L is the distance in inches between the lines of support, B is the width of the specimen, and D is the average thickness under the middle knife edges, both in inches. The average thickness shall be determined to the nearest 0.002 inch.

F-3a. Modulus of rupture test of dry shingles.—The specimen for this test shall be tested after cooling from the drying treatment specified in paragraph F-1.

F-3b. Modulus of rupture test after saturation.—The specimens for this test shall be tested after immersion in water for 24 hours as outlined in paragraph F-2. The samples from the absorption test may be used.

F-3c. Modulus of rupture test after heat exposure.—The specimens for this test shall be tested after cooling following heating for 4 hours in a muffle furnace maintained at an average temperature of 600° F. within $\pm 20^\circ$ F., for the space occupied by the samples. The specimens shall be shielded from direct radiation from heating element or flames.

G. PACKING AND MARKING

G-1. Any special requirements of the individual departments are noted under section H.

G-2. Packing.—Unless otherwise specified, the subject commodity shall be delivered in standard commercial containers, so constructed as to insure acceptance by common or other carriers, for safe transportation, at the lowest rate, to the point of delivery.

G-3. Marking.—Unless otherwise specified, shipping containers shall be marked with the name of the material and type as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications of the issue in effect on date of invitation for bids shall form a part of this specification:

H-1a. Army.—United States Army Specification No. 100-2b, Standard Specification for Marking of Shipments.

H-1b. Navy.—Navy Department purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, Roofing, siding, and sheet metal work; dampproofing and membrane waterproofing, copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D. C.

I. NOTES

I-1. *Items to be specified.*—Purchasers should exercise all options specified herein and should specify type; method of laying; color; surface finish as smooth, granular, or rough, or at bidder's option, any one of the three; thickness; size as defined in paragraphs D-6a, D-6b, D-6c, and D-6d; the amount of side lap for Type C shingles; length and type of hip and ridge finish; and nails or other fastenings.

I-2. *Color and surface finish.*—Cement-asbestos shingles can be obtained in various shades of gray, red, brown, black, buff, purple, green, and mixtures of these colors. The depth of color penetration is in the range 0.005 to 0.02 inch. Manufacturers' lists should be consulted to avoid, where possible, the drafting of requirements in point of color or finish that would unduly restrict competition.

Efflorescence may appear on cement-asbestos shingles within a few months after application, but generally disappears within 2 years. This does not necessarily involve a permanent change in applied colors.

I-3. *Sizes.*—Shingles of each type are to be requisitioned in one width and length. Bidders are permitted to supply them in the range of sizes for each type indicated in Paragraph D-6. The limits are placed so as to enable the widest possible competition consistent with obtaining a desired design or appearance.

I-4. Copies of this specification may be obtained upon application, accompanied by money order or coupon, or cash, to the Superintendent of Documents, Government Printing Office, Washington, D. C. Price 5 cents.

I-5. An alphabetical index of Federal specifications may be purchased, as noted in paragraph above, price to be obtained from the Superintendent of Documents.

Notice: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., 30 September 1949

The United States Army Index of Specifications (Including MIL (JAN) Standards) is published for the information and guidance of all concerned.

BY ORDER OF THE SECRETARY OF THE ARMY:

OFFICIAL:

EDWARD F. WITSELL
Major General
The Adjutant General

J. LAWTON COLLINS
Chief of Staff, United States Army

U. S. ARMY SPECIFICATIONS

NEW AND REVISED SPECIFICATIONS

The following specifications were approved as U. S. Army Specifications on the dates indicated and their use, whenever applicable, is mandatory upon all procuring agencies of the Department of the Army:

TITLE	NUMBER	DATE APPROVED	CUSTODIAN	*REMARKS
Bombs, fragmentation, 90 lb, M82, 120 lb, M86, and 220 lb, AN-M88, metal parts for	50-70-5	September 15	O	N
Bombs, steel, G.P. and S.A.P., metal arc welded, general specifications for the construction of	50-71-10	21	O	N
Boots, rubber, fireman	20-141A	8	Q	R
Carrier, shovel, intrenching, M-1943	6-478	22	Q	N
Cartridges, electric, for 20 MM gun, M24, loading, assembling, marking and packing	50-21-48	15	O	N
Cartridge, remover, M29, assembly, marking and packing	50-63-9	30	O	N
Cups, closing, for blank ammunition	50-11-85B	28	O	R
Detonator, electric, M36	50-78-8	21	O	N
Fuze, bomb, nose, AN-M103A1, AN-M139-A1, AN-M140A1, M163, M164, M165 and M171, loading, assembling and packing	50-17-12C	21	O	R
Fuzes, bomb, tail, M112A1, M113A1 and M114A1, loading, assembling and packing	50-17-46	15	O	N
Fuze, rocket, RD, M104, metal parts for	50-97-2A	30	O	R
Igniter, Jato, M21 loading, assembling and packing	50-49-4	21	O	N
Insecticide, roach and ant control residual spray, 1 gallon container	4-117	28	Q	N

* N - Indicates New Specification
R - Indicates Revised Specification

NEW AND REVISED U. S. ARMY SPECIFICATIONS (CONT'D)

TITLE	NUMBER	DATE APPROVED	CUSTO- DIAN	REMARKS
Jacket, instructor, physical reconditioning	8-185	September 30	Q	N
Machine; honing and grinding, horizontal, bushing and hydraulic brake cylinder, precision, electric, motor-driven	56-35-10	30	O	N
Mask, gas, special, M2A2-acid vapor MI-III A1	97-51-340	28	C	N
Mask: oxygen, pressure breathing, type A-13A	94-3165A	August 9	A	R
Packaging and packing of strapping, flat, steel and seals, box strapping	100-89	September 22	Q	N
Paintings: hospital and kitchen cars	43-17	27	T	N
Polychloronaphthalene	50-11-149A	8	O	R
Primer, M2	50-48-19	9	O	N
Primers, percussion, manufacture, loading, assembling, and packing	50-48-100	27	O	R
Radio set AN/VRC-11() (components of)	71-3429	30	S	N
Radiographic inspection of metals	57-0-7	30	O	N
Radiographic procedure and qualifi- cation tests	57-0-10	30	O	N
Radiographic standards for inspect- ion of arc & gas welds in steel	57-0-8	30	O	N
Radiographic standards for inspect- ion of steel castings	57-0-9	30	O	N
Shell, incendiary, 20 MM, M96 loading, assembling, marking and packing	50-15-6	21	O	N
Trousers, instructor, physical reconditioning	8-186	30	Q	N

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NEW AND REVISED U. S. ARMY SPECIFICATIONS (CONT'D)

TITLE	NUMBER	DATE APPROVED	CUSTODIAN	REMARKS
Welding of constructional steel; resistance, spot	57-206-21	September 1	O	N
Wiper; windshield, electric, aircraft, general specification for	94-40408A	August 29	A	R

CHANGE:

The title of U.S. Army Specification No. 100-73 listed on page 77 and 483 of United States Army Index of Specifications, January 1949, should be changed to read as follows:

Crates; Wood, Nailed, Domestic Shipment, 1000 pounds Maximum Net Load

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U. S. ARMY SPECIFICATIONS

CANCELLATIONS

The following U. S. Army Specifications have been canceled and their use by all procuring agencies of the Department of the Army will be discontinued:

TITLE	NUMBER	DATE CANCELED	CUSTODIAN	REMARKS
Acacia (gum arabic) (technical grade)	50-11-15B	September 13	O	*Fed. Spec. JJJ-Q-801
Adapters, priming, M-1A3	49-22A	13	O	* JAN-A-417
Antimony sulfide (for Ordnance use)	50-11-14D	13	O	* JAN-A-159A
Arbor, expanding for abrasive bands	10-2495	26	M	Not required
Arsenic disulphide (As_2S_2) (red arsenic, red orpiment, realgar ruby arsenic)	4-1034	13	O	* JAN-A-672
Bag, sand	10-2546	26	M	* Fed. Spec. K-B-85
Barrels, 4.2-inch chemical mortar, M2	96-81-172	13	O	* JAN-B-348
Baseplates, 4.2-inch chemical mortar, M2A1	96-81-195	13	O	* JAN-B-351
Beakers	10-2561	26	M	* Navy Spec. 57B13
Cartridges, ball, long rifle, caliber .22	50-3-3	13	O	* JAN-C-566
Cartridge, carbine, high pressure test, caliber .30, M1 (complete round)	50-1-32	13	O	* JAN-C-743
Cartridge, grenade, carbine, caliber .30, M6 (complete round)	50-1-36	13	O	* JAN-C-746
Cartridge, high-pressure test, caliber .30, M1 (complete round)	50-1-5A	13	O	* JAN-C-743
Cartridge, high pressure test, caliber .50, M1, (complete round)	50-4-6B	13	O	* JAN-C-743
Cartridge, pistol, high-pressure test, caliber .45, M1 (complete round)	50-2-5	13	O	* JAN-C-743

* Denotes Superseded by:

U.S. ARMY SPECIFICATIONS CANCELED (CONT'D)

TITLE	NUMBER	DATE CANCELED	CUSTO- DIAN	REMARKS
		September		
Cartridge, rifle grenade, caliber .30, M3 (complete round)	50-1-38	13	0	* JAN-C-746
Cartridges, shotgun, 12-gage	50-5-1C	13	0	* JAN-S-726
Charge, springing, rod, earth, blast-driven	49-32	13	0	* JAN-W-442
Clips, cord, detonating, M-1	49-35	13	0	* JAN-C-373
Cloth, glass-fiber, opacified	50-11-144	13	0	* JAN-C-769
Copper, powdered	50-11-145	13	0	* JAN-C-768
Crimpers, cap, M-2	49-13B	13	0	* JAN-C-418
Detonators, delay, M-1 and M2	49-33A	13	0	* JAN-D-409
Drill, cranial, brace with burr and drill	10-2134B	26	M	* Fed. Spec. GG-I-526A
Films, reflection-reducing, for glass optical elements	51-70-4B	13	0	* JAN-F-675
Filiform Bougie with screw	10-2993	26	M	* Fed. Spec. GG-F-340
Firing devices, pull friction type, M-2	49-34A	13	0	* JAN-F-364
Firing device, pull, release type, M-3	49-26A	13	0	* JAN-F-419
Fuse, blasting, time	49-16A	13	0	* JAN-F-360
General specification for small arms ammunition	50-0-2A	13	0	* JAN-A-625
Growler, armature testing, universal	56-85-5	13	0	* JAN-T-594
Kapok, fiber	6-30B	2	A	* Fed. Spec. JJJ-K-108
Lighters, fuse, weatherproof, M-2	49-23A	13	0	* JAN-L-394
Magnesium powder (for use in ammunition)	57-21-1D	13	0	* JAN-M-382A
Mortars, chemical, 4.2-inch, M2	96-81-178	13	0	* JAN-M-354
Needle holder, Kollie	10-2041A	13	M	* Fed. Spec. GG-H-576

* Denotes Superseded by:

24-45083A6CD

U.S. ARMY SPECIFICATIONS CANCELED (CONT'D)

TITLE	NUMBER	DATE CANCELED	CUSTO- DIAN	REMARKS
		September		
Oil, lubricating, preservative, special	2-120	13	0	* JAN-I-644
Outfits, skeet and trap	52-17-18A	13	0	* JAN-T-737
Phosphorus, red (for use in primer mixtures)	50-11-137	13	0	* JAN-P-670
Powder, black	50-14-1D	13	0	* JAN-P-223A
Powders, fuze	50-14-6A	13	0	* JAN-P-663
Powder, smokeless, for cartridges, caliber .30 and caliber .50	50-12-9B	13	0	* JAN-P-733
Primer for caliber .30 ammunition	50-1-3B	13	0	* JAN-P-749
Primer for caliber .45 ammunition	50-2-3B	13	0	* JAN-P-749
Primer for caliber .50 ammunition	50-4-2B	13	0	* JAN-P-749
Scabbard, bayonet, M5	52-4-8C	13	0	* JAN-S-796
Screws, elevating (for 4.2-inch chemical mortar standard, M1)	96-81-207	13	0	* JAN-S-352
Shellac and aniline dye mixture	50-11-148	13	0	* JAN-S-732
Sights, reflex, M23 and M24	51-75-61	13	0	* JAN-S-777
Sightunits, M27 w/e (for 4.2-inch chemical mortar)	96-81-227	13	0	* JAN-S-355
Snake, demolition, M-3	49-36	13	0	* JAN-S-445
Solder, low-melting point	57-98	13	0	* JAN-S-627
Standards, 4.2-inch chemical mortar, M1	96-81-140	13	0	* JAN-S-347
Strontium, peroxide	50-11-64B	13	0	* JAN-S-612
Tape, cotton, linen-finish	6-364	13	0	* JAN-T-638
Trailer, 7½-ton, 4W, tank, gasoline, 2,500	91-171	26	0	Not required
Truck, 2-1/2 ton, 6x6	91-121	13	0	* JAN-T-712
Zirconium, powdered	50-11-141	13	0	* JAN-Z-399A

* Denotes Superseded by:

24-45083ABCD

MILITARY SPECIFICATIONS

NEW AND REVISED

The following specifications were approved as Military Specifications on the dates indicated and their use, wherever applicable, is mandatory upon all procuring agencies of the Department of the Army:

TITLE	SYMBOL	DATE AP- PROVED	CUSTO- DIAN	SUPER- SEDED
Adapter, tube, flexible nozzle, for Jerrican	MIL-A-1402	September 22	Q	QM tent. OQMD 157A
Ambulance, 3/4 ton 4 x 2 metropol- itan	MIL-A-1435	30	O	USA 91-163
Apples, dehydrated	MIL-A-1035A	23	Q	JAN-A-1035 QM tent. CQD 78C
Apricots; dehydrated	MIL-A-1380	12	Q	QM tent. CQD 304B
Arrester, spark, M-1941	MIL-A-1428	30	Q	QM tent. JQD 45C
Asbestos-composition, hard, sheet	MIL-A-1383	12	-	Navy 32A3
Bacon, sliced, canned	MIL-B-3049	22	Q	QM tent. CQD 155A
Bags, paper; clothing, mailing	MIL-B-1408	23	Q	QM tent. CQD 428
Baskets, bread, wire	MIL-B-1376	12	-	Navy 64B8c
Beef-stew, canned	MIL-B-3045	16	Q	QM tent. CQD 359A
Bindings, ski, crosscountry	MIL-B-1434	30	Q	QM tent. BQD 137A
Blades, razor safety	MIL-B-1418	26	Q	QM tent. JQD 7A
Boilers, outfit, cooking, pack, with covers	MIL-B-1422	30	Q	QM tent. JQD 24A
Bomb, photo-flash, AN-M46	MIL-B-1396	20	O	USA 50-55-15
Bomb, target identification, 250 lb., M89, M90, M91, M98 and M100	MIL-B-1397	20	O	USA 50-55-18

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MILITARY SPECIFICATIONS (CONT'D)

TITLE	SYMBOL	DATE APPRVD.	CUSTO- DIAN	SUPER- SEDED
Bottle, identification, burial	MIL-B-1406	September 22	Q	QM tent. JQD 439A
Brush, mountain	MIL-B-1433	30	Q	QM tent. BQD 84
Brushes, wire, rotary, cup, and radial (disk)	MIL-B-1252	12	-	Navy 40B5A
Candlestick, cast iron, spiked bottom and side, galvanized	MIL-C-1401	22	Q	QMC tent. JQD 150
Candy, bar	MIL-C-1424	30	Q	QMC tent. CQD 307A
Carrier, 5-gallon can, pack	MIL-C-1412	22	Q	QM tent. JQD 504A
Carrier, pin, tray, laundry, complete with pins	MIL-C-1407	23	Q	QM tent. JQD 741
Cartridge, AP-T, M95, for 20-MM guns cartridge, incendiary, M96, for 20- MM guns cartridge, HEI, M97, w/ fuze, FD, M75, for 20-MM guns cartridge, TP, M99, for 20-MM guns, loading, assembling, marking, and packing	MIL-C-1389	16	O	USA 50-21-44
Cartridge, HE, M306, for 75MM rifle, cartridge, HE, M309, for 75MM rifle, assembling, marking and packing	MIL-C-1391	15	O	USA 50-21-34
Cartridge, smoke, WP, M308, for 57MM rifle, cartridge, smoke, WP, M311, for 75 MM rifle, assembling, marking and packing	MIL-C-1390	15	O	USA 50-21-35A
Cartridge, TP, M306, for 57-MM rifle, cartridge, TP, M309, for 75-MM rifle, assembling, marking, and packing	MIL-C-1386	15	O	USA 50-21-42
Castings, ferrous, precision	MIL-C-10005(ORD)	12	O	- - -
Case, stoves, cooking, gasoline, one-burner	MIL-C-1426	30	Q	QM tent. JQD 705
Chains, and plates, for tents	MIL-C-1416	22	Q	QM tent. JQD 148C

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MILITARY SPECIFICATIONS (CONT'D)

TITLE	SYMBOL	DATE APPROVD	CUSTO- DIAN	SUPER- SEDED
Chains and supporting ring, for assembly tent, M-1942	MIL-C-1410	September 22	Q	QM tent. JQD 161
Chicken, overseas, Army style: frozen	MIL-C-1377	12	Q	QM tent. CQD 191A
Chili con carne, canned	MIL-C-1381	12	Q	QM tent. CQD 365A
Cleaner, burner slot, for range, field, M-1937	MIL-C-1429	30	Q	QM tent. JQD 386
Cleaner, generator, for range field, M-1937	MIL-C-1425	30	Q	QM tent. JQD 392
Cloth; cotton twill	MIL-C-5039	20	-	AN-C-103
Cloth, strands, and tape, asbestos	MIL-C-1207	12	-	Navy 32C11f
Compound; lubricating, inner tube, aircraft tire	MIL-C-5024	August 8	-	AF 14161
Confections, pan-coated	MIL-C-3046	September 16	Q	QM tent. CQD 184A
Container, fuel, 1-quart	MIL-C-1405	22	Q	QM tent. JQD 187B
Container, tin with graphite grease, for range, field, M-1937	MIL-C-1423	30	Q	QM tent. JQD 394
Container, tin (small parts and graphite grease), empty, for range, field, M-1937	MIL-C-1415	22	Q	QM tent. JQD 388
Containers, metal, light gage, integral tear strip type	MIL-C-10012(ORD)	29	Q	QM tent. JQD 305A
Cookset, mountain	MIL-C-1417	26	Q	QM tent. BQD 104
Crampon, mountain	MIL-C-1432	30	Q	AN-C-63
Cord; nylon	MIL-C-5040	6	-	QM tent. JQD 143A
Damper, stove pipe, 4"	MIL-D-1427	30	Q	USA 34-21
Decoration, fourragere (rayon)	MIL-D-3052	23	Q	AF 31426
Developer; film, aerial roll, 400 foot 9-1/2 inch wide, type B-6	MIL-D-1373	8	-	

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MILITARY SPECIFICATIONS (CONT'D)

TITLE	SYMBOL	DATE APPRVD	CUSTO- DIAN	SUPER- SEDED
Dielectric material, polyethylene	MIL-D-3054	September 30	S	AN-AER AN-D-19 Navy 16F13
Dryer, film photographic, type A-8 (16 millimeter, manually operated)	MIL-D-1234	8	-	USA 75-259
Egg, stabilized, dehydrated	MIL-E-10006(QMG)	12	Q	- - - QM tent. JCQD 20A
Envelope, pay record	MIL-E-1409	22	Q	QM tent. JQD 409
Eye, picket, pin, M-1910	MIL-E-1414	22	Q	QM tent. JQD 409
File, dog, toenail	MIL-F-1413	22	Q	QM tent. JQD 333
Fittings, pipe, brass or bronze (threaded), 125-pound	MIL-F-1184	12	-	Navy 45F2g
Fittings, pipe, bronze (threaded), 250-pound	MIL-F-1181	12	-	Navy 45F1f
Felt, insulating, mineral (for shipboard use)	MIL-F-1228	12	-	Navy 32F4a
Flare, airport, M76	MIL-F-1395	20	O	USA 50-55-21
Flare, aircraft, parachute, AN-M26	MIL-F-1420	30	O	USA 50-55-12A
Flavoring, imitation vanilla, tablets	MIL-F-3040	8	Q	QM tent. CQD 56B
Foot-measuring outfit (for Army and Air Force shoes)	MIL-F-1430	30	Q	QM tent. JQD 1046
Flare, tow target, M50	MIL-F-1400	20	O	USA 50-55-16
Gasoline, combat, automotive	MIL-G-3056	30	O	USA 2-103C
Gages, carpenters' and machinists'	MIL-G-1248	12	-	Navy 41G4c
Generator sets, diesel-engine- driven, direct-and-alternating- current (Naval shipboard use)	MIL-G-3048	20	-	Navy 17G14
Glass, lantern slide cover	MIL-G-1385	12	-	USA 75-356
Globe, gasoline lantern, quadrant type	MIL-G-1403	22	Q	QM tent. JQD 684
Grenade body (for bursting type grenades and igniters)	MIL-G-3057	30	G	- - -

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MILITARY SPECIFICATIONS (CONT'D)

TITLE	SYMBOL	DATE APPRVD.	CUSTO- DIAN	SUPER- SEDED
Grape beverage crystals, synthetic	MIL-G-1067A	September 8	Q	JAN-G-1067 QM tent. CQD 142B
Grinders, garbage (for shipboard use)	MIL-G-1260	12	-	Navy 6601
Hammer, piton, mountain	MIL-H-1431	30	Q	QM tent. BQD 101C
Holders, card, bedstead (metal)	MIL-H-1404	22	Q	QM tent. CQD 17B
Hooks, tent, assembly, wall section	MIL-H-1411	23	Q	QM tent. JQD 283A
Insignia, embroidered	MIL-I-3037	8	Q	USA 6-246A & 6-451
Insulation, electrical, cotton-fiber, untreated	MIL-I-3042	8	-	Navy 17-I-30, 17-S-10
Insulation, electrical, glass-fiber, untreated	MIL-I-1140A	30	-	JAN-I-1140 & Navy 17-I-31
Insulation, electrical, asbestos- fiber, treated and untreated	MIL-I-3053	26	-	Navy 17-I-29
Lead azide	MIL-L-3055	30	O	USA 50-13-12B BuOrd O.S. 885
Lifters, tack	MIL-L-3041	22	E	USA 26-45 Navy 53LL
Magazine; aircraft camera, roll film, 9 x 18 inch negative, 390 ft. film capacity, type A-8B	MIL-M-1421	30	-	USA 75-239B
Malted cereal sirup	MIL-M-1375	12	Q	QM Par. Desc. Malted Cereal Sirup
Mandrels, expanding, lathe	MIL-M-1243	12	-	Navy 40M3a
Mortar, 81-MM., T106	MIL-M-10008(ORD)	16	O	OD tent. AXS 1832
Mount, mortar, 81-MM., T62, with baseplate, T23	MIL-M-10007(ORD)	16	O	OD tent. AXS-1833
Packing, asbestos-metallic-cloth, sheet and tape	MIL-P-1233	12	-	Navy 33P2h

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MILITARY SPECIFICATIONS (CONT'D)

TITLE	SYMBOL	DATE APPROV.	CUSTO- DIAN	SUPER- SEDED
Packing, synthetic-rubber, cloth- insertion (symbol 2353)	MIL-P-1384	September 12	-	Navy 33F81
Peaches; (clingstone, peeled, blanched), dehydrated	MIL-P-1379	12	Q	QM tent. CQD 182B
Poncho, lightweight, O.D.	MIL-P-3003A	23	Q	MIL-P-3003
Pots, fire, gasoline	MIL-P-1382	12	-	Navy 41F19c
Primer, electric, M52A2, loading, assembling, and packing	MIL-P-1394	15	O	USA 50-48-17
Resin-coating, permanent (for inter- nal engine parts)	MIL-R-3043	8	-	AF-Navy Aero. AN-C-148
Reusable shipping containers for drive axle assemblies for materials handling equipment and special purpose vehicles	MIL-R-10011(QMC)	26	Q	- - -
Safelights; photographic	MIL-S-1369	8	-	USA 75-257
Scrapers; hydraulic piston rod	MIL-S-5049	19	-	AN-S-60
Shell, fixed HE, M63 for 37 MM guns TP, M63 MOD 1 for 37 MM guns TP, M92 for 37 MM guns assembling, marking, and packing	MIL-S-1393	16	O	USA 50-21-39
Shell, fixed, HE-T, M54, for 37 MM guns loading, assembling, marking, and packing	MIL-S-1392	20	O	USA 50-21-40
Shrimp, peeled, green, frozen	MIL-S-3051	23	Q	QM tent. CQD 99
Signals, aircraft, double-star AN- M37A1 to AN-M42A1	MIL-S-1398	20	O	USA 50-55-14A
Signals, aircraft, tracer, double star, AN-M53A1 to AN-M58A1	MIL-S-1399	20	O	USA 50-55-20
Signals, aircraft, single-star, AN-M43A1 to AN-M45A1	MIL-S-1419	30	O	USA 50-55-13B
Sprayer, paint, pneumatic (for bituminous emulsion)	MIL-S-3050	22	E	USA 39-7A
Steel, cartridge-clip, strip, WD1045 special annealed	MIL-S-3039	2	O	Springfield Armory tent. SIS-156

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MILITARY SPECIFICATIONS (CONT'D)

TITLE	SYMBOL	DATE APPROV.	CUSTODIAN	SUPERSEDED
Steel; chrome-nickel-molybdenum (4340) bar and rod	MIL-S-5000	August 15	-	AN-QQ-S-756
Strap, wrist watch, nylon	MIL-S-3035	September 8	0	Fr. Ars. tent. FIS 1076
Tank, processing, 4 by 5 film	MIL-T-1370	8	-	USA 75-272
Testing-outfits, boiler-water (for shipboard use)	MIL-T-1241	12	-	Navy 57T5e
Trainer; demonstrator, gyro rotor, auxiliary universal motor powered	MIL-T-5004	July 28	-	AF 40844
Transformers and inductors (audio, power, and pulse)	MIL-T-27	September 30	S	USA 71-4942 Navy 16T30
Truck, dump body, 9.5 cu. yd. (15-ton), 150-inch wheelbase	MIL-T-3044	15	E	USA 91-119
Truck, 1/4-ton, 4x4, utility, M38	MIL-T-1374	8	0	USA 91-183
Trimmer, paper and photographic print	MIL-T-1371	8	-	USA 75-353
Trimmer, photographic print, type A-2 (hand-operated)	MIL-T-1372	8	-	USA 75-365
Tent, kitchen, flyproof, M-1948	MIL-T-10009(QMC)	21	Q	- - -
Tractors, warehouse, electric, spark proof 2000 lbs. and 4000 lbs. draw-bar-pull	MIL-T-10010(QMC)	20	Q	- - -
Valves, fuel selector	MIL-W-5018	1	-	USA 95-28416 BuAer M-596
Vegetables, dehydrated; packaging and packing of, with in-can dehydration	MIL-V-1378	12	Q	QM tent. CQD 384A
Wheel and brake assemblies; land type and amphibious type aircraft	MIL-W-5013	19	-	AN-W-6
Cutout; reverse current, 24 volt D.C. system	MIL-C-5026	August 15	-	- - -

ERRATA:

The Army custodian of Military Specification JAN-C-755 for Coating, fire-resistant (for woven cotton netting) listed on page 6, April Supplement 1949, U.S. Army Index of Specifications, should be changed from "E" to "T".

MILITARY STANDARDS

NEW AND REVISED STANDARDS

The following Standards were approved as Military Standards on the dates indicated, and their use, wherever applicable, is mandatory upon all agencies of the Department of the Army.

TITLE	SYMBOL	DATE APPROVED	ARMY CUSTODIAN	EFFECTIVE DATE
		September		
Formula for green smoke - III	MIL-STD-503	14	C	1 Dec. 1949
Formula for red smoke - II	MIL-STD-504	14	C	1 Dec. 1949

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FEDERAL SPECIFICATIONS

The following Federal Specifications and Amendments for use of all departments and establishments of the Government were promulgated by the Director of Procurement, Treasury Department and their use, whenever applicable, is mandatory upon all procuring agencies of the Department of the Army:

FEDERAL SPECIFICATIONS PROMULGATED

TITLE	SYMBOL	EFFECTIVE DATE	REMARKS
Ammonia, aqua (ammonium-hydroxide), technical	O-A-451a	9 Sep 1949	R
Bronze, aluminum; ingots (for remelting)	QQ-B-675	1 Oct 1949	N
Costumers, metal	AA-C-553	22 Sep 1949	N
Film, x-ray, diagnostic	L-F-345	3 Oct 1949	N
Kerosene	VV-K-211b	9 Sep 1949	R
Lettering sets and accessories	GG-L-256	1 Oct 1949	N
Padding, laundry (stitched-cotton-roving)	CCC-P-86a	3 Oct 1949	R
Sodium silicate, liquid	O-S-605a	22 Sep 1949	R
Splints, attachments, and accessories	GG-S-620	22 Sep 1949	N
Stands, basin, solution, hospital (with removable basins)	RR-S-705	15 Sep 1949	N
Tables, instrument and dressing, operating room	AA-T-55	22 Sep 1949	N

FEDERAL SPECIFICATIONS AMENDED

TITLE	SYMBOL	EFFECTIVE DATE	AMENDMENT NUMBER
Acoustical-units; prefabricated	SS-A-118a	1 Nov 1949	2
Chrome-yellow, and chrome-orange; dry (paint pigments)	TT-C-290	1 Nov 1949	2
Iron-blue; dry (paint-pigment)	TT-I-677	1 Nov 1949	2
Iron oxide; black, synthetic, dry (paint pigment)	TT-I-698	1 Nov 1949	1
Lampblack; dry (paint-pigment)	TT-L-70	1 Nov 1949	1
Tapes; measuring, general-use	GGG-T-106	15 Oct 1949	2
Yellow-iron-oxide; hydrated, synthetic, dry (paint pigment)	TT-Y-216	1 Nov 1949	2

FEDERAL SPECIFICATIONS

CANCELED

TITLE	SYMBOL	REMARKS
Cushion; carpet and rug, hair-felt	G-C-811	
Enamel; pigmented (air-drying and baking), black	TT-E-521	
Felt; hair	G-F-201c	

FEDERAL SPECIFICATION

PAPER; BUILDING, WATERPROOFED

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. CLASSIFICATION

1.1 Types.—Waterproofed building paper shall be furnished in the following types, as specified:

Type I.—Uncreped, not reinforced

Type II.—Uncreped, not reinforced, saturated or infused both sides

Type III.—Creped one direction, not reinforced

Type IV.—Uncreped, reinforced

Type V.—Creped one direction, reinforced

Type VI.—Creped two directions, or creped in one direction and pleated or corrugated in the other direction, not reinforced

Type VII.—Creped two directions, or creped in one direction and pleated or corrugated in the other direction, reinforced

1.2 Classes.—Waterproofed building paper in accordance with this specification shall be furnished in the following classes, as specified:

Class A.—For uses where a high degree of water-vapor resistance is required

Class B.—For uses where only a moderate degree of water-vapor resistance or high water-resistance is required

Class C.—For uses where only a moderate degree of water resistance is required

Class D.—For uses where high permeability to water vapor is required

1.3 Form.—The paper shall be in rolls. (See 1.4.2.)

1.4 Sizes.—Unless otherwise specified, waterproofed building paper shall be furnished in the following minimum sizes, as specified:

1.4.1 Width.—The widths of the rolls shall be 36, 40, 48, 60, 72, 84, and 96 inches, as specified.

1.4.2 Area.—The area of the paper in rolls shall be 250, 500, or 1,000 square feet, as specified.

2. APPLICABLE SPECIFICATIONS

2.1 The following Federal Specification, of the issue in effect on date of invitation for bids, forms a part of this specification:

UU-P-31—Paper; General Specifications and Methods of Testing.

(Activities outside the Federal Government may obtain copies of Federal Specifications and Standards as outlined under General Information in the Index of Federal Specifications and Standards, and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.)

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, Seattle, and Washington, D. C.)

(Federal Government activities may obtain copies of Federal Specifications and Standards and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

manship, packaging, packing, and marking. (See 1.1, 1.3, 1.4.1, 3.6, 3.7, 5.1, 5.2, and 5.3.)

4.3 Tests.

4.3.1 Test specimens.—An equal number of tests shall be made on each test specimen, and the average of the test values shall be compared with the requirements of this specification.

4.3.2 The following tests shall be made in accordance with methods described in Federal Specification UU-P-31:

Tests	Method No.
Atmospheric conditions ¹	102
Tensile breaking strength (dry) and elongation	171
Water resistance	181
Water-vapor permeability ²	182

¹ The conditioning time shall be not less than 48 hours.

² At 50 ± 2 percent relative humidity and $23^\circ \pm 2^\circ$ C.

4.3.3 Pliability.—The test for pliability shall be made as follows: Cut strips, 6 inches by 1 inch, in the machine direction of the paper. Bend them over a $\frac{1}{16}$ -inch mandrel at 32° F. through an arc of 180° at a uniform rate in 2 seconds. All strips shall remain uncracked.

4.3.4 Amount in shipment.—The number of square feet in the shipment shall be calculated as follows:

(1) Obtain percent tare from the weight of five rolls of paper taken at random from the shipment and the tare weight stated by the contractor.

(2) Using this percent tare, obtain net weight of the whole shipment from the gross weight of the whole shipment.

(3) Obtain average weight per square foot of the paper from the sample sheets.

(4) Calculate the square feet in the shipment by dividing the net weight (2) of the whole shipment by the average weight per square foot (3).

4.3.5 Retests.—Should the paper fail to pass any test, an additional test will be made if requested by the contractor, using twice the number of specimens previously tested. The cost of the retesting shall be borne by the contractor.

5. PREPARATION FOR DELIVERY

5.1 Packaging.—Unless otherwise specified, the paper shall be furnished in commercial rolls.

5.2 Packing.—The subject commodity shall be prepared for shipment to permit acceptance by carrier for transportation at the lowest applicable rate and to afford maximum protection from normal hazards of transportation.

5.3 Marking.—The name of the commodity, type, class, width, contents in square feet, specification number, stock number, order number, and manufacturer's name shall be plainly marked on the outside of each roll.

6. NOTES

6.1 Ordering data.—Purchasers should specify the type, class, width, area, reinforcing (if reinforced), tensile strength (for classes A, B, and C), any special packaging required, and should exercise any desired option offered herein. (See 1.1, 1.2, 1.4.1, 1.4.2, 3.2, 3.5.1, 3.5.2, 3.5.3, 5.1, and 7.2.4.)

6.2 Payment basis.—Payment shall be on the basis of 100 square feet. (See 3.8.)

6.3 Federal specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, classes, etc., which are suitable for Federal Government requirements.

Patent notice.—The furnishing by the Government of specifications, including drawings or other data in connection therewith, does not in any way grant the recipient of such material, or any other person, a license or right to manufacture, use, or sell any patented or unpatented invention that may in any way be related thereto.

7. DEPARTMENTAL REQUIREMENTS

7.1 The following specifications and standard, of the issues in effect on date of invitation for bids, and special requirements, form a part of this specification for purchases made under this specification by the respective departments.

UU-P-147b

7.2 Army, Navy, and Air Force.

7.2.1 Applicable specifications and standard.

Federal Specification:

UU-T-116—Tape, Paper, Gummed, Water-Resistant.

Military Specification:

MIL-A-140—Adhesive, Water-Resistant, Waterproof Barrier-Material.

Military Standard:

MIL-STD-129—Marking for Shipment and Storage.

(Copies of specifications, standard, and drawings required by contractors in connection with specific procurement functions may be obtained from the procuring agency, or as directed by the contracting officer.)

7.2.2 Packing.

7.2.2.1 *For domestic shipment.*—Except for full carload shipments, rolls shall be wound on cores and completely wrapped with at least one thickness of the material itself. For full carloads, direct to using installations, each roll shall be taped securely with a 4-inch-width water-resistant gummed tape meeting the requirements of Federal Specification UU-T-116, centered along the end edge of the paper and applied across the full width of the roll, or the end of the paper shall be secured with water-resistant

adhesive conforming to Military Specification MIL-A-140. Each roll in carload shipments shall be marked distinctly "KEEP DRY" in addition to the marking required by 7.2.3.

7.2.2.2 *For overseas shipment.*—The rolls shall be wound on plugged cores completely wrapped over-all with at least one thickness of the material itself. Wrappers shall be sealed securely with asphalt or with water-resistant adhesive complying with Military Specification MIL-A-140. The wrappers shall be closed at ends by means of inside and outside headers, using sufficient adhesive to make watertight seals. Each roll shall not exceed 200 pounds gross weight, unless otherwise specified.

7.2.3 *Marking.*—In addition to any special marking by the contract or order, all shipping containers shall be marked in accordance with Military Standard MIL-STD-129.

7.2.4 *Ordering data.*—Procurement documents should specify whether domestic or overseas packing is required. (See 7.2.2.)

MILITARY INTEREST:

Army—E

Navy—Y

Air Force.

U. S. GOVERNMENT PRINTING OFFICE: 1954

Copies of this specification may be purchased for 10 cents.

FEDERAL SPECIFICATION

PAPER; BUILDING, WATERPROOFED

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. CLASSIFICATION

1.1 Types.—Waterproofed building paper shall be furnished in the following types, as specified:

Type I.—Uncreped, not reinforced

Type II.—Uncreped, not reinforced, saturated or infused both sides

Type III.—Creped one direction, not reinforced

Type IV.—Uncreped, reinforced

Type V.—Creped one direction, reinforced

Type VI.—Creped two directions, or creped in one direction and pleated or corrugated in the other direction, not reinforced

Type VII.—Creped two directions, or creped in one direction and pleated or corrugated in the other direction, reinforced

1.2 Classes.—Waterproofed building paper in accordance with this specification shall be furnished in the following classes, as specified:

Class A.—For uses where a high degree of water-vapor resistance is required

Class B.—For uses where only a moderate degree of water-vapor resistance or high water-resistance is required

Class C.—For uses where only a moderate degree of water resistance is required

Class D.—For uses where high permeability to water vapor is required

1.3 Form.—The paper shall be in rolls. (See 1.4.2.)

1.4 Sizes.—Unless otherwise specified, waterproofed building paper shall be furnished in the following minimum sizes, as specified:

1.4.1 Width.—The widths of the rolls shall be 36, 40, 48, 60, 72, 84, and 96 inches, as specified.

1.4.2 Area.—The area of the paper in rolls shall be 250, 500, or 1,000 square feet, as specified.

2. APPLICABLE SPECIFICATIONS

2.1 The following Federal Specification, of the issue in effect on date of invitation for bids, forms a part of this specification:

UU-P-31—Paper; General Specifications and Methods of Testing.

(Activities outside the Federal Government may obtain copies of Federal Specifications and Standards as outlined under General Information in the Index of Federal Specifications and Standards, and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.)

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, Seattle, and Washington, D. C.)

(Federal Government activities may obtain copies of Federal Specifications and Standards and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

2.2 Specifications and other publications applicable only to individual departments are listed in section 7.

3. REQUIREMENTS

3.1 Material.—The material shall consist of paper made water-resistant with asphalt or other treating or combining agents that will give compliance with this specification. All types except type II shall be free from ground-wood pulp.

3.2 Reinforcing.—If the paper is reinforced, it shall be reinforced with cords or strands of fiber imbedded in the combining agent, running in any two directions of the paper and averaging not less than 10 or 20 cords or strands of fiber per foot in each direction, as specified.

3.3 Stretch.—Types III and VI shall have a stretch of not less than 15 percent, and types V and VII shall have a stretch of not less than 10 percent in each creped, pleated, or corrugated direction.

3.4 Pliability.—Except for type II, the paper shall not crack when bent. (See 4.3.3.)

3.5 Physical properties.—The tensile strength, water resistance, and water-vapor permeability shall be as follows:

3.5.1 Class A.—The minimum tensile strength of class A paper, in each direction, per inch width, shall be 20 pounds (unless specified as 35 pounds), except type VI paper which shall be 15 pounds. The paper shall have a minimum water resistance of 24 hours, and a maximum water-vapor permeability of 4 grams per square meter per 24 hours (0.576 grain per square foot per hour for a calculated pressure differential of 1 inch of mercury).

3.5.2 Class B.—The minimum tensile strength of Class B paper, in each direction, per inch width, shall be 20 pounds (unless specified as 35 pounds), except type VI paper which shall be 15 pounds. The paper shall have a minimum water resistance of 16 hours, and a maximum water-vapor permeability of 6 grams per square meter per 24 hours (0.864 grain per square foot

per hour for a calculated pressure differential of 1 inch of mercury).

3.5.3 Class C.—The minimum tensile strength of class C paper, in each direction, per inch width, shall be 20 pounds (unless specified as 35 pounds), except type VI paper which shall be 15 pounds. The paper shall have a minimum water resistance of 8 hours.

3.5.4 Class D.—Class D paper shall have a minimum tensile strength in each direction of 20 pounds per inch width. The paper shall have a minimum water resistance of 10 minutes and a minimum water-vapor permeability of 35 grams per square meter per 24 hours (5.04 grains per square foot per hour for a calculated pressure differential of 1 inch of mercury).

3.6 Unasphalted area.—Rolls of laminated paper shall not contain an area of more than $\frac{1}{2}$ inch, measured from the longitudinal edges of the combined sheets, which is devoid of the laminant used.

3.7 Workmanship.—Workmanship shall be in accordance with best commercial practice. The paper shall be uniformly constructed, free from holes, tears, creases, cuts, or other imperfections which might impair its usefulness. The paper shall not stick together to such an extent as to cause tearing when unrolled.

3.8 Tare weight.—For calculation of the number of square feet in shipments, the contractor shall inform the purchaser of the average tare weight per roll. (See 6.2.)

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Sampling.—The sample shall consist of not less than 10 sheets of each type and class delivered. Each sheet shall be not less than 1 square foot, and each shall be taken from a different unit of the shipment. At least three outer turns of rolls shall be removed before taking the sample sheet.

4.2 Inspection.—Deliveries shall be inspected for compliance with this specification in type, form, width, unasphalted area, work-

manship, packaging, packing, and marking. (See 1.1, 1.3, 1.4.1, 3.6, 3.7, 5.1, 5.2, and 5.3.)

4.3 Tests.

4.3.1 Test specimens.—An equal number of tests shall be made on each test specimen, and the average of the test values shall be compared with the requirements of this specification.

4.3.2 The following tests shall be made in accordance with methods described in Federal Specification UU-P-31:

Tests	Method No.
Atmospheric conditions ¹	102
Tensile breaking strength (dry) and elongation	171
Water resistance	181
Water-vapor permeability ²	182

¹ The conditioning time shall be not less than 48 hours.

² At 50 ± 2 percent relative humidity and $23^\circ \pm 2^\circ$ C.

4.3.3 Pliability.—The test for pliability shall be made as follows: Cut strips, 6 inches by 1 inch, in the machine direction of the paper. Bend them over a $\frac{1}{16}$ -inch mandrel at 32° F. through an arc of 180° at a uniform rate in 2 seconds. All strips shall remain uncracked.

4.3.4 Amount in shipment.—The number of square feet in the shipment shall be calculated as follows:

(1) Obtain percent tare from the weight of five rolls of paper taken at random from the shipment and the tare weight stated by the contractor.

(2) Using this percent tare, obtain net weight of the whole shipment from the gross weight of the whole shipment.

(3) Obtain average weight per square foot of the paper from the sample sheets.

(4) Calculate the square feet in the shipment by dividing the net weight (2) of the whole shipment by the average weight per square foot (3).

4.3.5 Retests.—Should the paper fail to pass any test, an additional test will be made if requested by the contractor, using twice the number of specimens previously tested. The cost of the retesting shall be borne by the contractor.

5. PREPARATION FOR DELIVERY

5.1 Packaging.—Unless otherwise specified, the paper shall be furnished in commercial rolls.

5.2 Packing.—The subject commodity shall be prepared for shipment to permit acceptance by carrier for transportation at the lowest applicable rate and to afford maximum protection from normal hazards of transportation.

5.3 Marking.—The name of the commodity, type, class, width, contents in square feet, specification number, stock number, order number, and manufacturer's name shall be plainly marked on the outside of each roll.

6. NOTES

6.1 Ordering data.—Purchasers should specify the type, class, width, area, reinforcing (if reinforced), tensile strength (for classes A, B, and C), any special packaging required, and should exercise any desired option offered herein. (See 1.1, 1.2, 1.4.1, 1.4.2, 3.2, 3.5.1, 3.5.2, 3.5.3, 5.1, and 7.2.4.)

6.2 Payment basis.—Payment shall be on the basis of 100 square feet. (See 3.8.)

6.3 Federal specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, classes, etc., which are suitable for Federal Government requirements.

Patent notice.—The furnishing by the Government of specifications, including drawings or other data in connection therewith, does not in any way grant the recipient of such material, or any other person, a license or right to manufacture, use, or sell any patented or unpatented invention that may in any way be related thereto.

7. DEPARTMENTAL REQUIREMENTS

7.1 The following specifications and standard, of the issues in effect on date of invitation for bids, and special requirements, form a part of this specification for purchases made under this specification by the respective departments.

UU-P-147b

7.2 Army, Navy, and Air Force.

7.2.1 *Applicable specifications and standard.*

Federal Specification:

UU-T-116—Tape, Paper, Gummed, Water-Resistant.

Military Specification:

MIL-A-140—Adhesive, Water-Resistant, Waterproof Barrier-Material.

Military Standard:

MIL-STD-129—Marking for Shipment and Storage.

(Copies of specifications, standard, and drawings required by contractors in connection with specific procurement functions may be obtained from the procuring agency, or as directed by the contracting officer.)

7.2.2 *Packing.*

7.2.2.1 *For domestic shipment.*—Except for full carload shipments, rolls shall be wound on cores and completely wrapped with at least one thickness of the material itself. For full carloads, direct to using installations, each roll shall be taped securely with a 4-inch-width water-resistant gummed tape meeting the requirements of Federal Specification UU-T-116, centered along the end edge of the paper and applied across the full width of the roll, or the end of the paper shall be secured with water-resistant

adhesive conforming to Military Specification MIL-A-140. Each roll in carload shipments shall be marked distinctly "KEEP DRY" in addition to the marking required by 7.2.3.

7.2.2.2 *For overseas shipment.*—The rolls shall be wound on plugged cores completely wrapped over-all with at least one thickness of the material itself. Wrappers shall be sealed securely with asphalt or with water-resistant adhesive complying with Military Specification MIL-A-140. The wrappers shall be closed at ends by means of inside and outside headers, using sufficient adhesive to make watertight seals. Each roll shall not exceed 200 pounds gross weight, unless otherwise specified.

7.2.3 *Marking.*—In addition to any special marking by the contract or order, all shipping containers shall be marked in accordance with Military Standard MIL-STD-129.

7.2.4 *Ordering data.*—Procurement documents should specify whether domestic or overseas packing is required. (See 7.2.2.)

MILITARY INTEREST:

Army—E
Navy—Y
Air Force.

U. S. GOVERNMENT PRINTING OFFICE: 1954

Copies of this specification may be purchased for 10 cents.

FEDERAL SPECIFICATION

PAPER; BUILDING, WATERPROOFED

This specification was approved on the above date by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. CLASSIFICATION

1.1 Types.—Waterproofed building paper shall be furnished in the following types, as specified:

Type I. —Uncreped, not reinforced.

Type II. —Uncreped, not reinforced, saturated or infused both sides.

Type III. —Creped one direction, not reinforced.

Type IV. —Uncreped, reinforced.

Type V. —Creped one direction, reinforced.

Type VI. —Creped two directions, or creped in one direction and pleated or corrugated in the other direction, not reinforced.

Type VII. —Creped two directions, or creped in one direction and pleated or corrugated in the other direction, reinforced.

1.2 Classes.—Waterproofed building paper in accordance with this specification shall be furnished in the following classes, as specified:

Class A.—For uses where a high degree of water-vapor resistance is required.

Class B.—For uses where only a moderate degree of water-vapor resistance or high water-resistance is required.

Class C.—For uses where only a moderate degree of water resistance is required.

Class D.—For uses where high permeability to water vapor is required.

1.3 Form.—The paper shall be in rolls. (See 1.4.2.)

1.4 Sizes. — Unless otherwise specified, waterproofed building paper shall be furnished in the following minimum sizes, as specified:

1.4.1 Width.—The widths of the rolls shall be 36, 40, 48, 60, 72, 84, and 96 inches, as specified.

1.4.2 Length.—The length of the paper in rolls shall be 250, 500, or 1,000 lineal feet, as specified.

2. APPLICABLE SPECIFICATIONS

2.1 The following Federal Specification, of the issue in effect on date of invitation for bids, forms a part of this specification:

UU-P-31—Paper; General Specifications and Methods of Testing.

(Copies of Federal specifications and the Federal Specifications Index may be obtained on application, accompanied by money order, coupon, or cash, to the Superintendent of Documents, Government Printing Office, Washington 25, D. C., or to the GSA Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco,

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and Seattle. Prices may be obtained from the Superintendent of Documents or from the GSA Regional Offices.)

2.2 Specifications and other publications applicable only to individual departments are listed in section 7.

3. REQUIREMENTS

3.1 **Material.**—The material shall consist of paper made water-resistant with asphalt or other treating or combining agents that will give compliance with this specification. All types except type II shall be free from groundwood pulp.

3.2 **Reinforcing.** — If the paper is reinforced, it shall be reinforced with cords or strands of fiber imbedded in the combining agent, running in any two directions of the paper and averaging not less than 10 or 20 cords or strands of fiber per foot in each direction, as specified.

— 3.3 **Stretch.**—Types III and VI shall have a stretch of not less than 15 percent, and types V and VII shall have a stretch of not less than 10 percent in each creped, pleated, or corrugated direction.

3.4 **Pliability.** — Except for type II, the paper shall not crack when bent. (See 4.3.3.)

3.5 **Physical properties.** — The tensile strength, water resistance, and water-vapor permeability shall be as follows:

3.5.1 **Class A.** — The minimum tensile strength of Class A paper, in each direction, per inch width, shall be either 35 pounds or 20 pounds, as specified, except type VI paper which shall be 15 pounds. The paper shall have a minimum water resistance of 24 hours and a maximum water-vapor permeability of 4 grams per square meter per 24 hours (0.576 grain per square foot per hour for a calculated pressure differential of 1 inch of mercury).

3.5.2 **Class B.** — The minimum tensile strength of Class B paper, in each direction, per inch width, shall be either 35 pounds or 20 pounds, as specified, except type VI paper which shall be 15 pounds. The paper shall have a minimum water resistance of 16 hours, and a maximum water-vapor permeability of 6 grams per square meter per 24 hours (0.864 grain per square foot per hour for a calculated pressure differential of 1 inch of mercury).

3.5.3 **Class C.** — The minimum tensile strength of class C paper, in each direction, per inch width, shall be either 35 pounds or 20 pounds, as specified, except type VI paper which shall be 15 pounds. The paper shall have a minimum water resistance of 8 hours.

3.5.4 **Class D.**—Class D paper shall have a minimum tensile strength in each direction of 20 pounds per inch width. The paper shall have a minimum water resistance of 10 minutes and a minimum water-vapor permeability of 100 grams per square meter per 24 hours (5.04 grains per square foot per hour for a calculated pressure differential of 1 inch of mercury).

3.6 **Unasphalted area.**—Rolls of laminated paper shall not contain an area of more than $\frac{1}{2}$ inch, measured from the longitudinal edges of the combined sheets, which is devoid of the laminant used.

3.7 **Workmanship.** — Workmanship shall be in accordance with best commercial practice. The paper shall be uniformly constructed, free from holes, tears, creases, cuts, or other imperfections which might impair its usefulness. The paper shall not stick together to such an extent as to cause tearing when unrolled.

3.8 **Tare weight.**—For calculation of the number of square feet in shipments, the contractor shall inform the purchaser of the average tare weight per roll. (See 6.2.)

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Sampling.—The sample shall consist of not less than 10 sheets of each type and class delivered. Each sheet shall be not less than 1 square foot, and each shall be taken from a different unit of the shipment. At least three outer turns of rolls shall be removed before taking the sample sheet.

4.2 Inspection. — Deliveries shall be inspected for compliance with this specification in type, form, width, unasphalted area, workmanship, packaging, packing, and marking (See 1.1, 1.3, 1.4.1, 3.6, 3.7, 5.1, 5.2, and 5.3.)

4.3 Tests.

4.3.1 Test specimens.—An equal number of tests shall be made on each test specimen, and the average of the test values shall be compared with the requirements of this specification.

4.3.2 The following tests shall be made in accordance with methods described in Federal Specification UU-P-31:

Tests	Method No.
Atmospheric conditions ¹ -----	102
Tensile breaking strength (dry) and elongation -----	171
Water resistance -----	181
Water-vapor permeability ² -----	182

¹ The conditioning time shall be not less than 48 hours.

² At 50 ± 2 percent relative humidity and $23^\circ \pm 2^\circ$ C.

4.3.3 Pliability. — The test for pliability shall be made as follows: Cut strips, 6 inches by 1 inch, in the machine direction of the paper. Bend them over a $\frac{1}{8}$ -inch mandrel at 32° F. through an arc of 180° at a uniform

rate in 2 seconds. All strips shall remain uncracked.

4.3.4 Amount in shipment.—The number of square feet in the shipment shall be calculated as follows:

(1) Obtain percent tare from the weight of five rolls of paper taken at random from the shipment and the tare weight stated by the contractor.

(2) Using this percent tare, obtain net weight of the whole shipment from the gross weight of the whole shipment.

(3) Obtain average weight per square foot of the paper from the sample sheets.

(4) Calculate the square feet in the shipment by dividing the net weight (2) of the whole shipment by the average weight per square foot (3).

4.3.5 Retests.— Should the paper fail to pass any test, an additional test will be made if requested by the contractor, using twice the number of specimens previously tested. The cost of the retesting shall be borne by the contractor.

5. PREPARATION FOR DELIVERY

5.1 Packaging.—Unless otherwise specified, the paper shall be furnished in commercial rolls.

5.2 Packing. — The subject commodity shall be prepared for shipment to permit acceptance by carrier for transportation at the lowest applicable rate and to afford maximum protection from normal hazards of transportation.

5.3 Marking.—The name of the commodity, type, class, width, contents in square feet, specification number, stock number, order number, and manufacturer's name shall be plainly marked on the outside of each roll.

6. NOTES

6.1 Ordering information. — Purchasers

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should exercise any desired option offered herein and should specify the type, class, width, length, reinforcing, if reinforced, tensile strength (for classes A, B, and C), and any special packaging required. (See 1.1, 1.2, 1.4.1, 1.4.2, 3.2, 3.5.1, 3.5.2, 3.5.3, 5.1, and 7.2.4.)

6.2 Payment basis.—Payment shall be on the basis of 100 square feet. (See 3.8.)

6.3 Bid samples.—If samples are required with bid, this requirement should be stated in the inquiry or invitation for bids, giving information as to size and quantity of sample.

6.4 Federal specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, classes, etc., which are suitable for Federal Government requirements.

Patent notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

7. DEPARTMENTAL REQUIREMENTS

7.1 The following specifications and other publication, of the issues in effect on date of invitation for bids, and special requirements, form a part of this specification for purchases made under this specification by the respective departments.

7.2 Army, Navy, and Air Force.

7.2.1 Applicable specifications and other publication.

Federal Specification:

UU-T-116—Tape; Paper, Gummed, Water-Resistant.

Military Specification:

JAN-P-140—Packaging and Packing for Overseas Shipment — Adhesives, Water-Resistant, Case-Liner.

U. S. Army Specifications:

94-40645—Marking; Exterior, Domestic and Export Shipment, by Contractors.¹

100-2—Standard Specification for Marking Shipments by Contractors.²

Navy Department Specification:

General Specifications for Inspection of Material.³

Bureau of Supplies and Accounts Publication:

Navy Shipment Marking Handbook.³

(Copies of specifications and publications required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer. Both the title and identifying symbol or number should be stipulated when requesting copies.)

7.2.2 Packing.

7.2.2.1 For domestic shipment.—Except for full carload shipments, rolls shall be wound on cores and completely wrapped with at least one thickness of the material itself. For full carloads, direct to using installations, each roll shall be taped securely with a 4-inch-width water-resistant gummed tape meeting the requirements of Federal Specification UU-T-116, centered along the end edge of the paper and applied across the full width of the roll or the end of the paper shall

¹ Applicable to Air Force purchases only.

² Applicable to Army purchases only.

³ Applicable to Navy purchases only.

be secured with water-resistant adhesive conforming to Military Specification JAN-P-140. Each roll in carload shipments shall be marked distinctly "KEEP DRY" in addition to the marking required by paragraph 7.2.3.

7.2.2.2 For overseas shipment.—The rolls shall be wound on plugged cores completely wrapped over all with at least one thickness of the material itself. Wrappers shall be sealed securely with asphalt or with water-resistant adhesive complying with Military Specification JAN-P-140. The wrappers shall be closed at ends by means of inside and outside headers, using sufficient adhesive to make watertight seals. Each roll shall not exceed 200 pounds gross weight, unless otherwise specified.

7.2.3 Marking.—The rolls or shipping containers for the Army shall be marked in accordance with U. S. Army Specification 100-2; for the Navy, in accordance with the Navy Shipment Marking Handbook; and for the Air Force, in accordance with U. S. Army Specification 94-40645.

7.2.4 Ordering data.—Procurement documents should specify whether domestic or overseas packing and marking are required (see 7.2.2 and 7.2.3).

7.2.5 Inspection procedures.—For Naval purchases the general inspection procedures shall be in accordance with General Specifications for Inspection of Material.

NAVY INTEREST: S Y

This specification is a part of Section IV, Part 5, of the Federal Standard Stock Catalog.

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SUPERSEDING

Fed. Spec. UU-P-147

24 May 1948

FEDERAL SPECIFICATION

PAPER; BUILDING, WATERPROOFED

This specification was approved on the above date by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. CLASSIFICATION

1.1 Types.—Waterproofed building paper shall be furnished in the following types, as specified:

- Type I. —Uncreped, not reinforced.
- Type II. —Uncreped, not reinforced, saturated or infused both sides.
- Type III. —Creped one direction, not reinforced.
- Type IV. —Uncreped, reinforced.
- Type V. —Creped one direction, reinforced.
- Type VI. —Creped two directions, or creped in one direction and pleated or corrugated in the other direction, not reinforced.
- Type VII. —Creped two directions, or creped in one direction and pleated or corrugated in the other direction, reinforced.

1.2 Classes.—Waterproofed building paper in accordance with this specification shall be furnished in the following classes, as specified:

- Class A.—For uses where a high degree of water-vapor resistance is required.
- Class B.—For uses where only a moderate degree of water-vapor resistance or high water-resistance is required.

Class C.—For uses where only a moderate degree of water resistance is required.

Class D.—For uses where high permeability to water vapor is required.

1.3 Form.—The paper shall be in rolls. (See 1.4.2.)

1.4 Sizes.— Unless otherwise specified, waterproofed building paper shall be furnished in the following minimum sizes, as specified:

1.4.1 Width.—The widths of the rolls shall be 36, 40, 48, 60, 72, 84, and 96 inches, as specified.

1.4.2 Length.—The length of the paper in rolls shall be 250, 500, or 1,000 lineal feet, as specified.

2. APPLICABLE SPECIFICATIONS

2.1 The following Federal Specification, of the issue in effect on date of invitation for bids, forms a part of this specification:

UU-P-31—Paper; General Specifications and Methods of Testing.

(Copies of Federal specifications and the Federal Specifications Index may be obtained on application, accompanied by money order, coupon, or cash, to the Superintendent of Documents, Government Printing Office, Washington 25, D. C., or to the GSA Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco.

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and Seattle. Prices may be obtained from the Superintendent of Documents or from the GSA Regional Offices.)

2.2 Specifications and other publications applicable only to individual departments are listed in section 7.

3. REQUIREMENTS

3.1 **Material.**—The material shall consist of paper made water-resistant with asphalt or other treating or combining agents that will give compliance with this specification. All types except type II shall be free from groundwood pulp.

3.2 **Reinforcing.** — If the paper is reinforced, it shall be reinforced with cords or strands of fiber imbedded in the combining agent, running in any two directions of the paper and averaging not less than 10 or 20 cords or strands of fiber per foot in each direction, as specified.

3.3 **Stretch.**—Types III and VI shall have a stretch of not less than 15 percent, and types V and VII shall have a stretch of not less than 10 percent in each creped, pleated, or corrugated direction.

3.4 **Pliability.** — Except for type II, the paper shall not crack when bent. (See 4.3.3.)

3.5 **Physical properties.** — The tensile strength, water resistance, and water-vapor permeability shall be as follows:

3.5.1 **Class A.** — The minimum tensile strength of Class A paper, in each direction, per inch width, shall be either 35 pounds or 20 pounds, as specified, except type VI paper which shall be 15 pounds. The paper shall have a minimum water resistance of 24 hours and a maximum water-vapor permeability of 4 grams per square meter per 24 hours (0.576 grain per square foot per hour for a calculated pressure differential of 1 inch of mercury).

3.5.2 **Class B.** — The minimum tensile strength of Class B paper, in each direction, per inch width, shall be either 35 pounds or 20 pounds, as specified, except type VI paper which shall be 15 pounds. The paper shall have a minimum water resistance of 16 hours, and a maximum water-vapor permeability of 6 grams per square meter per 24 hours (0.864 grain per square foot per hour for a calculated pressure differential of 1 inch of mercury).

3.5.3 **Class C.** — The minimum tensile strength of class C paper, in each direction, per inch width, shall be either 35 pounds or 20 pounds, as specified, except type VI paper which shall be 15 pounds. The paper shall have a minimum water resistance of 8 hours.

3.5.4 **Class D.**—Class D paper shall have a minimum tensile strength in each direction of 20 pounds per inch width. The paper shall have a minimum water resistance of 10 minutes and a minimum water-vapor permeability of 100 grams per square meter per 24 hours (5.04 grains per square foot per hour for a calculated pressure differential of 1 inch of mercury).

3.6 **Unasphalted area.**—Rolls of laminated paper shall not contain an area of more than $\frac{1}{2}$ inch, measured from the longitudinal edges of the combined sheets, which is devoid of the laminant used.

3.7 **Workmanship.** — Workmanship shall be in accordance with best commercial practice. The paper shall be uniformly constructed, free from holes, tears, creases, cuts, or other imperfections which might impair its usefulness. The paper shall not stick together to such an extent as to cause tearing when unrolled.

3.8 **Tare weight.**—For calculation of the number of square feet in shipments, the contractor shall inform the purchaser of the average tare weight per roll. (See 6.2.)

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Sampling.—The sample shall consist of not less than 10 sheets of each type and class delivered. Each sheet shall be not less than 1 square foot, and each shall be taken from a different unit of the shipment. At least three outer turns of rolls shall be removed before taking the sample sheet.

4.2 Inspection. — Deliveries shall be inspected for compliance with this specification in type, form, width, unasphalted area, workmanship, packaging, packing, and marking (See 1.1, 1.3, 1.4.1, 3.6, 3.7, 5.1, 5.2, and 5.3.)

4.3 Tests.

4.3.1 Test specimens.—An equal number of tests shall be made on each test specimen, and the average of the test values shall be compared with the requirements of this specification.

4.3.2 The following tests shall be made in accordance with methods described in Federal Specification UU-P-31:

Tests	Method No.
Atmospheric conditions ¹ -----	102
Tensile breaking strength (dry) and elongation -----	171
Water resistance -----	181
Water-vapor permeability ² -----	182

¹ The conditioning time shall be not less than 48 hours.

² At 50 ± 2 percent relative humidity and $23^\circ \pm 2^\circ$ C.

4.3.3 Pliability. — The test for pliability shall be made as follows: Cut strips, 6 inches by 1 inch, in the machine direction of the paper. Bend them over a $\frac{1}{8}$ -inch mandrel at 32° F. through an arc of 180° at a uniform

rate in 2 seconds. All strips shall remain uncracked.

4.3.4 Amount in shipment.—The number of square feet in the shipment shall be calculated as follows:

(1) Obtain percent tare from the weight of five rolls of paper taken at random from the shipment and the tare weight stated by the contractor.

(2) Using this percent tare, obtain net weight of the whole shipment from the gross weight of the whole shipment.

(3) Obtain average weight per square foot of the paper from the sample sheets.

(4) Calculate the square feet in the shipment by dividing the net weight (2) of the whole shipment by the average weight per square foot (3).

4.3.5 Retests.—Should the paper fail to pass any test, an additional test will be made if requested by the contractor, using twice the number of specimens previously tested. The cost of the retesting shall be borne by the contractor.

5. PREPARATION FOR DELIVERY

5.1 Packaging.—Unless otherwise specified, the paper shall be furnished in commercial rolls.

5.2 Packing. — The subject commodity shall be prepared for shipment to permit acceptance by carrier for transportation at the lowest applicable rate and to afford maximum protection from normal hazards of transportation.

5.3 Marking.—The name of the commodity, type, class, width, contents in square feet, specification number, stock number, order number, and manufacturer's name shall be plainly marked on the outside of each roll.

6. NOTES

6.1 Ordering information. — Purchasers

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should exercise any desired option offered herein and should specify the type, class, width, length, reinforcing, if reinforced, tensile strength (for classes A, B, and C), and any special packaging required. (See 1.1, 1.2, 1.4.1, 1.4.2, 3.2, 3.5.1, 3.5.2, 3.5.3, 5.1, and 7.2.4.)

6.2 Payment basis.—Payment shall be on the basis of 100 square feet. (See 3.8.)

6.3 Bid samples.—If samples are required with bid, this requirement should be stated in the inquiry or invitation for bids, giving information as to size and quantity of sample.

6.4 Federal specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, classes, etc., which are suitable for Federal Government requirements.

Patent notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

7. DEPARTMENTAL REQUIREMENTS

7.1 The following specifications and other publication, of the issues in effect on date of invitation for bids, and special requirements, form a part of this specification for purchases made under this specification by the respective departments.

7.2 Army, Navy, and Air Force.

7.2.1 Applicable specifications and other publication.

Federal Specification:

UU-T-116—Tape; Paper, Gummed, Water-Resistant.

Military Specification:

JAN-P-140—Packaging and Packing for Overseas Shipment — Adhesives, Water-Resistant, Case-Liner.

U. S. Army Specifications:

94-40645—Marking; Exterior, Domestic and Export Shipment, by Contractors.¹

100-2—Standard Specification for Marking Shipments by Contractors.²

Navy Department Specification:

General Specifications for Inspection of Material.³

Bureau of Supplies and Accounts Publication:

Navy Shipment Marking Handbook.³

(Copies of specifications and publications required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer. Both the title and identifying symbol or number should be stipulated when requesting copies.)

7.2.2 Packing.

7.2.2.1 For domestic shipment.—Except for full carload shipments, rolls shall be wound on cores and completely wrapped with at least one thickness of the material itself. For full carloads, direct to using installations, each roll shall be taped securely with a 4-inch-width water-resistant gummed tape meeting the requirements of Federal Specification UU-T-116, centered along the end edge of the paper and applied across the full width of the roll or the end of the paper shall

¹ Applicable to Air Force purchases only.

² Applicable to Army purchases only.

³ Applicable to Navy purchases only.

be secured with water-resistant adhesive conforming to Military Specification JAN-P-140. Each roll in carload shipments shall be marked distinctly "KEEP DRY" in addition to the marking required by paragraph 7.2.3.

7.2.2.2 For overseas shipment.—The rolls shall be wound on plugged cores completely wrapped over all with at least one thickness of the material itself. Wrappers shall be sealed securely with asphalt or with water-resistant adhesive complying with Military Specification JAN-P-140. The wrappers shall be closed at ends by means of inside and outside headers, using sufficient adhesive to make watertight seals. Each roll shall not exceed 200 pounds gross weight, unless otherwise specified.

7.2.3 Marking.—The rolls or shipping containers for the Army shall be marked in accordance with U. S. Army Specification 100-2; for the Navy, in accordance with the Navy Shipment Marking Handbook; and for the Air Force, in accordance with U. S. Army Specification 94-40645.

7.2.4 Ordering data.—Procurement documents should specify whether domestic or overseas packing and marking are required (see 7.2.2 and 7.2.3).

7.2.5 Inspection procedures.—For Naval purchases the general inspection procedures shall be in accordance with General Specifications for Inspection of Material.

NAVY INTEREST: S Y

This specification is a part of Section IV, Part 5, of the Federal Standard Stock Catalog.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1951

For sale by the Superintendent of Documents, Washington 25, D. C. Price 5 cents.

UU-P-147a

AMENDMENT—1
12 February 1952

FEDERAL SPECIFICATION

PAPER, BUILDING, WATERPROOFED

This amendment, which forms a part of Federal Specification UU-P-147a, dated 22 August 1951, was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

Page 1, paragraph 1.4.2: Delete and substitute:

1.4.2 *Area.*—The area of the paper in rolls shall be 250, 500, or 1,000 square feet, as specified.

Page 2, paragraph 3.5.4, line 6: Delete "100" and substitute "35".

This amendment is a part of Section IV, Part 5, of the Federal Standard Stock Catalog.

FORM—3—(Rev. 4-50)

U.S. GOVERNMENT PRINTING OFFICE: 1952

INTERIM FEDERAL SPECIFICATION

ASPHALT, PETROLEUM (BUILT-UP ROOFING, WATER-PROOFING, AND DAMP-PROOFING)

This Interim Federal Specification was developed by the General Services Administration, Federal Supply Service, Washington, D. C. 20407, based upon currently available technical information. It is recommended that Federal agencies use it in procurement and forward recommendations for changes to the preparing activity at the address shown above.

The General Services Administration has authorized Federal agencies to use this Interim Federal Specification as a valid exception to Federal Specification SS-A-666, dated June 6, 1933.

1. SCOPE AND CLASSIFICATION.

1.1 Scope. This specification covers petroleum asphalt with and without fillers.

1.2 Classification. Asphalt shall be of the following types, as specified (see 6.2):

- Type I - Mineral surfaced flat roofing.
- Type II - Unsurfaced flat roofing.
- Type III - Unsurfaced steep roofing.
- Type IV - Water-proofing, damp-proofing, below ground level, at moderate temperatures.
- Type V - Water-proofing, damp-proofing, above ground level, temperatures up to 125°F.
- Type VI - Water-proofing, damp-proofing, above ground level, vertical surfaces, above 125°F.

2. APPLICABLE SPECIFICATIONS, STANDARDS, AND OTHER PUBLICATIONS.

2.1 Specifications and standards. The following specifications and standards, of the issues in effect on date of invitation for bids, form a part of this specification to the extent specified herein:

Federal Specifications:

- PPP-D-705 - Drum: Metal Shipping, Steel (Over 12 and Under 55 Gallon).
- PPP-D-723 - Drums, Fiber.

Federal Standards:

- Fed. Std. No. 102 - Preservation, Packaging, and Packing Levels.
- Fed. Std. No. 123 - Marking for Domestic Shipment (Civilian Agencies).

(FOR INSTRUCTIONS ON OBTAINING COPIES OF FEDERAL SPECIFICATIONS AND STANDARDS, SEE LAST PAGE).

Military Standards:

- MLL-STD-129 - Marking for Shipment and Storage.

(Copies of Military specifications and standards required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other Publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

American Society for Testing and Materials:
Designation:

- D312 - Specification for Asphalt for Use in Constructing Built-Up Roof Coverings.
- D449 - Specification for Asphalt for Damp-proofing and Waterproof.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia 3, Pennsylvania.)

3. REQUIREMENTS.

3.1 Types I, II and III. Each of these types shall meet the applicable requirements of ASTM D312.

3.1.1 Types IV, V and VI. Each of these types shall meet the applicable requirements of ASTM D449.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES.

4.1 Inspection responsibility. The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract or order. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Sampling and testing. Sampling and testing, for Types I, II and III shall be in accordance with ASTM D312, for Types IV, V and VI sampling and testing shall be in accordance with ASTM D449.

4.3 Inspection of preparation for delivery. The packaging, packing and marking of the asphalt shall be inspected to determine conformance to the applicable requirements of Section 5.

5. PREPARATION FOR DELIVERY.

(For civil agency procurement the definitions and application of levels of packaging and packing shall be in accordance with Fed. Std. No. 102).

5.1 Packaging and Packing shall be level A, B or C as specified (see 6.2).

5.1.1 Level A and B. The asphalt shall be packaged and packed in quantities as specified (see 6.2) in a close-fitting fiber drum conforming to FPP-D-723, type I or II, grade C, as applicable.

5.1.1.1 Type I and II. Unless otherwise specified the asphalt shall be packaged and packed in quantities as specified (see 6.2) in a close-fitting metal drum conforming to FPP-D-705, and FPP-D-711, type I, as applicable.

5.1.2 Level C. The asphalt shall be packaged in accordance with the suppliers commercial practice and packed to insure carrier acceptance and safe delivery to destination in containers complying with the rules and regulations applicable to the mode of transportation.

5.2 Marking.

5.2.1 Civil agencies. In addition to markings required by the contract or order, the shipping containers shall be marked in accordance with Fed. Std. No. 123.

5.2.2 Military activities. In addition to markings required by the contract or order, the shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES.

6.1 Intended use. Asphalt covered by this specification is intended for use according to type as follows:

- Type I - Suitable for use where slag or gravel is used on inclines up to 3 inches per foot.
- Type II - Suitable for use where slag or gravel is not used, and where inclines do not exceed 3 inches per foot.
- Type III - Suitable for use where slag or gravel is not used, and where inclines are greater than 3 inches per foot, but not over 6 inches per foot.
- Type IV - Suitable for use below ground level under uniformly moderate temperature conditions both during the process of installation and during service.
- Type V - Suitable for use above ground level where not exposed to temperatures exceeding 125°F (52°C).
- Type VI - Suitable for use above ground level where exposed on vertical surfaces in direct sunlight or at temperatures above 125°F (52°C).

6.2 Ordering data. Purchasers should exercise any desired options offered herein, and procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type of asphalt required (1.2).
- (c) Level of packaging and packing required (5.1).

6.3 Supersession data:

<u>This Specification</u>	<u>SS-A-666</u>
Type I - - - - -	-Type I, Class A deleted Type I, Class B
Type II - - - - -	-Type II, Class A, Grade 1
Type III - - - - -	-Type II, Class B; deleted Type II, Class A, Grade 2
Type IV - - - - -	-Type III
Type V - - - - -	-Type III
Type VI - - - - -	-Type III

6.4 Transportation description. The transportation descriptions and minimum weights applicable to this commodity are:

RAIL:

MOTOR:

Military Interests:
Army - MO
Navy - SHIPS
Air Force - MOA

INSTRUCTIONS ON OBTAINING COPIES OF
FEDERAL SPECIFICATIONS AND STANDARDS

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications, Standards and Handbooks and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

(Single copies of this specification and other, product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Washington, D. C., Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, and Auburn, Wash.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications, Standards and Handbooks from established distribution points in their agencies.)

NOTICE

When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

MILITARY SPECIFICATION

ROOF-COATING; ASPHALT-BASE EMULSION

This specification was approved by the Departments of the Army, the Navy, and the Air Force for use of procurement services of the respective Departments.

1. SCOPE

1.1 This specification covers asphalt-base emulsion for roof applications.

2. APPLICABLE SPECIFICATIONS AND OTHER PUBLICATIONS

2.1 Specifications.—The following specifications, of the issue in effect on date of invitation for bids, form a part of this specification:

FEDERAL SPECIFICATIONS

SS-R-406 —Road and Paving-Materials; General Specifications (Method for Sampling and Testing).

TT-P-141 —Paint, Varnish, Lacquer, and Related Materials; Methods of Inspection, Sampling, and Testing.

TT-P-143 —Paint, Varnish, Lacquer and Related Materials; General Specification for Packaging, Packing, and Marking.

VV-L-791 —Lubricants, Liquid-Fuels, and Related Products; Methods of Inspection, Sampling, and Testing.

MILITARY SPECIFICATION

MIL-P-10380—Packaging of Paint, Varnish, Lacquer, and Related Materials (For Overseas Shipment).

U. S. ARMY SPECIFICATIONS

94-40645 —Marking; Exterior, Domestic and Export Shipment, by Contractors.

100-2 —Standard Specification for Marking Shipments by Contractors.

NAVY DEPARTMENT SPECIFICATION

General Specifications for Inspection of Material.

(Army.—Copies of specifications should be obtained from the procuring agency or as directed by that agency. Both the title and identifying number or symbol should be stipulated when requesting copies.)

(Navy.—Copies of Federal, Military, and Navy Department specifications may be obtained upon application to the Bureau of Supplies and Accounts, Navy Department, Washington 25, D. C., except that activities of the Armed Forces should make application to the Commanding Officer, Naval Supply Depot, Scotia 2, N. Y. Both the title and identifying number or symbol should be stipulated when requesting copies.)

(Air Force.—Copies of Federal and Military specifications may be obtained upon application to the Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Both the title and identifying number or symbol should be stipulated when requesting copies.)

(Marine Corps.—Copies of Federal and Military specifications may be obtained upon application to the Quartermaster General, Headquarters, U. S. Marine Corps, Navy Building, Washington 25, D. C. Both the title and identifying number or symbol should be stipulated when requesting copies.)

2.2 Other publications. — The following publications, of the issue in effect on date of invitation for bids unless otherwise indicated, form a part of this specification:

BUREAU OF SUPPLIES AND ACCOUNTS PUBLICATION

Navy Shipment Marking Handbook.

(Copies of the Navy Shipment Marking Handbook may be obtained upon application to the Bureau of Supplies and Accounts, Navy Department, Washington 25, D. C., except that activities of the Armed Forces should make application to the Commanding Officer, Naval Supply Depot, Scotia 2, N. Y.)

AMERICAN SOCIETY FOR TESTING MATERIALS SPECIFICATIONS

D 466-42 — Standard Methods of Testing Films Deposited From Bituminous Emulsions.

D 529-39T — Tentative Recommended Practice for Accelerated Weathering Test of Bituminous Materials.

(Applications for copies of American Society for Testing Materials specifications should be addressed to the American Society for Testing Materials, 1916 Race Street, Philadelphia 8, Pa.)

3. REQUIREMENTS

3.1 Description.—The emulsion shall be a homogeneous mixture of either the clay or chemical type, compounded from refined petroleum asphalt, a nonflammable dispersing agent, and mineral fillers or fibers. Petroleum or coal-tar derivatives shall not be used as solvents. The emulsion shall conform to the requirements shown in table I and to additional requirements herein specified.

3.2 Material.—Material shall be as specified herein. Material not definitely specified shall be of a good commercial quality entirely suitable for the purpose. Material shall

be free from all defects and imperfections that might affect the serviceability of the finished product.

3.3 Consistency.—The consistency shall be suitable for application by spray, brush, or mop, at temperatures above freezing, without heating or thinning, at a rate of approximately 2½ gallons per 100 square feet. The emulsion shall bond to both damp and dry surfaces.

3.4 Condition in container.—The emulsion after remaining undisturbed in the shipping container for a period of at least 48 hours, shall show no separation of water, coagulation of the asphalt base, setting, or packing that cannot be overcome by moderate stirring. The emulsion shall not become unusable when stored in the original container for a period of 2 years at temperatures between 40° F. and 160° F.

3.5 Physical properties. — The emulsion shall have the following physical properties:

3.5.1 Setting time.—Setting time shall not exceed 24 hours when tested in accordance with 4.3.2.2.

3.5.2 Ignition.—The emulsion shall show no indication of ignition when tested in accordance with 4.3.2.3.1.

3.5.3 Flow.—The emulsion shall show no evidence of sag, flow, or blistering when tested in accordance with 4.3.2.4.

TABLE I.—Composition

Requirements	Clay type		Chemical type	
	Minimum	Maximum	Minimum	Maximum
Weight per gallon (lbs.)	8.2	8.7	9.2	9.7
Non-volatile material (percent)	45.0	--	40.0	--
Water (percent) ¹	--	55.0	--	60.0
Ash, percent of non-volatile material	5.0	20.0	30.0	50.0
Non-volatile organic base	Asphalt			
Inorganic reinforcement	Mineral fibers and fillers			

¹ The percentage of water (4.3.1.3) and the percentage of volatile material (4.3.1.2) shall not differ by more than 2 percent.

ASTM - D - 1227 - 52T } Evaluation
MIL - R - 3472 - Type I
 Climate
 Type I

SL 11

SL 11

SL 11

3.5.4 Flexibility.—The emulsion shall show no evidence of cracking, flaking, or loss of adhesion when tested in accordance with 4.3.2.5.

3.5.5 Water resistance.—The emulsion shall show no evidence of blistering or appreciable re-emulsification when tested in accordance with 4.3.2.6.

3.5.6 Accelerated weathering.—The emulsion shall show no evidence of sag, alligatoring, or cracking through to the metal when tested in accordance with 4.3.2.7.

3.6 Identification and labeling.

3.6.1 Manufacturer's identification.—Each container of emulsion shall bear the manufacturer's name or trade-mark stamped, or otherwise permanently marked upon the container.

3.6.2 Labeling.—Each container of emulsion shall be stenciled or labeled on two sides, in a clear and legible manner, with the following:

**"ASPHALT-BASE ROOF-COATING DO
NOT ALLOW TO FREEZE**

During cold weather store in a closed building
at a temperature of not less than
plus 40° F."

3.7 Workmanship.—Workmanship shall be of the highest grade throughout and in accordance with good commercial practice for this type of commodity.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Sampling.—Sampling shall be in accordance with Specification SS-R-406, method 101.1.

4.2 Inspection Procedures.—For Navy purchases, the general inspection procedures shall be in accordance with General Specifications for Inspection of Material.

4.3 Inspection and tests.—The emulsion and the preparation for delivery thereof shall be given such inspection and tests as may be necessary to determine conformance with the requirements of this specification. Unless otherwise specified, tests shall be conducted at a laboratory designated by the contracting officer. (See 6.2.)

4.3.1 Composition.

4.3.1.1 Weight per gallon.—Weight per gallon shall be determined in accordance with Specification TT-P-141, Method 401.

4.3.1.2 Volatile and nonvolatile material.—The volatile and nonvolatile material shall be determined in accordance with Specification TT-P-141, Method 404.1, except that the material shall be heated for 24 hours, or until the loss of weight on successive hourly weighings is not more than 0.05 gm.

4.3.1.3 Water content.—The water content shall be determined in accordance with Specification SS-R-406, method 222.0.

4.3.1.4 Ash.—Ash shall be determined in accordance with Specification VV-L-791, method 541.2, rapid routine method for ash.

4.3.2 Physical properties.

4.3.2.1 Test panels.—Tests for setting time, resistance to direct flame, resistance to flow, and flexibility shall be conducted on coated steel panels. The panels shall be 6 inches square with a nominal thickness of not less than 0.0120 nor more than 0.0179 inch. The panels shall be capable of being bent through an arc of 180 degrees around a 1/2-inch mandrel without developing any irregularities. Panels shall be prepared for the tests in the following manner: Loose scale shall be removed by sand blasting or other appropriate means. A brass mask 6 inches square and 1/16-inch thick with a 4-inch square opening in the center shall be clamped to the panel. The panel shall be placed in a horizontal position and the opening in the mask covered

with a coating of thoroughly stirred emulsion. Excess emulsion shall be removed with a flat scraper in such a manner that a uniform coating $\frac{1}{16}$ -inch thick remains on the panel. The mask shall be removed while the panel is in the horizontal position.

4.3.2.2 Setting time.—A freshly coated panel shall be exposed in a horizontal position at a temperature of approximately 23° C. and 50 percent relative humidity. The condition of the surface shall be tested at intervals by rubbing lightly with the finger. The emulsion will be considered to have reached a firm set when such rubbing does not break or roll the surface of the coating.

4.3.2.3 Resistance to flame.

4.3.2.3.1 Ignition.—Place a small amount of the emulsion (3 to 4.5 gm) in a flat-bottomed dish on a ring stand in a horizontal position. Adjust a Bunsen or Fisher burner to a soft flame approximately 6 inches long. Hold the flame horizontally with the tip just above the edge of the dish and direct the flame across the surface of the emulsion for 10 seconds. Allow the emulsion to cool for 5 minutes, and repeat the test by applying the flame in a horizontal plane at right angles to the first position.

4.3.2.3.2 Direct flame test.—A coated panel shall be allowed to dry for 48 hours in a horizontal position at approximately 23° C. and 50 percent relative humidity, and then subjected to the blue flame of a Bunsen or Fisher burner for 10 seconds. The panel shall then be placed in a vertical position and the coating subjected to prolonged contact with the flame. After prolonged contact with the flame, not more than a few drops of oily material shall appear and the major portion of the coating shall char in place.

4.3.2.4 Resistance to flow under heat.—Resistance to flow under heat shall be determined in accordance with A.S.T.M. Standard D 466-42.

4.3.2.5 Flexibility.—A coated panel shall be allowed to dry as specified in 4.3.2.3.2 and placed in an oven for 5 hours at 60° C. plus or minus 0.5° C. Allow the panel to cool to room temperature and condition for one hour at 0° C. plus or minus 1° C. Bend the prepared panel, with the coated surface out, around a 2-inch-diameter mandrel through an arc of 180 degrees in approximately 2 seconds. Small hairline cracks that do not extend to the metal may be ignored.

4.3.2.6 Water resistance.—Water resistance shall be determined in accordance with A.S.T.M. Standard D 466-42.

4.3.2.7 Accelerated weathering test.—The accelerated weathering test shall be conducted in accordance with A.S.T.M. Standard D 529-39T, cycle A, for a total of 800 24-hour cycles. (See 6.3.)

5. PREPARATION FOR DELIVERY

5.1 Army purchases.

5.1.1 Packaging and packing for domestic shipment.

5.1.1.1 Packaging.—Commercial packaging will be acceptable.

5.1.1.2 Packing.—The roof-coating shall be packed or prepared for shipment in such a manner as to insure acceptance and safe delivery to the designated point by common or other carriers, at the lowest rate of the carrier.

5.1.2 Packaging and packing for overseas shipment.—The roof-coating shall be packaged and packed in conformance with Specification MIL-P-10880.

5.2 Air Force and Navy purchases.

5.2.1 Packaging and packing for domestic and overseas shipment.—The roof coating shall be packaged and packed in accordance with Specification TT-P-143.

5.3 Marking.

5.3.1 For identification.—Each can, drum, and box shall be marked or labeled to indicate the item and quantity contained therein, the specification number, order number, and manufacturer's name or trademark.

5.3.2 For shipment.—In addition to any special marking required by the contract or order, shipments for the Army shall be marked in accordance with Specification 100-2; for the Navy in accordance with the Navy Shipment Marking Handbook; for the Air Force in accordance with Specification 94-40645.

6. NOTES

6.1 Use.—The asphalt-base emulsion is intended for use as a protective coating for smooth-surfaced asphalt roofs having inclines of not less than $\frac{1}{4}$ -inch to the foot.

6.2 Ordering data. — Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. Location of laboratory where tests will be conducted. (See 4.3.)

c. For Army purchases whether domestic or overseas packaging and packing are required. (See 5.1.1 and 5.1.2.)

6.3 The accelerated weathering test (4.3.2.7) may be waived, at the option of the contracting officer, upon certification by the contractor that the emulsion meets the test requirements.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Custodian:

Army—Corps of Engineers

Other interest:

Army—T
Navy—YMCSHS
Air Force.

Potter
UNITED STATES ARMY

INDEX

OF

SPECIFICATIONS

(Including NME (JAN) Standards)

MONTHLY SUPPLEMENT

APRIL 1949



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DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., 30 APRIL 1949

The United States Army Index of Specifications (Including
NME (JAN) Standards) is published for the information and
guidance of all concerned.

BY ORDER OF THE SECRETARY OF THE ARMY;

OFFICIAL:

EDWARD F. WITSELL
Major General
The Adjutant General

OMAR N. BRADLEY
Chief of Staff, United States Army

U. S. ARMY SPECIFICATIONS

NEW AND REVISED SPECIFICATIONS

The following specifications were approved as U. S. Army Specifications on the dates indicated and their use, whenever applicable, is mandatory upon all procuring agencies of the Department of the Army:

TITLE	NUMBER	DATE APPROVED	CUSTODIAN	* REMARKS
		April		
Adapter, grenade projection, chemical, M2	50-50-13	19	O	N
Alidade, brass, open sight, with leather case and accessories	42.1-2A	22	E	R
Antenna coupler CU-119()/FR	71-3403	11	S	N
Bridge-model kit, training aid, floating bridges M ₁ and M ₁ A2	47-112	28	E	N
Cabinet, proofing, insulated, portable, 36-pan capacity	28-173	15	Q	N
Camera PH-150-()	75-553	1	S	N
Cap, herringbone twill, (O.D. 7)	6-326A	21	Q	R
Coated cellophane film for increment charge containers	50-11-151	14	O	N
Control switchboard SB-100()/MTC	71-3411	14	S	N
Covers, canvas, machinery trailer with equipment and oven for mobile bakery, M-1945	6-467	27	Q	N
Ditcher, plow type, 12-inch bottom, 26-inch depth	44-175	14	E	N
Engine generator PU-181()/PGC-1	71-3401	18	S	N
Enlarger PH-275-()	75-428	18	S	N
Flag, marking, laundry, 3 x 5 inches	6-461A	13	Q	R
Frequency meter TS-175()/U	71-5095	11	S	N

* N - Indicates New Specification
R - Indicates Revised Specification

NEW AND REVISED U. S. ARMY SPECIFICATIONS (CONT'D)

TITLE	NUMBER	DATE APPROVED	CUSTODIAN	REMARKS
Hydrometer TS-386/U	70-501	April 28	S	N
Ladders, berth, aluminum, 5-rung, adjustable	65-50	22	T	N
Mine, anti-personnel, M2A1, metal parts	50-86-9	14	O	N
Overshoes, arctic, women's, all rubber, lace type	20-137A	21	Q	R
Packaging and packing of machines, computing, desk type and portable type with carrying case, motor driven and hand operated	100-83	26	Q	N
Packaging and packing of organ, electronic in re-useable shipping containers	100-82	1	Q	N
Pocket, cartridge, caliber .30 M-1, carbine or rifle	6-474	14	Q	N
Press, drill, radial type, 11 inch column, 4-foot arm, motor-driven, 5-HP., 208-volt, 60-cycle, 3-phase	56-20-7	26	E	N
Radio set SCR-281-() (components for)	71-3402	19	S	N
Radiosonde AN/AMT-2()	74-124	6	S	N
Reader PH-608()/PPF	75-554	20	S	N
Roller, road, towed-type, sheeps-foot, single-drum, with removable feet	44-172	22	E	N
Saw, table, tilted-type, portable, gasoline-driven, skid-mounted, 16-inch-blade	56-80-10	20	E	N
Shell, fixed, HE, M48 for 75 MM guns M42A1 for 76 MM guns M71 for 90 MM guns and shell, semi-fixed, HE, M48 for 75 MM howitzers M1 for 105 MM howitzers assembling, marking and packing	50-21-41	14	O	N

24-45083

NEW AND REVISED U. S. ARMY SPECIFICATIONS (CONT'D)

TITLE	NUMBER	DATE APPROVED	CUSTO- DIAN	REMARKS
Stove, yukon, liquid fuel, complete	28-174	April 13	Q	N
Thermometer ML-352/UM	74-129	19	S	N
Trough, dough, for mobile bakery, M-1945	28-172	15	Q	N
Wavemeter FR-39()/U	71-3379	19	S	N
Truck, 5-ton, 4 x 2, coal-delivery, conveyor-type	91-203	14	E	N

ERRATA:

Changes indicated below should be made in the United States Army Index of Specifications, January 1949:

Delete the following specifications:

Page 117 - Gypsum; calcined SS-C-901

List the following specifications:

Page 270 - 4-1126 Sulfadiazine Tablets, 7.7 grains M

Pages 57 and 286 - 10-2379 Clamp, Adjustable M

U. S. ARMY SPECIFICATIONS

CANCELLATIONS

The following U. S. Army Specifications have been canceled and their use by all procuring agencies of the Department of the Army will be discontinued:

TITLE	NUMBER	DATE CANCELED	CUSTO- DIAN	REMARKS
Album, photographic type A-3 (loose-leaf)	75-266	March 29	A	Not required
Amboceptor paper cutter	10-2043A	April 29	M	Not required
Apparatus, anesthesia	10-2835	29	M	Not required
Binder, medical history	1-38	22	M	Not required
Carrier, combat gas mask, M7	97-53-31	11	C	Not required
Cane, walking	10-2529	21	M	Sup. by Fed. Spec. GG-P-598
Clamps, rubber dam	10-2629	22	M	Sup. by Fed. Spec. GG-I-526
Grate for lanterns	10-2488	20	M	Not required
Desciccator, Scheibler	10-2248A	29	M	Not required
Excavators, dental	10-2433B	20	M	Sup. by Fed. Spec. GG-I-526
Flask, with cup	10-2511A	19	M	Not required
Forceps, tooth extracting	10-2129B	20	M	Sup. by Fed. Spec. GG-I-526
Glass PH-162	75-547	29	S	Sup. by Fed. Spec. GG-Q-391
Harness, head, C4	97-51-258	11	C	Not required
Hose, coolant system, reclaimed and synthetic rubber	20-118A	29	O	Sup. by Fed. Spec. ZZ-H-428
Irons, caulking, set of 3, numbers 1, 2, and 3 crease	17-146	14	E	Sup. by Fed. Spec. OGG-I-671

U. S. ARMY SPECIFICATIONS CANCELED (CONT'D)

TITLE	NUMBER	DATE CANCELED	CUSTO- DIAN	REMARKS
Kit, first aid, aeronautic, empty	6-274	April 14	M	Sup. by JAN-K-303
Lantern, muscle test	10-2758	21	M	Sup. by Fed. Spec. GG-L-112
Parka, fur (Alaskan clothing)	21-1	8	Q	Not required
Points, carborundum, mounted, for dental handpiece	10-2862A	21	M	Sup. by Fed. Spec. GG-P-598
Scalers	10-2596A	12	M	Sup. by Fed. Spec. GG-I-526
Spoon, metal (for typhoid-carrier examination)	10-2005C	26	M	Not required
Suiting, olive drab, 20-ounce	85-39A	1	Q	Not required
Tubes, glass, 15 CC, for centrifuge (graduated and ungraduated)	10-2259A	29	M	Sup. by Navy Spec. 57T10
Unit, operating, dental	10-2965A	29	M	Not required
Urinalysis set	10-2498	20	M	Not required
Wax, crown, dental	4-1103A	19	M	Sup. by Fed. Spec. U-W-119

28-45083ABC0

NATIONAL MILITARY ESTABLISHMENT SPECIFICATIONS

NEW AND REVISED SPECIFICATIONS

The following specifications were approved as National Military Establishment Specifications on the dates indicated and their use, wherever applicable, is mandatory upon all procuring agencies of the Department of the Army; printed copies are expected to be available in approximately 45 days:

TITLE	SYMBOL	DATE APPROVED	ARMY CUSTODIAN	SUPERSEDED
Apples, dehydrated	JAN-A-1035	April 29	Q	QM Tent. CQD 78D
Beans, with frankfurter chunks, in tomato sauce, canned	JAN-B-1065	13	Q	QM Tent. CQD 300A
Beef, boneless, frozen	JAN-B-760	21	Q	QM Tent. CQD 11M
Beef and pork loaf, canned, nonfat dry milk solids added	JAN-B-753	21	Q	QM Tent. CQD 374
Camouflage-cloth, impregnated, flame-resistant	JAN-C-765	29	E	USA 39-13 CE Tent. T-1213C
Caskets, burial, metal, with shipping case (current death type)	JAN-C-756	7	Q	Pur. Des. 69
Clinometers, service	JAN-C-759	18	E	USA 42-13A
Coating, fire-resistant (for woven cotton matting)	JAN-C-755	13	E	- - -
Coffee, soluble product	JAN-C-1019	21	Q	QM Tent. CQD 322A
Compound, leather dressing, preservative, for field treatment	JAN-C-1063	11	Q	USA 92-61
Container, decoration, plastic	JAN-C-1061	5	Q	USA 34-29
Compound, water-repellent, textile finish	JAN-C-1068	18	Q	QM Tent. PQD 115D
Crushing-and-screening-plant, two-unit, gasoline-engine-driven, semitrailer-mounted	JAN-C-764	29	E	USA 44-92
Egg and egg products, frozen	JAN-E-1037	29	Q	QM Tent. CQD 169B

NATIONAL MILITARY ESTABLISHMENT SPECIFICATIONS (CONT'D)

TITLE	SYMBOL	DATE APPROVED	ARMY CUSTODIAN	SUPERSEDED
		April		
Film, test, 16-MM, target (for determining picture unsteadiness of motion picture projectors)	JAN-F-766	29	S	- - -
Film, test, 16-MM, warble frequency (for determining acoustical response)	JAN-F-767	29	S	- - -
Grape beverage crystals, synthetic	JAN-G-1067	13	Q	QM Tent. CQD 142B
Ham chunks, canned	JAN-H-1021	25	Q	QM Tent. CQD 190C
Ham and eggs, chopped, canned	JAN-H-1038	29	Q	QM Tent. CQD 375A
Hammers, pneumatic, riveting	JAN-H-754	13	E	CE Tent. T-1815
Insecticide, DDT powder, water-dispersible	JAN-I-1064	13	Q	USA 4-114
Ladders, chain (shipboard use)	JAN-L-221A	29	T	JAN-L-221
Lead stearate (for use in ammunition)	JAN-L-758	15	O	OD Tent. PKS-1272
Lead styphmate, normal	JAN-L-757	13	O	OD Tent. PKS-1282
Lemon juice powder, synthetic	JAN-L-1066	13	Q	QM Tent. Spec. CQD 43C
Meat cuts and sausage products, fresh, chilled, or frozen: Packaging and packing for domestic and overseas shipment	JAN-M-1018	25	Q	QM Tent. CQD 348
Meat and noodles, canned	JAN-M-1025	25	Q	QM Tent. CQD 199B
Methyl bromide	JAN-M-1060	5	Q	USA 4-112
Nets, camouflage, cotton-twine, garnished with fabric	JAN-N-763	29	E	USA 39-20A
Orange juice powder, synthetic	JAN-O-1026	25	Q	QM Tent. CQD 165B

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NATIONAL MILITARY ESTABLISHMENT SPECIFICATIONS (CONT'D)

TITLE	SYMBOL	DATE APPROVED	ARMY CUSTODIAN	SUPERSEDED
		April		
Packaging and packing for overseas shipment, graders, road	JAN-P-762	22	E	CE Tent. T-2486
Powder, propellant; cartridge, grenade carbine, caliber .30, M6 and M7	JAN-P-761	21	O	OD Tent. FKS-892
Shortening, coconut oil	JAN-S-1023	11	Q	QM Tent. CQD 378
Sirup, chocolate and chocolate-flavored	JAN-S-1062	11	Q	QM Tent. CQD 369A
Stew, meat and vegetable, canned	JAN-S-1030	25	Q	QM Tent. CQD 8D
Truck, 5-ton, 6x6, chassis, M39 truck, 5-ton, 6 x 6, chassis, M40 truck, 5-ton, 6x6, cargo, M41	JAN-T-740	13	O	---

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FEDERAL SPECIFICATIONS

The following Federal Specifications and Amendments for use of all departments and establishments of the Government were promulgated by the Director of Procurement, Treasury Department and their use, whenever applicable, is mandatory upon all procuring agencies of the Department of the Army:

FEDERAL SPECIFICATIONS PROMULGATED

TITLE	SYMBOL	EFFECTIVE DATE	REMARKS
Amyl alcohol; secondary (for use in organic coatings)	TT-A-516	15 May 1949	N
Buckram; cotton	CCC-B-751	28 Apr 1949	N
Canes; walking	LLL-C-83	18 Apr 1949	N
Chipboard; Plain	UU-G-282	15 Apr 1949	N
Chocolate and sweet chocolate	JJJ-G-271a	1 May 1949	R
Ink; writing, blue, alkaline (non corrosive)	TT-I-566	1 May 1949	N
Isopropyl acetate (for use in organic coatings)	TT-I-721	1 May 1949	N
Lanterns; muscle-test, optical	GG-L-112	1 May 1949	N
Lubricants, liquid fuels, and related products; methods of sampling and testing	VV-L-791d	18 Apr 1949	R
Pads; stamp	TT-P-16a	18 Apr 1949	R
Paper; bread-wrapping, waxed, self-sealing	UU-P-134	15 Apr 1949	N
Sheeting; cotton, unbleached, narrow	CCC-S-281a	18 Apr 1949	R
Wire, steel (carbon); hard-drawn, spring and zinc-coated high strength	QQ-W-465a	1 May 1949	R

FEDERAL SPECIFICATIONS AMENDED

TITLE	SYMBOL	EFFECTIVE DATE	AMENDMENT NUMBER
Brushes; sweeping, floor	H-B-651a	15 Apr 1949	1
Chrome-green; pure, dry (paint-pigment)	TT-C-235	15 Apr 1949	2
Envelopes, leather; slide-fastener	KK-E-561a	15 Apr 1949	1
Glasses, gage; flat (plain and reflex), (for pressures 125 pounds and over)	DD-G-491	15 Apr 1949	1
Milk; evaporated	C-M-371a	15 Apr 1949	1
Oakum; marine	T-O-56	15 Apr 1949	1
Oil; fuel (for oil burners)	VV-O-326	1 May 1949	3
Oil; linseed, boiled (for use in organic coatings)	TT-O-364	1 May 1949	1

FEDERAL SPECIFICATIONS

CANCELED

TITLE	SYMBOL	REMARKS
Brushes, paint; metal-bound, flat (high-grade)	H-B-421	Sup. by Fed. Spec. H-B-420
Brushes, paint; metal-bound, flat (medium-grade)	H-B-431	Sup. by Fed. Spec. H-B-420
Brushes, paint; metal-bound, flat (utility-wall)	H-B-436	Sup. by Fed. Spec. H-B-420
Melons (honey-dew, honey-ball, persian, or casaba); fresh	Y-M-211	Sup. by Fed. Specs. Y-M-210 and Y-M-212

UNITED STATES ARMY
INDEX
OF
SPECIFICATIONS
(Including NME (JAN) Standards)
MONTHLY SUPPLEMENT

MARCH 1949



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DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., 31 March 1949

The United States Army Index of Specifications (Including NME (JAN) Standards) is published for the information and guidance of all concerned.

BY ORDER OF THE SECRETARY OF THE ARMY:

OFFICIAL:

EDWARD F. WITSELL
Major General

The Adjutant General

OMAR N. BRADLEY

Chief of Staff, United States Army

U. S. ARMY SPECIFICATIONS

NEW AND REVISED SPECIFICATIONS

The following specifications were approved as U. S. Army Specifications on the dates indicated and their use, whenever applicable, is mandatory upon all procuring agencies of the Department of the Army:

TITLE	NUMBER	DATE APPROVED	CUSTODIAN	REMARKS
Amplifier AM-92()/TI	71-3390	March 7	S	N
Analyzer ZM-3()/U	71-3388	18	S	N
Antenna junction box J-346/FRE-12X RF cable assembly CG-561/U and RF cable assembly CG-562/U	71-3395	9	S	N
Antenna support AB-105()/FRG	69-45	9	S	N
Barge, deck or liquid cargo, non-propelled, steel, 578-ton or 4,160-bbl., 120', design 231B	65-28	21	T	N
Barge, dry cargo, steel, 130', design 267	65-48	28	T	N
Barge, gasoline, non-propelled, steel, 13,000 barrels, 235 foot, design 7004	65-47	28	T	N
Box, ammunition 40MM, M14	51-29-7	8	O	N
Car, railway, hopper, 56½-inch gauge, 50-ton, 8-wheel (riveted)	43-28	18	T	N
Car, railway, hopper, 56½-inch gauge, 50-ton, 8-wheel (welded)	43-55	18	T	N
Car, railway, tank, ICG-103-W, 56½-inch gauge, 10,000-gallon, 8-wheel (welded)	43-27A	24	T	R
Case PH-318	75-552	7	S	N
Crystal rectifier test set TS-268()/U	71-2512	11	S	N

* N - Indicates New Specification
R - Indicates Revised Specification

NEW AND REVISED U. S. ARMY SPECIFICATIONS (CONT'D)

TITLE	NUMBER	DATE APPROVED	CUSTODIAN	REMARKS
Detector set AN/PRS-3()	71-3396	March 3	S	N
Developing tank PH-594/FFQ	75-551	3	S	N
Electrodes, welding; covered, bronze (for joining)	57-203-14	28	O	N
Exciter unit O-5()/FR	71-3394	11	S	N
Fids, hand	65-49	28	T	N
Film slide adapter PH-640()/FFP	75-555	28	S	N
Frequency meter set I-129-() (absorption type)	71-1388B	7	S	R
Fuze, rocket, base detonating, M404 metal parts for	50-97-2	7	O	N
Gaskets, rubber, for cartridge storage cases, smokeless powder boxes and tanks	50-11-83A	7	O	R
Harness, man, two-trace-type	6-475	22	Q	N
Heater PH-418-()	75-544	1	S	N
Igniter, electric, M12	50-49-2	7	O	N
Kit; photographic water supply, type O-2	75-389A	February 17	A	R
Lamp, electric, warning, red, with blinker device, vehicle, 6-volt	91-200	March 3	E	N
Lathe, engine, motor-driven, 5-HP., 208-volt, 60-cycle, 3-phase, 16-inch by 54-inch capacity, tool-room type, quick-change gears	56-65-9	25	E	N
Lighting equipment; aircraft, installation of general specification for	94-32265F	11	A	R
Mask, cheek protector, arctic	6-473	31	Q	N
Meter test equipment AN/GSM-1() (components of)	71-1689A	18	S	R
Mine cases, and buoys, steel, submarine mine	89-2951	16	O	N

NEW AND REVISED U. S. ARMY SPECIFICATIONS (CONT'D)

TITLE	NUMBER	DATE APPROVED	CUSTO- DIAN	REMARKS
Packaging and packing of range, field, M-1937 pack A and pack B	100-84	March 23	Q	N
Primer, gasoline-engine, hand- operated, displacement-pump type	90-24	3	E	N
Public address set AN/UIQ-1() (principal components for)	71-3192A	7	S	R
Rack MT-452()/F, MT-453()/F and MT-693()/FRR-12X	69-19	9	S	N
Radio frequency wattmeter TS-118() /AP	71-5088	29	S	N
Radio transmitting set AN/SRT-10() (components for)	69-2	1	S	N
Radio transmitter T-171()/FR and antenna tuner TN-171()/FRT	71-3398	14	S	N
Recorder-reproducer AN/GNQ-4() (components of)	71-3367	7	S	N
Regulator; voltage, direct current generator, 26-30 volt, type P-1	94-32276D	February 25	A	R
RF amplifier AM-333()/FRT	71-3400	March 31	S	N
Signal generator TS-465()/U	71-3386	18	S	N
Sling, pallet type, wire rope	66-4	2	T	N
Soap, liquid, antiseptic	35-17	4	Q	N
Standard oscillator TS-221/TSM	71-3393	29	S	N
Telegraph switchboard SB-6()/GG	71-3397	29	S	N
Tent, shelter half, new type	6-476	23	Q	N
Test set I-49-()	71-110E	29	S	R
Test TS-190()/U	71-3377	7	S	N
Truck, 2-1/2-ton, earth borer and pole setter V-18()/MTQ	91-165A	7	S	R
Vessel, supply, diesel, steel 176 foot, design 381	65-39	24	T	N

U. S. ARMY SPECIFICATIONS

CANCELLATIONS

The following U. S. Army Specifications have been canceled and their use by all procuring agencies of the Department of the Army will be discontinued:

TITLE	NUMBER	DATE CANCELED	CUSTO- DIAN	REMARKS
		March		
Boiler, steam, hospital (cooking and sterilizing)	84-44	8	M	Not required
Cover, insulating, for airplane smoke tank M40	96-31-69	18	C	Not required
Mask, gas, noncombatant, M1A3-I-I	97-51-231	25	C	Not required
Mask, gas, noncombatant, M2-2-I (small child size)	97-51-213	25	C	Not required
Mask, gas, noncombatant, small child, M2A-2-I	97-51-235	22	C	Not required
Tank, airplane smoke, M40	96-31-67	17	C	Not required

NATIONAL MILITARY ESTABLISHMENT SPECIFICATIONS

NEW AND REVISED SPECIFICATIONS

The following specifications were approved as National Military Establishment Specifications on the dates indicated and their use, wherever applicable, is mandatory upon all procuring agencies of the Department of the Army; printed copies are expected to be available in approximately 45 days:

TITLE	SYMBOL	DATE APPROVED	ARMY CUSTODIAN	SUPERSEDED
Bats, baseball	JAN-B-1000	March 21	Q	QM Tent. JQD 639B
Bats, softball	JAN-B-1001	21	Q	QM Tent. JQD 644B
Beans, baked; dehydrated	JAN-B-1039	25	Q	QM Tent. CQD 90
Beef, tenderloin	JAN-B-1040	25	Q	QM Tent. CQD 351
Beverage pack, aid station	JAN-B-1041	24	Q	QM Tent. CQD 347
Boots, leather, laced, logger type, with-calks	JAN-B-1004	21	Q	QM Tent. BQD 249
Cables, electrode, with lug (for arc-welding)	JAN-C-741	8	E	—
Cap, canteen, chain-and-gasket assembled	JAN-C-1052	28	Q	USA 28-1144A
Cap, wool, knit, M-1941	JAN-C-1005	21	Q	QM Tent. PQD 87B
Cartridge, grenade, rifle and carbine	JAN-C-746	30	O	USA 50-1-36 and 50-1-38
Cartridge, small arms, high pressure test	JAN-C-743	14	O	USA 50-4-6B, 50-1-32, 50-1-5A and 50-2-5
Carton, ice cream, 1/2-pint	JAN-C-1042	24	Q	QM Tent. CQD 373
Cereal, pre-mixed (with sugar and dry milk)	JAN-C-1045	24	Q	QM Tent. CQD 92
Cheese; dehydrated, process, bulk	JAN-C-1047	24	Q	QM Tent. CQD 26A

NATIONAL MILITARY ESTABLISHMENT SPECIFICATIONS (CONT'D)

TITLE	SYMBOL	DATE APPROVED	CUSTODIAN	SUPERSEDED
Chicken or turkey, boned, canned	JAN-C-1058	March 31	Q	QM Tent. CQD 34E
Cleaning-compound, spark-plug, ceramic	JAN-C-744	17	A	OD Tent. AXS-1234 and AN-C-61A
Compound, germicidal rinse	JAN-C-1054	28	Q	QM Tent. JCQD 1013
Compound, hardening, mortuary	JAN-C-1009	21	Q	USA 35-7
Cookie, oatmeal, chocolate chip	JAN-C-1029	24	Q	QM Tent. CQD 401
Cookie, sandwich	JAN-C-1043	23	Q	QM Tent. CQD 321A
Cream, massage, embalming	JAN-C-1011	22	Q	USA 35-16
Cream, pasteurized, for reconsti- tuted milk	JAN-C-1036	23	Q	QM Tent. CQD 136
Film, test, 16-MM, 7000 cycle (for determining azimuth error)	JAN-F-752	31	S	—
Film, test, 16-MM, 1000 cycle (for determining uniformity of scanning beam illumination)	JAN-F-751	31	S	—
Fluid, embalming, arterial	JAN-F-1006	21	Q	USA 35-8
Fluid, fingerprint detector (16 ounce with 24 acetate sheets)	JAN-F-1016	22	Q	QM Fur. Des. 56B
Food packet, individual, assault, IA-1	JAN-F-1034	24	Q	QM Tent. CQD 404
Glass, fibrous, board and stripping tape, hard-surface (heat-insula- tion)	JAN-G-742	7	T	N.D. 32G8(INT)
Gloves, cotton, dress, women's	JAN-G-1007	21	Q	QM Tent. PQD 464
Gloves, cotton, protective	JAN-G-1057	30	Q	QM Tent. PQD 41E
Gloves, leather, tan, officers	JAN-G-1017	22	Q	QM Tent. CQD 204
Gloves, women's, work, cotton	JAN-G-1008	21	Q	QM Tent. PQD 212A

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NATIONAL MILITARY ESTABLISHMENT SPECIFICATIONS (CONT'D)

TITLE	SYMBOL	DATE APPROVED	ARMY CUSTODIAN	SUPERSEDED
Hamburgers, canned	JAN-H-1048	March 25	Q	QM Tent. CQD 309C
Hash, corned beef, canned	JAN-H-750	31	Q	QM Tent. CQD 149B
Keeper, slide, plastic, ball type	JAN-K-1051	28	Q	USA 61-54
Key, can unattached	JAN-K-1027	25	Q	QM Tent. CQD 10A
Lard, service style	JAN-L-1059	31	Q	QM Tent. CQD 39C
Lead, pile driving, steel, pendulum, skid-mounted	JAN-L-747	30	E	CE Tent. T-2240
Meringue-powder	JAN-M-748	31	Q	—
Milk; pasteurized (reconstituted, blended, and standardized with reconstituted skim milk)	JAN-M-1022	25	Q	QM Tent. CQD 137A
Moisture-resistance-test, for material items used in electronic communication, and electrical equipment	JAN-M-745	22	S	—
Oil, neat's foot, sulphomated	JAN-O-1056	30	Q	QM Tent. BQD 256
Oil, solubilized (for reconditioning leather)	JAN-O-1055	28	Q	QM Tent. BQD 262
Paper, music writing	JAN-P-1014	22	Q	QM Tent. FQD 505
Pipe, culvert, iron or steel, nestable (for overseas use)	JAN-P-236A	7	E	JAN-P-236, USA 44-102 and Navy 44F17
Pork roll	JAN-P-1020	25	Q	QM Tent. CQD 146
Pouch, first-aid-packet, leather	JAN-P-1002	21	Q	QM Tent. JQD 779
Primers, percussion (for small arms ammunition)	JAN-P-749	31	O	USA 50-1-3B, 50-2-3B, 50-4-2B and FXS-430(Rev. 1)

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NATIONAL MILITARY ESTABLISHMENT SPECIFICATIONS (CONT'D)

TITLE	SYMBOL	DATE APPROVED	ARMY CUSTOMER	SUPERSEDED
Ration, parachute, emergency	JAN-R-1024	March 24	Q	QM Tent. CQD 302A
Scabbard, leather, carbine, caliber .30, M-1	JAN-S-1012	22	Q	QM Tent. JQD 193B
Sealer, liquid, embalming	JAN-S-1010	22	Q	USA 35-15
Shoes, field, women's	JAN-S-1013	22	Q	QM Tent. BQD 89B
Soup, noodle, with chicken; dehydrated	JAN-S-1019	25	Q	QM Tent. CQD 352A
Spreads for bread	JAN-S-1032	25	Q	QM Tent. CQD 32G
Sugar; granulated, compressed	JAN-S-1028	30	Q	QM Tent. CQD 245
Thong, emergency	JAN-T-1003	21	Q	QM Tent. BQD 248
Tomato juice cocktail; dehydrated	JAN-T-1031	25	Q	QM Tent. CQD 79A
Tongues, pork; canned	JAN-T-1033	24	Q	QM Tent. CQD 339
Wax, plastic, derma surgery	JAN-W-1015	22	Q	QM Pur. Des. 75
Whistle, thunderer (plastic)	JAN-W-1053	28	Q	USA 61-53

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FEDERAL SPECIFICATIONS

The following Federal Specifications and Amendments for use of all departments and establishments of the Government were promulgated by the Director of Procurement, Treasury Department and their use, whenever applicable, is mandatory upon all procuring agencies of the Department of the Army:

FEDERAL SPECIFICATIONS PROMULGATED

TITLE	SYMBOL	EFFECTIVE DATE	REMARKS
Amyl acetate (for use in organic coatings)	TT-A-511	1 Mar. 1949	N
Butyl acetate; secondary (for use in organic coatings)	TT-B-840	15 Mar. 1949	N
Carriages, dressing; surgical	AA-C-112	1 Apr. 1949	N
Governors, gasoline-engine; centrifugal velocity, and air-vane	F-G-621	15 Mar. 1949	N
Insulation, mineral-wool; blanket, felt, and industrial-Batt (for heated surfaces)	HH-I-563	15 Mar. 1949	N
Melons, Casaba and Persian type; fresh	Y-M-212	1 Apr. 1949	Sup. part of Y-M-211
Paint, varnish, lacquer, and related materials; methods of inspection, sampling, and testing	TT-P-141b	25 Mar. 1949	R
Points, silicon-carbide; dental	GG-P-598	15 Mar. 1949	N
Red squill powder	O-R-171	15 Apr. 1949	N
Rodenticide; fumigant dust (42 percent calcium cyanide dust)	O-R-501	15 Apr. 1949	N
Shallots; green, bunched	HHH-S-256	1 Apr. 1949	Sup. part of HHH-O-541
Tacks; map and marking	FF-T-51	1 Apr. 1949	N
Transits, one-minute; and transit tripods	GG-T-621	15 Mar. 1949	N

FEDERAL SPECIFICATIONS AMENDED

TITLE	SYMBOL	EFFECTIVE DATE	AMENDMENT NUMBER
Cards; guide, card-size	UU-C-76b	15 Apr. 1949	1
Insulation, building, mineral-wool; Batts, loose-fill, and granular-fill	HH-I-521c	15 Mar. 1949	1
Leather and leather products; general specifications (methods of sampling, inspection, and tests)	KK-L-311	15 Mar. 1949	3
Motors; alternating-current, fractional-horsepower, single-phase and universal	CC-M-636	1 Mar. 1949	2
Paper; computing-machine	UU-P-185a	15 Apr. 1949	1
Paper; duplicator, liquid process	UU-P-231	15 Mar. 1949	1
Paper; manifold	UU-P-328b	15 Apr. 1949	1

FEDERAL SPECIFICATIONS

CANCELED

TITLE	SYMBOL	REMARKS
Onions or shallots; green, bunched	HHH-O-541	Sup. by Fed. Specs. HHH-O-533 and HHH-S-256

October 22, 1954

INTERIM FEDERAL SPECIFICATION
FOR
SHINGLES, ASPHALT, MINERAL SURFACED, THICK-BUTT

(This Interim Federal Specification has been developed by the National Bureau of Standards, Building Technology Division, based upon currently available technical information, but has not been approved for promulgation as a regular Federal Specification. It is subject to modification, and, pending its promulgation as a regular Federal Specification, may be used in procurement.)

1. SCOPE AND CLASSIFICATION

1.1 Scope.-- This specification covers asphalt shingles of the thick-butt type.

1.2 Style.-- Shingles shall be of the square-butt style, intended for a maximum exposure of five inches.

2. APPLICABLE SPECIFICATIONS AND OTHER PUBLICATIONS.

2.1 Specifications.-- There are no other specifications applicable to this specification except those referenced in section 7 by individual departments.

2.2 Other publications.-- The following publications of the issues in effect on date of invitation for bids, form a part of this specification.

ASTM Designation D228 Tentative Methods of Testing Asphalt Roll Roofing, Cap Sheets, and Shingles.

ASTM Designation A239 Standard Method of Test for Uniformity of Coating by the Preace Test (Copper Sulfate dip) on Zinc Coated (Galvanized) Iron or Steel Articles.

Underwriters Laboratories, Inc. List of Inspected Fire Protection Equipment and Materials

GENERAL SERVICES ADMINISTRATION
Business Service Center
1114 Commerce St., Dallas, Texas

(Activities outside the Federal Government may obtain copies of Federal Specifications and Standards as outlined under "General Information" in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the GSA Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, Seattle, and Washington, D. C.

(Federal Government activities may obtain copies of Federal Specifications and Standards and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

ASTM Designations D-228 and A-239 are published by the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. List of Inspected Fire Protection Equipment and Materials is published by the Underwriters' Laboratories, Inc., 207 E. Ohio Street, Chicago 11, Illinois.

3. REQUIREMENTS

3.1. Qualitative requirements.

3.1.1 Fabrication.-- The shingles shall be composed of roofing felt made of organic fibers, saturated with asphalt and coated on both sides with asphaltic compounds that may include mineral stabilizers. They shall be surfaced on the weather side with mineral granules. The reverse side of the shingle may be dusted with talc, mica or any suitable surfacing material that will prevent sticking in the package.

3.1.2 Thick-butt portion.-- The weather surface of the shingle, extending from the lower edge of the exposure tab to a distance of not less than 6 in., shall be coated with a greater amount of asphaltic material than that used on the remaining portion. The mineral surfacing granules shall be applied uniformly over the entire surface and shall be embedded firmly in the asphaltic coating.

3.1.3 Non-weather surface finish.— The remainder of the weather side shall be uniformly coated and surfaced with mineral granules. The mineral granules on the non-weather surface may be of a type different from those on the weather surface.

3.2 Quantitative requirements.— The shingles shall meet the quantitative requirements specified in Table 1.

TABLE 1. QUANTITATIVE REQUIREMENTS

	Min.	Max.
Behavior on heating at 176°F (80°C) for 2 hrs:		
Loss, Percent		1.5
Slippage of coating, Inch		1/16
Weight of total area of shingle per 100 sq. ft., pounds	80	
Weight of thick-butt portion per 100 sq. ft., pounds		1.5
Weight of thin portion of shingle per 100 sq. ft., pounds		1.5
Weight of moisture-free desaturated felt per 100 sq. ft., pounds		1.5
Saturation of felt, percent		1.5
Ash of moisture-free desaturated felt, percent		1.5
Weight of coating material on weather side of thick-butt portion per 100 sq. ft., pounds		1.5
Weight of coating material on unexposed weather side per 100 sq. ft., pounds	10	

	Min.	Max.
Mineral stabilizer in coating passing a No. 100 (149 micron) sieve, including mineral surfacing material passing a No. 100 sieve, percent by weight	—	50
Weight of mineral matter passing a No. 6 (3360 micron) sieve and retained on a No. 100 (149 micron) sieve on the weather side of the thick-butt portion per 100 sq. ft., pounds	28	—
Weight of mineral matter passing a No. 6 (3360 micron) sieve and retained on a No. 100 (149 micron) sieve on the un-exposed weather side per 100 sq. ft., pounds	14	—

3.3 Nails.— To be purchased separately.

3.3.1 Dimensions.— Zinc-coated nails for applying shingles to nominal 1-inch wood sheathing shall be not less than 1 3/4 in. in length with a head not less than 5/16 in. in diameter. The shank shall have a cross section not greater than No. 10 gauge wire (0.135 in.) and not less than No. 12 gauge wire (0.105 in.). If barbed, the barbing should not increase the diameter of the shank more than 0.01 in. If square and twisted (spiral), the cross-sectional area shall be equivalent to that specified above. The lower end of the shank shall be pointed.

3.3.2 Protective coating.— Nails shall be galvanized or sherardized, and shall resist four 1-minute dips in a copper sulfate solution when tested in accordance with the Standard Method of Test for Uniformity of Coating by the Potassium Test (Copper Sulfate dip) on Zinc Coated (Galvanized) Iron or Steel Articles (ASTM Designation A239) of the American Society for Testing Materials.

3.3.3 Alternates.-- Other non-corrosive nails conforming to the above dimensions may be used. For application over plywood the length of the nails should be shortened to conform to the thickness of the plywood used.

3.4 Fire and Casualty Hazards.

3.4.1 The contractor shall submit proof to the purchasing agency that the material he furnishes under this specification conforms to the requirements of the Underwriters' Laboratories, Inc., regarding fire and casualty hazards. The label (class C), listing, marker, or certified report of the Underwriters' Laboratories, Inc., will be accepted as evidence of compliance with this requirement.

3.4.2 In lieu of Underwriters' Laboratories evidence, the contractor may submit evidence from other sources that his material conforms to Underwriters' Laboratories requirements. The acceptance or rejection of such proof of conformance shall be decided by the purchasing agency.

3.4.3 Compliance with the Underwriters' Laboratories requirements regarding fire and casualty hazards does not absolve the contractor from complete compliance with the requirements of this specification in order to secure the acceptance of his material. In the event of differences between any of the requirements of this specification and those of Underwriters' Laboratories, Inc., the requirements of this specification shall govern.

4. SAMPLING, INSPECTION AND TESTS.

4.1 Sampling, inspection and tests shall be performed in accordance with Tentative Methods of Testing Asphalt Roll Roofing, Cap Sheets and Shingles, ASTM Designation D228.

5. PREPARATION FOR DELIVERY.

5.1 Packaging.-- Unless otherwise specified, commercial packages are acceptable under this specification.

5.2 Packing.-- The subject commodity shall be prepared for shipment to permit acceptance by carrier for transportation at the lowest applicable rate, and to afford maximum protection from normal hazards of transportation.

5.3 Marking.-- Unless otherwise specified, shipping containers shall be marked with the name of the commodity, style, and quantity contained therein, as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order.

6. NOTES.

6.1 Ordering data.-- Purchaser should specify the style of shingle and should exercise any desired options offered herein. (See 1, 2, 3.3, 3.3.1, 3.3.2, 3.3.3, 5.1, 5.3).

6.2 It is believed that this specification adequately describes the characteristics necessary to secure the desired material and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

6.3 Federal specifications do not include all types, classes, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the type, classes, etc., which are suitable for Federal Government requirements.

PATENT NOTICE: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawing, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the manufacture, use or sell any patented invention that may in any way be related thereto.

7. DEPARTMENTAL REQUIREMENTS

7.1 The following specifications and other publications, of the issue in effect on date of invitation for bids and special

requirements, form a part of this specification for purchases made under this specification by the respective departments.

7.2 Army - (To be supplied).

7.3 Navy - (To be supplied).

7.4 Air Force - (To be supplied).

SS-S-346

JANUARY 3, 1945

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

SIDING; CEMENT-ASBESTOS

This specification was approved on the above date by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than March 15, 1945. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE SPECIFICATION.

A-1. The following Federal Specification of the issue in effect on date of invitation for bids shall form a part of this specification
FF-N-101. Nails; spikes; staples; and tacks.

B. TYPES.

B-1. This specification covers cement-asbestos siding of two types, as specified in the invitation for bids:

Type I. Shingles.

Type II. Clapboards.

C. MATERIAL AND WORKMANSHIP.

C-1. Each unit shall be composed of a uniform mixture of portland cement and asbestos fiber, with or without the addition of a curing agent, pigments, mineral granules or mineral fillers as may be necessary to produce specified colors, formed under pressure and thoroughly cured. The siding shall be free from defects which detract from serviceability or the appearance of the exposed face.

D. GENERAL REQUIREMENTS.

D-1. *Breakage.*—Siding units shall be whole and clean. Rejection or replacement may be required if more than 2 percent of the units are broken.

D-2. *Holes for fastening and laps.*—Siding shall be furnished with holes for fastening. The holes shall be located to give a minimum overlap of 1½ inches at the top.

D-3. *Nails and fastenings.*—Backer strips, nails and other fastenings for siding shall be supplied in proper quantity and size. Allowance shall be made for 5 percent waste of these items. The nails shall have flat heads and shall be long enough for properly securing the siding. Unless otherwise specified, the nails shall be zinc-coated (hot-dipped) steel.

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D-4. *Color and finish.*—

D-4a. The color or colors shall be as specified. Colors other than the normal cement gray or buff shall be obtained by embedding lime-proof mineral pigments or mineral granules, or both, in the exposed face, or by chemical impregnation.

D-4b. The exposed surface of the units shall be wood-grained or smooth, as specified.

E. *DETAIL REQUIREMENTS.*

E-1. *Sizes and shapes.*—

E-1a. Type I (shingles) shall be of uniform thickness, generally rectangular in shape, 9½ inches or 12 inches wide by 24 inches or 32 inches long. Units of one-half normal length may be furnished in an amount not exceeding two of these per bundle. Butts shall be either wavy, random width, thatched or straight, as specified.

E-1b. Type II (clapboards) shall be of uniform thickness, rectangular in shape, and not less than 9 inches wide by 96 inches long. Fifteen percent of the units may be furnished in lengths of 48, 64 and 80 inches.

E-1c. A plus or minus tolerance of ⅛ inch will be permitted in the widths and lengths supplied without requiring adjustment in number of units or area covered.

E-1d. The average thickness of the units shall be not less than 0.16 inch and the average thickness of any one unit shall be not less than 0.15 inch. For siding with a wood-grained surface, the thickness shall be taken as the weighted average at projections and depressions.

E-2. *Absorption.*—The average absorption shall be not more than 25 percent for type I siding and not more than 30 percent for type II siding. (See F-3.)

E-3. *Strength.*—Siding shall conform to the strength requirements of table I.

TABLE I.—*Flexural strength*

Condition when tested (See F-4.)	Minimum modulus of rupture, pounds per square inch			
	Average of four specimens		Any one specimen	
	Type I	Type II	Type I	Type II
Dry	3,000	2,500	2,500	2,000
Saturated	1,500	1,250	1,250	1,000
After heat test	3,000	2,500	2,500	2,000

F. *METHODS OF SAMPLING, INSPECTION, AND TESTS.*

F-1. *Sampling.*—From each lot of 50,000 units or fraction thereof of the same type, 12 units shall be selected by the inspector. Additional units may be taken at the discretion of the inspector.

F-2. *Preparation of specimens.*—Six pairs of specimens shall be prepared for testing. Each specimen shall be approximately 3 inches wide and from 8 to 12 inches long; the longer dimension of one of the specimens of each pair shall be parallel to the length of the siding unit and that of the other at right angles thereto. Immediately before testing, each specimen shall be dried to constant weight in a ventilated oven at a temperature between 220° and 230° F.

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F-3. Absorption test.—Two pairs of the dried specimens shall be weighed, each specimen separately. Weighings shall be accurate within 0.5 percent. These specimens shall be submerged for 24 hours in tap water at 60° to 80° F. They shall then be removed from the water, wiped with a damp cloth and again weighed. The difference between the weight after immersion and the weight when dry, multiplied by 100 and divided by the dry weight, shall be taken as the absorption in percent.

F-4. Strength test.—The modulus of rupture of each specimen of two pairs of the dried specimens shall be determined by placing the specimen on supports which cannot exert longitudinal constraint (rocker type knife edges, rollers, etc.) and applying the load at midspan through a similar edge bearing against the finished surface of the specimen. The span shall be not less than 7 inches nor more than 10 inches, and the load line and supports shall be parallel. The load shall be applied at a uniform rate such as to result in failure of the specimen in 1 to 2 minutes. The error in the load reading shall not exceed 2 percent of the specified minimum load.

F-4a. The modulus of rupture shall be computed by the formula:

$$R = \frac{3WL}{2BD^2}$$

R—Modulus of rupture, pounds per square inch.

W—Maximum load, pounds.

L—Span, inches.

B—Width of specimen, inches.

D—Weighted average thickness of specimen at midspan, inch.

F-4b. The modulus of rupture of each of the four specimens, previously tested for absorption, shall be determined in a similar manner while the specimens are saturated.

F-4c. The remaining four specimens (two pairs) shall be heated for 4 hours in a muffle furnace at a temperature of 600° F. plus or minus 20° F. The specimens shall be shielded from direct radiation of the heating element or flames. After cooling to room temperature, the modulus of rupture shall be determined as described above.

G. PACKING AND MARKING FOR SHIPMENT.

G-1. Packing.—Unless otherwise specified, the subject commodity shall be so packed or bundled as to insure acceptance and safe delivery by common or other carriers, at the lowest rate, to the point of delivery called for in the contract or purchase order.

G-2. Marking.—Unless otherwise specified, each package or bundle shall be marked with the name of the material and type as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS.

H-1. The following departmental specifications of the issue in effect on date of invitation for bids, and special requirements, shall form a part of this specification, and shall be applicable to purchases made under this specification by the respective departments:

H-2. Army.—Standard Specifications No. 100-2 for Marking Shipments (copies of which may be obtained, without cost, upon application to the Quartermaster General, Washington, D. C.).

H-3. Navy.—

H-3a. Navy Department specifications.—

General Specifications for Inspection of Material.

39P16—General Specification for Packaging and Packing for Overseas Shipment.

Copies of these specifications, of the Navy Shipment Marking Handbook, and of the Navy Handbook on Packing and Materials Handling: Palletizing for Overseas Shipment may be obtained without cost upon application to the Bureau of Supplies and Accounts, Navy Department, Washington 25, D. C.

H-3b. Packing.—

H-3b (1). For domestic shipment.—Unless otherwise specified, the subject commodity shall be bundled.

H-3b (1) a. Bundles shall have suitable slats of wood not less than $\frac{1}{4}$ -inch thick and extending the full width of the siding, or a suitable fiberboard folder to protect the edges. The bundles shall be strapped girthingwise at each end and at intermediate points where necessary, to form a compact rigid bundle. The strapping shall be not less than $\frac{1}{2}$ by 0.020 inch flat metal strapping. The gross weight shall not exceed 150 pounds.

H-3b (1) b. Bundles whose lengths are 48 inches or less may be palletized. All bundles shall be stacked flat, with not more than one type, color, shape or length on any one pallet. The palletizing shall conform to the requirements of the Navy Handbook on Packaging and Materials Handling entitled "Palletizing for Overseas Shipment."

H-3b (2). For overseas shipment.—Unless otherwise specified, the subject commodity shall be packed in unsheathed crates, or shall be bundled as described in paragraph H-3b (1) a, and shall be palletized as described in paragraph H-3b (1) b. Unsheathed crates shall be made of well-seasoned lumber free from knots and other defects which would tend to weaken the crate. Three-way corner construction shall be used. The minimum size of edge members and intermediate struts shall be $\frac{3}{4}$ by $2\frac{5}{8}$ inches for gross weights of approximately 250 pounds; or $\frac{3}{4}$ by $3\frac{5}{8}$ inches for heavier weights. Crates of gross weight exceeding approximately 400 pounds shall be of the heavy duty type with suitable slats, diagonals and skid construction. Only cement-coated, chemically etched, box, cooler, or sinker nails of not less than 8D shall be used. On crates of less than 400 pounds gross weight, at least one diagonal brace shall be placed on each face (except that diagonals shall not be required on two faces if the outside width of the face does not exceed 16 inches). In no case shall the angle between the edge members and the diagonals be less than 30° or more than 60°. Crates shall be strapped in accordance with section VI of Navy Department Specification 39P16. The gross weight shall not exceed 500 pounds.

H-3b (3). For domestic or overseas shipment.—Where practicable, shipping containers shall be of the same uniform size and contain the identical number of items of one size, type, color and shape. Containers shall be designed to fit the contents in a compact manner.

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H-3c. Marking.—Unless otherwise specified, each shipping container shall be plainly marked with the following information completed:

MATERIAL _____
STOCK NO. _____
SIZE _____
COLOR _____
TYPE _____
FINISH _____
QUANTITY _____
MANUFACTURER _____
CONTRACTOR _____
CONTRACT NO. _____
WEIGHT _____
CUBE _____

In addition to the foregoing, marking shall conform to the requirements of the latest issue of the Navy Shipment Marking Handbook.

I. NOTES.

I-1. Purchasers should specify the following:

- (a) Area to be covered or quantity of units.
- (b) Type I (shingles) or II (clapboard).
- (c) Butt edge, wavy, random width, thatched or straight. (See E-1a.)
- (d) Color. (See D-4a.)
- (e) Finish, smooth or wood-grained. (See D-4b.)
- (f) Size. (See E-1a and E-1b.)
- (g) Kind of nails, zinc-coated (hot-dipped) steel, hard copper, bronze, copper-clad steel or cadmium-plated steel. (See D-3.)
- (h) The lengths of the nails and the kind and thickness of the base for the siding units.
- (i) Samples required, if any, and purpose.

I-2. Manufacturers' lists should be consulted to avoid, where possible, the drafting of requirements that would unduly restrict competition.

I-3. Waterproofed sheathing paper should be used behind siding units.

I-4. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-5. Federal Specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, etc., which are suitable for Federal Government requirements.

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I-6. An Index of Federal Specifications and also a Quarterly Supplement-Index of Emergency Alternate Federal Specifications may be purchased as noted in the paragraph below, price to be obtained from the Superintendent of Documents.

I-7. Copies of this specification and of FF-N-101 may be obtained upon application, accompanied by money order, coupon, or cash to the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Price 5 cents; FF-N-101, 10 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever, and the fact that the Government may have formulated, furnished or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1945

For sale by the Superintendent of Documents, Washington 25, D. C.
Price 5 Cents

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SS-M-351

JUNE 23, 1931

**SUPERSEDING
F. S. 3. No. 463
January 25, 1927.**

FEDERAL STANDARD STOCK CATALOGUE

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**MINERAL-FILLER; (FOR) SHEET ASPHALT OR
ASPHALTIC CONCRETE PAVEMENTS (PORTLAND
CEMENT, LIMESTONE DUST AND DOLOMITE
DUST)**

This specification was approved for promulgation by the Federal Specifications Board on June 23, 1931, for the use of the departments and independent establishments of the Government in the purchase of this commodity, and shall become mandatory for all departments and independent establishments of the Government not later than February 15, 1932. It may be put into effect, however, at any earlier date, after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS.

A-1. There are no other Federal specifications applicable to this specification.

A-2. Any special requirements of the individual departments of the Government are noted under section H.

B. TYPES.

B-1. The materials covered by this specification shall be supplied in the particular type(s) ordered by the purchasing department.

B-1a. *Type of Material.*—

Limestone dust.

Dolomite dust.

Portland cement.

C. MATERIAL.

C-1. Mineral filler shall consist of limestone dust, dolomite dust, or Portland cement, and shall be free from foreign or other objectionable material.

D. GENERAL REQUIREMENTS.

D-1. Mineral filler shall be dry and free from lumps.

E. DETAIL REQUIREMENTS.

E-1. When tested by means of laboratory sieves, the mineral filler shall meet the following requirements:

	Per cent
E-1a. Passing No. 200 sieve.....	65 to 100
Passing No. 30 sieve.....	100

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F. METHODS OF TESTING.

F-1. Tests of the mineral filler shall be made in accordance with the following method:

F-1a. Mechanical analysis: A. S. T. M. Standard Method D7-27.

G. PACKING AND MARKING.

G-1. Packaging, packing, and marking shall be in accordance with commercial practice unless otherwise specified.

G-2. Any special requirements of the individual departments are noted under section H.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS.

H-1. The following departmental specifications of the issue in effect on date of invitation for bids shall respectively form a part of this specification:

H-1a. Army: U. S. Army Specification No. 100-2, Standard Specification for Marking Shipments.

H-1b. Navy: Navy Department General Specifications for Inspection of Material, copies of which may be obtained without cost upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D. C.

I. NOTES.

I-1. It is believed that this specification is adequate and that normally no samples will be necessary to determine compliance with the requirements, prior to award. If, for a particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids.

I-2. This specification governs all United States Government purchases of this commodity. Users are requested to retain this specification in permanent file until a revision is issued.

I-3. Interested parties are advised that an Alphabetical Index of Federal Specifications may be obtained upon application as noted in paragraph next below, price to be obtained from the Superintendent of Documents.

I-4. Copies of this specification may be obtained upon application, accompanied by money order or coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D. C. Price 5 cents.

Notice.—When Government drawings, specifications, or other data, are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1931

For sale by the Superintendent of Documents, Washington, D. C. . . . Price 5 cents

Standard Specifications for

Primer for Use With Asphalt in Dampproofing and Waterproofing

AASHO DESIGNATION: M 116-42

(ASTM DESIGNATION: D 41-41)

Scope

1. These specifications cover asphaltic primer for use, when specified, with asphalt in dampproofing and waterproofing below or above ground level, for application to concrete and masonry surfaces.

Properties

2. The primer shall be free from water and shall conform to the following requirements:

Flash viscosity at 25 C. (77 F.) 25 to 150 sec.
Distillation, per cent by volume:
Up to 225 C. (437 F.) not less than 25
Up to 360 C. (680 F.) not more than 65

The residue obtained from the distillation up to 360 C. (680 F.) shall conform to the following requirements:

Penetration at 25 C. (77 F.), 100 g.,
5 sec. 20 to 40
Matter soluble in carbon disulfide not less than
99 per cent

Sampling

3. (a) From each shipment or fraction thereof representing primer of the same kind, a number of packages shall be selected at random equivalent to the cube root of the total number of packages in the lot. If the cube root as calculated proves to be a fractional number, it shall be expressed as the next higher whole number. For convenience, the following table is given, showing the number of samples to be selected for shipments of various sizes:

Packages in Shipment	Packages Selected
2 to 8.....	2
9 to 27.....	3
28 to 64.....	4

65 to 125.....	5
126 to 216.....	6
217 to 343.....	7
344 to 512.....	8
513 to 729.....	9
730 to 1000.....	10
1001 to 1331.....	11

(b) By means of a paddle, the contents of each package selected shall be thoroughly stirred so as to bring all portions thereof into uniform distribution. With an appropriate sampler, not less than 1 pt. of the primer shall be immediately drawn from the center of each package, and transferred to a clean receptacle of suitable size, which in turn shall be kept tightly covered, prior and immediately after the samples are being introduced. After all the pint samples have been added, the contents of the container shall be thoroughly agitated, whereupon 1 qt. of the mixture shall immediately be transferred to a clean quart can provided with a tightly fitting screw cap, which shall be immediately fastened in place. This sample shall be considered as representative of the shipment and shall be transmitted to the laboratory for examination, bearing a suitable tag or other means of identification.

Methods of Testing

4. The asphalt primer shall be tested in accordance with the following standard methods of the American Association of State Highway Officials:

Flash viscosity	T 72
Distillation	T 78
Penetration	T 49
Bitumen soluble in carbon disulfide.....	T 44

Standard Specifications for
Asphalt for Dampproofing and Waterproofing

AASHO DESIGNATION: M 115-52

(ASTM DESIGNATION: D 449-49)

Scope

1. These specifications cover three types of asphalt suitable for use as a mopping coat in dampproofing, or as a plying or mopping cement in the construction of a membrane system of waterproofing.

Primer

2. The material used as a primer shall conform to the Standard Specifications for Primer for Use with Asphalt in Dampproofing and Waterproofing (AASHO Designation: M 116).

Membrane Materials

3. For the construction of a membrane system of waterproofing, any or all of the following felts or fabrics conforming to the specifications of the American Society for Testing Materials may be used alone or in various combinations:

(a) *Felt*.—Standard Specifications for Asphalt-Saturated Roofing Felt for Use in Waterproofing and in Constructing Built-Up Roofs (ASTM Designation: D 226).

(b) *Asbestos Felt*.—Standard Specifications for Asphalt-Saturated Asbestos Felts for Use in Waterproofing and in Constructing Built-Up Roofs (ASTM Designation: D 250).

(c) *Cotton Fabrics*.—Standard Specifications for Woven Cotton Fabrics

Saturated with Bituminous Substances for Use in Waterproofing (ASTM Designation: D 173). asphalt type.

Types

4. The asphalts covered by these specifications are of three types, as follows:

Type A.—A soft, adhesive "self-healing" asphalt which flows easily under the mop and which is suitable for use below ground level under uniformly moderate temperature conditions both during the process of installation and during service.

NOTE.—This type of asphalt is suitable for foundations, tunnels, subways, etc.

Type B.—A somewhat less susceptible asphalt with good adhesive and "self-healing" properties for use above ground level where not exposed to temperatures exceeding 125 F. (52 C.).

NOTE.—This type of asphalt is suitable for railroad bridges, culverts, retaining walls, tanks, dams, conduits, spray decks, etc.

Type C.—An asphalt less susceptible to temperature than type B, with good adhesive properties for use above ground level where exposed on vertical surfaces in direct sunlight or at temperatures above 125 F. (52 C.).

Properties

5. The asphalt shall be homogeneous and free from water, and shall conform to the requirements prescribed in Table I.

Methods of Sampling and Testing

6. The asphalt shall be sampled and tested in accordance with the following standard methods of the American Association of State Highway Officials and the American Society for Testing Materials:

Sampling	T 40
Softening point	T 53
Flash point	T 48
Penetration	T 49
Ductility	T 51
Loss on heating	T 47
Bitumen soluble in carbon disulfide	T 44
Bitumen soluble in carbon tetrachloride	T 45
Ash	(ASTM) D 271
Coarse particles	T 171

TABLE I. REQUIREMENTS FOR ASPHALT FOR DAMPPROOFING AND WATERPROOFING.

	Type A		Type B		Type C	
	Min.	Max.	Min.	Max.	Min.	Max.
Softening point (ring-and-ball method)	115 F. (46 C.)	145 F. (63 C.)	145 F. (63 C.)	170 F. (77 C.)	180 F. (82 C.)	200 F. (93 C.)
Flash point (Cleveland open cup)	350 F. (175 C.)	.....	400 F. (205 C.)	.....	450 F. (235 C.)	.....
Penetration:						
6 C. (32 F.), 200 g., 60 sec.	5	.....	10	.....	10	.....
25 C. (77 F.), 100 g., 5 sec.	50	100	25	50	20	40
46 C. (115 F.), 50 g., 5 sec.	100	.....	.....	115	.....	100
Ductility at 25 C. (77 F.), (5 cm. per min.), cm.	30	.....	15	.....	2	.....
Loss on heating at 163 C. (325 F.), 50 g., 5 hr., per cent .....	.....	2	.....	1	.....	1
Penetration of residue, per cent of original	60	.....	60	.....	60	.....
Total bitumen soluble in carbon disulfide, per cent:						
Filled or native asphalt	95	.....	.....	.....	.....	.....
Unfilled asphalt	99	.....	99	.....	99	.....
Proportion of bitumen soluble in carbon tetrachloride, per cent	99	.....	99	.....	99	.....
Ash, per cent:						
Filled or native asphalt .....	.....	5	.....	.....	.....	.....
Unfilled asphalt .....	.....	1	.....	1	.....	1
Coarse particles retained on No. 200 (74-micron) sieve as percentage of bitumen insoluble in carbon disulfide, per cent .....	.....	12	.....	.....	.....	.....

Standard Specifications for
Asphalt for Dampproofing and Waterproofing

AASHO DESIGNATION: M 115-52

(ASTM DESIGNATION: D 449-49)

Scope

1. These specifications cover three types of asphalt suitable for use as a mopping coat in dampproofing, or as a plying or mopping cement in the construction of a membrane system of waterproofing.

Primer

2. The material used as a primer shall conform to the Standard Specifications for Primer for Use with Asphalt in Dampproofing and Waterproofing (AASHO Designation: M 116).

Membrane Materials

3. For the construction of a membrane system of waterproofing, any or all of the following felts or fabrics conforming to the specifications of the American Society for Testing Materials may be used alone or in various combinations:

(a) *Felt*.—Standard Specifications for Asphalt-Saturated Roofing Felt for Use in Waterproofing and in Constructing Built-Up Roofs (ASTM Designation: D 226).

(b) *Asbestos Felt*.—Standard Specifications for Asphalt-Saturated Asbestos Felts for Use in Waterproofing and in Constructing Built-Up Roofs (ASTM Designation: D 250).

(c) *Cotton Fabrics*.—Standard Specifications for Woven Cotton Fabrics

Saturated with Bituminous Substances for Use in Waterproofing (ASTM Designation: D 173). asphalt type.

Types

4. The asphalts covered by these specifications are of three types, as follows:

Type A.—A soft, adhesive "self-healing" asphalt which flows easily under the mop and which is suitable for use below ground level under uniformly moderate temperature conditions both during the process of installation and during service.

NOTE.—This type of asphalt is suitable for foundations, tunnels, subways, etc.

Type B.—A somewhat less susceptible asphalt with good adhesive and "self-healing" properties for use above ground level where not exposed to temperatures exceeding 125 F. (52 C.).

NOTE.—This type of asphalt is suitable for railroad bridges, culverts, retaining walls, tanks, dams, conduits, spray decks, etc.

Type C.—An asphalt less susceptible to temperature than type B, with good adhesive properties for use above ground level where exposed on vertical surfaces in direct sunlight or at temperatures above 125 F. (52 C.).

Properties

5. The asphalt shall be homogeneous and free from water, and shall conform to the requirements prescribed in Table I.

SPECIFICATIONS FOR HIGHWAY MATERIALS

Methods of Sampling and Testing

6. The asphalt shall be sampled and tested in accordance with the following standard methods of the American Association of State Highway Officials and the American Society for Testing Materials:

Sampling	T 40
Softening point	T 52
Flash point	T 48
Penetration	T 49
Ductility	T 51
Loss on heating	T 47
Bitumen soluble in carbon disulfide	T 44
Bitumen soluble in carbon tetrachloride	T 45
Ash	(ASTM) D 271
Coarse particles	T 171

TABLE I.—REQUIREMENTS FOR ASPHALT FOR DAMPPROOFING AND WATERPROOFING.

	Type A		Type B		Type C	
	Min.	Max.	Min.	Max.	Min.	Max.
Softening point (ring-and-ball method)	115 F. (48 C.)	145 F. (63 C.)	145 F. (63 C.)	170 F. (77 C.)	190 F. (83 C.)	200 F. (93 C.)
Flash point (Cleveland open cup)	350 F. (175 C.)		400 F. (205 C.)		400 F. (205 C.)	
Penetration:						
8 C. (32 F.), 200 g., 60 sec.	5		10		10	
25 C. (77 F.), 100 g., 5 sec.	50	100	25	50	20	40
48 C. (115 F.), 50 g., 5 sec.	100			115		100
Ductility at 25 C. (77 F.), (5 cm. per min.), cm.	30		15		2	
Loss on heating at 163 C. (325 F.), 50 g., 5 hr., per cent		2		1		1
Penetration of residue, per cent of original	60		60		60	
Total bitumen soluble in carbon disulfide, per cent:						
Filled or native asphalt	95					
Unfilled asphalt	99		99		99	
Proportion of bitumen soluble in carbon tetrachloride, per cent	99		99		99	
Ash, per cent:						
Filled or native asphalt		5				
Unfilled asphalt		1		1		1
Coarse particles retained on No. 200 (74-micron) sieve as percentage of bitumen insoluble in carbon disulfide, per cent		12				

Standard Specifications for

Primer for Use With Asphalt in Dampproofing and Waterproofing

AASHO DESIGNATION: M 116-42

(ASTM DESIGNATION: D 41-41)

Scope

1. These specifications cover asphaltic primer for use, when specified, with asphalt in dampproofing and waterproofing below or above ground level, for application to concrete and masonry surfaces.

Properties

2. The primer shall be free from water and shall conform to the following requirements:

Emul viscosity at 25 C. (77 F.) 25 to 150 sec.
Distillation, per cent by volume:
Up to 225 C. (437 F.) not less than 35
Up to 360 C. (680 F.) not more than 65

The residue obtained from the distillation up to 360 C. (680 F.) shall conform to the following requirements:

Penetration at 25 C. (77 F.), 100 g.,
5 sec. 20 to 50
Matter soluble in carbon disulfide not less than
99 per cent

Sampling

3. (a) From each shipment or fraction thereof representing primer of the same kind, a number of packages shall be selected at random equivalent to the cube root of the total number of packages in the lot. If the cube root as calculated proves to be a fractional number, it shall be expressed as the next higher whole number. For convenience, the following table is given, showing the number of samples to be selected for shipments of various sizes:

Packages in Shipment	Packages Selected
2 to 8	2
9 to 27	3
28 to 64	4

65 to 125	5
126 to 216	6
217 to 343	7
344 to 512	8
513 to 729	9
730 to 1000	10
1001 to 1331	11

(b) By means of a paddle, the contents of each package selected shall be thoroughly stirred so as to bring all portions thereof into uniform distribution. With an appropriate sampler, not less than 1 pt. of the primer shall be immediately drawn from the center of each package, and transferred to a clean receptacle of suitable size, which in turn shall be kept tightly covered, prior and immediately after the samples are being introduced. After all the pint samples have been added, the contents of the container shall be thoroughly agitated, whereupon 1 qt. of the mixture shall immediately be transferred to a clean quart can provided with a tightly fitting screw cap, which shall be immediately fastened in place. This sample shall be considered as representative of the shipment and shall be transmitted to the laboratory for examination, bearing a suitable tag or other means of identification.

Methods of Testing

4. The asphalt primer shall be tested in accordance with the following standard methods of the American Association of State Highway Officials:

Emul viscosity	T 72
Distillation	T 78
Penetration	T 49
Bitumen soluble in carbon disulfide	T 44

INTERIM FEDERAL SPECIFICATION

CLOTH, GLASS (FOR MEMBRANE WATERPROOFING AND BUILT-UP ROOFING)

This Interim Federal Specification has been developed by the General Services Administration, Federal Supply Service, based upon currently available technical information, but has not been approved for promulgation as a regular Federal Specification. It is subject to modification, and, pending its promulgation as a regular specification, may be used in procurement.

1. SCOPE AND CLASSIFICATION

1.1 Scope.- This specification covers open mesh smoothly woven cloth made from inorganic glass fibers and used for membrane waterproofing and built-up roofing.

1.2 Classification.- The glass cloth covered by this specification shall be of one type as specified herein.

1.3 Sizes.- The glass cloth covered by this specification shall be furnished in the sizes as specified. (See 3.3).

2. APPLICABLE SPECIFICATIONS

2.1 Specifications.- There are no other specifications applicable to this specification except those referenced in section 7 by individual departments.

(Copies of Federal Specifications and the Index of Federal Specifications and Standards may be obtained upon application accompanied by check, money order, cash, or Government Printing Office coupons, to the General Services Administration Business Service Center, Region 3, Seventh and D Streets, S. W., Washington 25, D. C. This office will also honor deposit account numbers issued by the Government Printing Office. Single copies of product specifications required for bidding purposes are available without charge at the GSA Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, Seattle, and Washington, D. C. Prices of additional copies may be obtained from the GSA Regional Offices.)

(Copies of this and other Interim Federal Specifications may be obtained upon application to the issuing agency or to the GSA Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, and Seattle.)

3. REQUIREMENTS

3.1 Material.- The glass fiber shall be acid resisting, shall not rot or decay, and shall show minimum capillary and wicking action.

3.2 Coating.- The glass cloth shall have a uniform coating compatible with asphalt base or coal-tar base compound, as specified.

3.3 Sizes.

3.3.1 Width.-- Unless otherwise specified, the glass cloth shall be furnished in rolls 36 inches wide with a tolerance of plus $1\frac{1}{2}$ inch and minus $\frac{1}{2}$ inch. Glass cloth shall also be available in random widths from 2" to 45".

3.3.2 Length.-- The glass cloth shall be furnished in rolls of 50 or 100 lineal yards in length with a tolerance of plus or minus $1/2$ yard.

3.3.3 Weight.-- A roll of 100 lineal yards shall weigh not more than 16 pounds or less than 10 pounds. The 50 yard roll shall weigh not more than 8 pounds nor less than 5 pounds. Weight per square yard of cloth shall be not more than 2.6 ounces or less than 1.5 ounces. (See 4.4.4.1).

3.4 Thread count.-- The thread count per inch shall be not more than 24 or less than 20 in both the direction of the warp and in the direction of the fill, when determined as specified in 4.4.6.

3.5 Selva.-- Unless otherwise specified the cloth shall have a minimum selva of not less than $1/8$ inch and a maximum selva of not more than $1/2$ inch.

3.6 Flia.-- The cloth shall not crack when subjected to the test specified in 4.4.4.

3.7 Breaking strength.-- The cloth shall have a minimum breaking strength of 75 pounds in both the direction of the warp and in the direction of the fill, when subjected to the test specified in 4.4.2.

3.8 Chemical requirements.

3.8.1 Weight of moisture-free uncoated cloth.-- The weight of moisture-free uncoated cloth per square yard shall be not more than 2.0 ounces or less than 1.2 ounce when subjected to the test in 4.4.5.

3.8.2 Ration of benzene-soluble coating to glass cloth the weight shall be not less than 0.593 or more than 1.00.

3.8.3 Volatile matter test.-- The cloth shall not have more than an average of 2.2% volatile matter, when subjected to the test specified in 4.4.3.

3.9 Workmanship.-- The glass cloth covered by this specification shall be free from visible external defects such as ragged or untrue edges, breaks, rents, folds and knots. The meshes of the cloth shall not be completely closed or sealed by the asphalt or coal-tar coating. There shall be sufficient porosity to allow the moppings of asphalt plying cement to come through. The cloth shall not stick when unrolled at temperatures between 10° C. (50° F.) and 32° C. (90° F.) to such an extent as to cause injury. The cloth shall be free from all imperfections which may impair its serviceability.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Lot.-- Unless otherwise specified a lot shall consist of all cloth submitted for inspection at the same time and manufactured by the same process.

4.2 Sampling.-- From each shipment of 1,000 rolls or less, at least 5 rolls shall be taken at random by the inspector for inspection and tests.

4.3 Inspection.-- Each lot shall be examined visually by the inspector for compliance with the requirements of this specification with respect to material appearance, workmanship, packaging, packing, etc.

4.4 Tests.

4.4.1 Pliability test.- Five strips shall be cut 1 inch wide and 6 inches long in the direction of the warp and immersed in a cooling mixture of ice and water at 0° C. (32° F.) for 10 to 15 minutes. The strips shall then be removed from the water and each strip bent over a 1/16 inch mandrel through an arc of 180° at a uniform speed in approximately 2 seconds and then through 360° over the same mandrel in the opposite direction. The strips shall then be dried thoroughly and examined. If 1 or more of these 5 strips crack during this test, 10 strips shall be cut from another part of the sample and the test repeated. If one or more of these strips crack, the material shall be reported as failing on the pliability test.

4.4.2 Breaking strength test (Grab Method).

4.4.2.1 Unless otherwise specified, the breaking strength of the cloth shall be determined by the grab method, which is outlined as follows:

4.4.2.2 Test specimens.- Specimens 4 inches wide and not less than 6 inches long shall be taken for the test. Two sets of 5 specimens each are required, one set for warp breaking strength, having the long dimensions parallel to the warp yarns, and the other set for filling breaking strength, having the long dimension parallel to the filling yarns. No two specimens for warp breaking strength shall contain the same warp yarns, or for filling breaking strength the same filling yarns. Unless otherwise specified, no specimen is taken nearer the selvage (if the specimen has a selvage) than one-tenth the width of the material.

4.4.2.3 Apparatus.- The apparatus used shall be a pendulum type of machine. It shall be of such capacity that when the specimen breaks, the angle between the pendulum and the vertical is between 90° and 45°. The jaws through which the load is applied shall move at a uniform rate of 12, plus or minus 2 inches per minute. The distance between the two pairs of jaws shall be 3 inches at the start of a test. The jaws shall have smooth flat faces with edges slightly rounded to prevent cutting. The face of one jaw of each pair shall measure 1 by 1 inch; that of the other jaw of each pair shall measure 1 inch by 2 or more inches, the long dimension being perpendicular to the direction of application of the load. The machine shall be calibrated with known loads applied in an ascending order.

4.4.2.4 Position of specimen in apparatus.- The specimen shall be placed symmetrically in the jaws of the machine with the long dimension parallel to and the short dimension at right angles to the direction of application of the load, care being taken to grip the same yarns in both pairs of jaws.

4.4.2.5 The results.- The breaking strength is the average of the results obtained by breaking 5 specimens. If a specimen slips in the jaws, breaks in the jaws, breaks at the edges of the jaws, or for any reason attributable to faulty operation the result falls markedly below the average for the set, the result shall be disregarded, another specimen taken, and the result of this break included in the average.

4.4.3 Volatile matter test.- Two strips of asphalt or coal-tar coated glass cloth shall be cut 6 inches wide and 12 inches long. The strips shall then be weighed separately and suspended for 5 hours in an oven at 105° to 110° C. (221° to 230° F.), removed from the oven, cooled in a desiccator, and weighed. Then the loss in weight shall be computed and the two results averaged.

4.4.4 Determination of weight and width.- The wrappers and other packing material shall be removed from each roll selected and the roll and packing materials, etc., weighed separately to the nearest one-quarter pound, then each roll shall be unrolled and measured for length and width to the nearest one-quarter inch. The area of each roll and the weight per square yard of each roll of cloth examined shall then be computed.

4.4.4.1 Weight per square yard.- The weight per square yard of each roll of cloth selected for inspection and tests shall be computed as follows:

Trim the sample so that it is 36 inches long and the full width of the roll, measure accurately to one-sixteenth inch, and weigh to the nearest gram (15 grains). From the measurements and weight so obtained compute the weight per square yard. The weight so determined is only to be used in making the laboratory calculations and shall not be used as a basis for acceptance or rejection.

4.4.5 Weight of uncoated cloth.- The weight of uncoated cloth shall be computed as follows:

Cut a strip approximately 2 inches wide and the full width of the sample, weigh, and extract with benzol (carbon tetrachloride, chloroform, or carbon bisulfide will usually give the same results but benzol should be used in case of dispute) in a suitable extraction apparatus until the solvent runs through colorless. The coated cloth may be cut into squares approximately 1 inch on each side in case an extraction apparatus of sufficient size to accommodate the whole strip is not available. Remove the uncoated cloth from the extraction apparatus, dry in air until free from the odor of benzol, and brush off any adhering particles of foreign matter. Place the uncoated cloth in a tared weighing bottle and heat in an oven at 105° to 110° C. (221° to 230° F.) for one-half hour, cool in a desiccator and weigh. Calculate the percentage of moisture-free cloth in the sample taken for extraction and compute the weight of moisture-free uncoated cloth per square yard from the weight obtained in 4.4.4.1.

4.4.6 Thread count.- Count the number of threads to the inch in both the warp and filling at five different places. The average of these shall be taken as the threads per inch or thread count.

5. PREPARATION FOR DELIVERY

5.1 Packaging.- Unless otherwise specified, commercial packaging shall be acceptable under this specification.

5.2 Packing.- Unless otherwise specified, the rolls of glass cloth shall be wound on either round, square or polygonal cores. The rolls shall be packaged in such a manner as to prevent unrolling in transit.

5.3 Marking.- Unless otherwise specified, shipping tags or containers when used shall be marked with the name of the manufacturer, the description of the product as defined by the contract or order under which the shipment is made, the quantity contained therein, the name of the contractor, the number of the contract or order, and the gross weight.

6. NOTES

6.1 Ordering data.- Purchasers should exercise any desired options offered herein, and specify whether or not the basis of purchase shall be by the roll or by the square (100 square feet). (See 3.2, 3.3.1, 3.3.2, 3.5, 4.1. 4.4.2.1. 4.4.2.2, 5.1, and 5.2, and 5.3).

6.2 It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

6.3 Federal specifications do not include all types, classes, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, classes, etc., which are suitable for Federal Government requirements.

PATENT NOTICE: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any other manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

7. DEPARTMENTAL REQUIREMENTS

7.1 The following specifications and other publications, of the issues in effect on date of invitation for bids, and special requirements, form a part of this specification for purchases made under this specification by the respective departments.

7.2 Army, Navy, and Air Force.- (To be supplied.)

RECEIVED
JUN - 9 1960
BIRD & SON, INC.
SAN FRANCISCO, CA.

20M 8-89 J

MEMORANDUM
SHREVEPORT

In Reply to _____ Date _____ From _____ To _____
Subject _____

BIRD 006502

R-P-381

JUNE 6, 1933

**SUPERSEDING
F.S. Nos. 80 and 83
December 29, 1923**

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**PITCH; COAL-TAR (FOR) MINERAL-SURFACED BUILT-
UP ROOFING, WATERPROOFING AND DAMP-
PROOFING**

This specification was approved for promulgation by the Federal Specifications Board on June 6, 1933, for the use of the departments and independent establishments of the Government in the purchase of this commodity, and shall become mandatory for all departments and independent establishments of the Government not later than February 15, 1934. It may be put into effect, however, at any earlier date, after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. There are no other Federal specifications applicable to this specification.

A-2. Any special requirements of the individual departments of the Government are noted under section H.

B. TYPES

B-1. Coal-tar pitch shall be of the following types: (the type (or types) desired shall be stated in the invitation for bids).

Type I. Coal-tar pitch for built-up roofing.

Type II. Coal-tar pitch for waterproofing and damp-proofing.

C. MATERIAL

C-1. Material shall be as specified under detail requirements.

D. GENERAL REQUIREMENTS

D-1. Basis of purchase.—Material shall be purchased by weight.

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E. DETAIL REQUIREMENTS

E-1. Appearance.—Freshly melted material of both types shall be uniformly glossy, and on aging one week its surface shall not become dull or show any separation of oily constituents. Freshly fractured material shall present a satiny black surface.

E-2. Physical and chemical requirements.—

	Type I		Type II	
	Maximum	Minimum	Maximum	Minimum
Softening point (cube in water method).....	66° C. (150° F.)	60° C. (140° F.)	60° C. (140° F.)	52° C. (125° F.)
Ductility (c.m.).....		50		50
Specific gravity at 25°/25° C. (77°/77° F.).....	1.34	1.22	1.34	1.22
Insoluble in carbon bisulphide (percent).....	30	15	30	15
Ash (percent).....	1		1	
DISTILLATION TEST				
Distillate under 300° C. (572° F.) (percent).....	12		12	
Specific gravity of distillate at 38°/15.5° C. (100°/60° F.).....		1.03		1.03

F. METHODS OF SAMPLING, AND TESTS

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

F-1. Sampling.—From each shipment select at random a number of packages equivalent to the cube root of the total number of packages included in the lot. If the cube root as calculated proves to be a fractional number, express it as the next higher digit.

A sample shall be taken at least 3 inches below the surface and at least 3 inches from the side of each container selected. A clean hatchet may be used if the material is hard enough to shatter and a broad, stiff putty knife if the material is soft. An auger, or brace and three-fourths-inch bit, or other suitable means may also be used. Avoid contamination with superficial water, wooden slivers, or foreign matter.

The samples so taken shall be combined by melting together with constant stirring to prevent overheating at a temperature not exceeding 121° C. (250° F.). When thoroughly melted, two 1-quart friction-top cans shall be filled with the well-mixed material, allowed to cool, tightly sealed, marked for identification with the manufacturer's name and brand, etc., and one transmitted to the testing laboratory. The other shall be retained for use in case of dispute.

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F.P.-351-3
(June 1935)

F-2. Laboratory examination.—

F-2a. Appearance.—Carefully melt about 10 g of the coal-tar pitch at a temperature not exceeding 121° C. (250° F.) and pour it into a small tin box or other suitable container provided with a cover. At least one half the surface shall be free from froth or bubbles. Allow the coal-tar pitch to cool in a place free from drafts and dust. When cool, examine the surface, then cover the box with the lid and set aside for one week, after which period examine again. Immediately after cooling, the surface shall be glossy black, and after standing one week the surface shall not show any dulling or the separation of greasy or oily material when compared with a freshly prepared sample.

F-2b. Softening point (cube in water method).—The softening point shall be determined by the "Standard Method of Test for Softening Point of Tar Products (Cube in Water Method)", D-61-24, A.S.T.M., Standards 1930, part II, page 655. This method is essentially as follows:

F-2b (1). Apparatus.—(See fig. 1.)

F-2b (1) a. A mold suitable for forming a 12.7 mm $\pm$ 0.1 mm (one half inch) cube of pitch.

F-2b (1) b. An L-shaped hook made from no. 12 gage copper wire, the foot of which shall be 2½ cm (1 inch) long.

F-2b (1) c. A glass vessel capable of being heated, not less than 8½ cm (3½ inches) in diameter by 10½ cm (4 inches) in depth measured from the bottom of the flare. (A 600-ml beaker, low form.)

F-2b (1) d. A total immersion thermometer meeting the following specification:

Type.—Etched stem, glass.

Liquid.—Mercury.

Range and subdivision.—Minus 4° to +104° C. in 0.2°.

Total length.—454 to 460 mm.

Stem.—Plain front, enamel back, suitable thermometer tubing. Diameter 6.0 to 7.0 mm.

Bulb.—Corning normal or equally suitable thermometric glass. Length, 20 to 30 mm. Diameter, not greater than stem.

Distance to -4° line from bottom of bulb.—50 to 70 mm.

Distance to +104° line from top of thermometer.—20 to 50 mm.

Filling above mercury.—Nitrogen gas.

Top finish.—Glass ring.

Graduation.—All lines, figures, and letters clear out and distinct. Lines corresponding to even degree marks to be longer than the remaining lines. Graduations to be numbered at each multiple of 2°.

Immersion.—Total.

Scale error.—The error at any point of the scale, when the thermometer is standardized at total immersion, shall not exceed 0.3°.

Special marking.—A serial number and the manufacturer's name or trade mark shall be etched on the stem.

Case.—The thermometer shall be supplied in a suitable case, on which shall appear "-4° to +104° C. in 0.2°, total immersion."

The A.S.T.M. low S.P. -2° to +80° C. thermometer (see A.S.T.M. Standards D 36-26 or D 61-24) gives within its range readings identical with the -4° to +104° C. thermometer specified above.

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F-2b (2). Preparation of sample.—The pitch shall be molded into a 12.7 mm (one half inch) cube, truly shaped and with sharp edges, either by melting and pouring or softening and pressing into a mold.

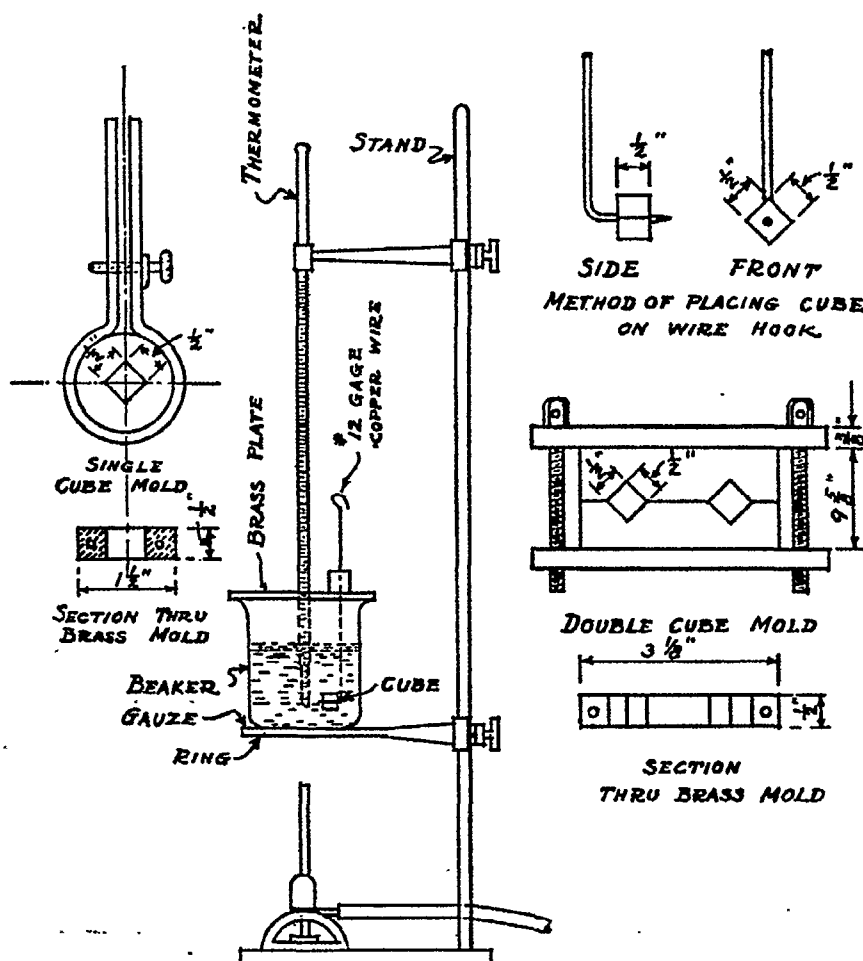


FIGURE 1.

(Two satisfactory molds are shown in fig. 1.) In all cases an excess of pitch shall be used and the surplus material shall be cut off cleanly with a slightly heated knife. If the pitch is melted, it should be thoroughly stirred to avoid incorporating air bubbles in the mass and then poured into the mold so as to leave an excess on cooling. The mold should rest on a brass plate, and the surface of the plate and the interior surfaces of the mold should be amalgamated to prevent the pitch from adhering to them.

Determine the softening point within three hours after the sample has been prepared.

F-2b (3). Procedure.—Assemble the apparatus as shown in figure 1. Fill the glass container to a depth of approximately 9 $\frac{1}{4}$ cm (3 $\frac{3}{4}$ inches) with freshly boiled, distilled water that has been cooled to not less than 45° C. below the softening point of the material under test. Place the cube of pitch on the wire as shown in figure 1 and suspend it in the water so that its lower edge is 2.5 ± 0.1 cm (1 inch) above the bottom of the beaker and its upper edge is not less than 5 cm (2 inches) below the surface of the water. Allow it to remain in the water for 15 minutes before applying heat. Suspend the thermometer so that the bottom of the bulb is level with the bottom edge of the cube of pitch and within 6 mm ($\frac{1}{4}$ inch), but not touching the cube.

Apply the heat in such a manner that the temperature of the water after the first three minutes of heating is raised uniformly 5° C. (9° F.) $\pm 0.5^\circ$ C. (1° F.) each minute. Report as the softening point the temperature indicated by the thermometer (adding or subtracting any certified corrections but making no emergent stem corrections) at the instant the sample touches the bottom of the container.

F-2c. Ductility.—The ductility shall be determined by the "Tentative Method of Test for Ductility of Bituminous Materials" D 113-26 T, Proceedings A.S.T.M. 1926, vol. 26, part 1, p. 886. This method is essentially as follows:

F-2c (1). Apparatus.—

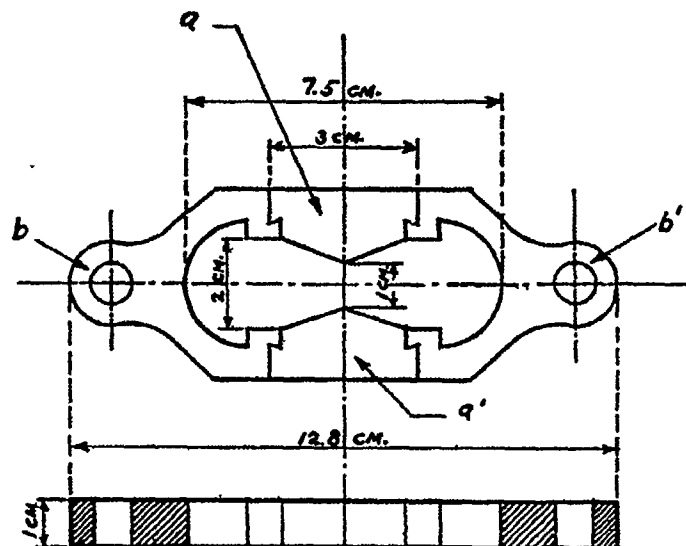


FIGURE 2.

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F-2c (1) a. Mold.—The mold shall be of the shape shown in figure 2. It shall be made of brass, the ends B and B' being known as clips and the parts A and A' as sides of the mold. The dimensions of the mold shall be as follows:

	CM
Total length (internal).....	7.45-7.55
Distance between clips.....	2.97-3.06
Width of clips at mouth.....	1.98-2.02
Width of briquet at minimum cross section (halfway between clips).....	0.99-1.01
Thickness of briquet throughout.....	0.99-1.01

F-2c (1) b. Water bath.—A water bath shall be maintained at a temperature varying not more than 0.1° C. from 25° C. (77° F.). The volume of water shall be not less than 10 liters, and the sample shall be immersed to a depth of not less than 10 cm and shall be supported on a perforated shelf not less than 5 cm from the bottom of the bath.

F-2c (1) c. Testing machine.—Any apparatus may be used for pulling the briquets of pitch apart which is so constructed that the briquet will be continuously immersed in water and the two clips pulled apart at a uniform rate of 5 cm per minute.

F-2c (2). Procedure.—The coal-tar pitch shall be completely melted at the lowest temperature at which it will be thoroughly fluid and then poured into the standard mold. The mold shall be assembled on a brass plate, and the surface of the plate and the interior surfaces of the side pieces A and A' of the mold shall be thoroughly amalgamated so as to prevent the pitch from sticking. In filling the mold care shall be taken not to disarrange the parts and thus distort the briquet. In filling, the pitch shall be poured in a thin stream back and forth from end to end of the mold until it is more than level full. After cooling at room temperature for 30 minutes the excess pitch shall be cut off by means of a hot putty knife, so that the mold will be just level full.

The brass plate and mold containing the briquet shall then be placed in the water bath and kept at a temperature of 25° C. (77° F.) for at least one and one half hours, when the briquet shall be removed from the plate and the side pieces A and A' detached.

The rings at each end of the clip shall then be attached to the pins or hooks in the ductility machine and the two clips pulled apart at a uniform rate of 5 cm per minute (± 5 percent). While the test is being made, the water in the tank of the ductility machine shall cover the briquet by at least 2.5 cm and shall be kept continuously at a temperature of 25° C. (77° F.) $\pm 0.5^\circ$ C. (1.0° F.). When the briquet of pitch breaks, the distance from the original position of the clip before pulling to its present position shall be measured and shall be taken as the ductility. The average of three tests shall be taken, excepting that any obviously abnormal result shall be rejected.

F-2d. Specific gravity at 25°/25° C. (77°/77° F.).—The specific gravity may be determined by any approved method, but some method similar to the following is recommended:

A small platinum pan or crucible supported in a wire sling shall be accurately weighed in air and the weight designated by (A). It

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shall then be weighed in a similar manner suspended in freshly distilled water at 25° C. (77° F.) but immersed except for the fine platinum wire used for suspension and this weight designated by (B). The crucible shall then be dried and poured almost full of coal-tar pitch which has been melted at the lowest possible temperature. It shall then be allowed to cool to 25° C. (77° F.) and weighed in the sling in air. This weight shall be designated as (C). Then it shall be weighed in water and the weight shall be designated as (D). From these weights the specific gravity shall be computed according to the following formula:

$$\text{Sp. gr.} = \frac{C - A}{(C - A) - (D - B)}$$

F-2e. Insoluble in carbon bisulphide.—Approximately one g of coal-tar pitch, accurately weighed, shall be placed in a beaker of 100 to 150 ml capacity, covered with cold carbon bisulphide and set aside for about 15 minutes, the liquid being stirred every few minutes until the lumps break up and the bitumen goes into solution. The solid particles shall be allowed to settle, and the carbon bisulphide solution of the bitumen shall be decanted through a weighed Gooch crucible prepared with a mat of asbestos fiber of a thickness that will scarcely transmit light.

The sediment remaining in the beaker shall be crushed with a stirring rod and a little more carbon bisulphide added. The sides of the beaker also shall be washed down with carbon bisulphide. The contents of the beaker shall then be poured into the crucible and all sediment washed from the beaker into the crucible with carbon bisulphide. Suction may be used to aid in filtering. The sediment on the filter shall be washed with carbon bisulphide until the washings run through colorless. The crucible shall then be set in a place free from dust until the carbon bisulphide evaporates and then placed in an oven at 105 to 110° C. (221 to 231° F.) for one hour. It shall then be cooled and weighed, the increase giving the total insoluble matter.

F-2f. Ash.—Place approximately one gram of the pitch, accurately weighed, in a previously ignited and weighed crucible of about 30 ml capacity and incinerate until all of the carbon is consumed. Cool, weigh, and calculate the percentage ash.

F-2g. Distillation test.—The coal-tar pitch shall be distilled by the "Standard Method of Test for Distillation of Bituminous Materials Suitable for Road Treatment" D 20-30, A.S.T.M. Standards 1930, part II, p. 642. This method is essentially as follows:

F-2g (1). Apparatus.—

F-2g (1) a. Flask.—The distillation flask, fig. 3, shall be a side neck distilling flask, having the following dimensions:

Diameter of bulb, outside.....	86 mm± 1.5 mm
Diameter of neck, inside.....	22 mm± 1.0 mm
Diameter of tubulature, inside.....	10 mm± 0.5 mm
Height of flask, outside.....	131 mm± 1.5 mm
Vertical distance bottom of bulb, outside, to horizontal tangent at tubulature, inside.....	93 mm± 1.5 mm
Length of tubulature.....	220 mm± 5.0 mm
Angle of tubulature.....	73 dec.± 2 dec.
Thickness of tubulature wall.....	1.0 to 1.5 mm

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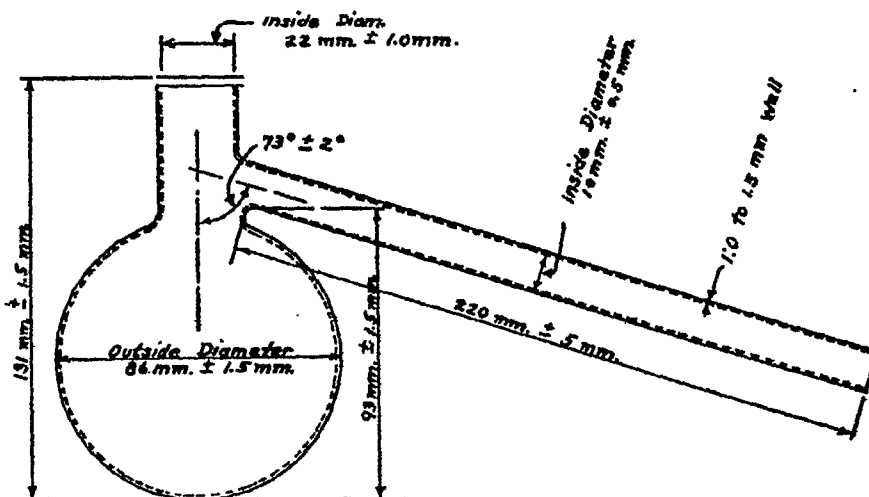


FIGURE 3.

F-2g (1) b. Condenser tube.—The condenser tube shall be a suitable form of tapered glass tubing of the following dimensions:

Outside diameter of small end, 12.5 mm permissible variation ± 1.5 mm.

Outside diameter of large end, 28.5 mm permissible variation ± 3.0 mm.

Length, 360.0 mm permissible variation ± 4.0 mm.

Length of tapered part, 100.0 mm permissible variation ± 5.0 mm.

F-2g (1) c. Shield.—A galvanized iron shield, lined with $\frac{1}{4}$ inch asbestos, of the form and dimensions shown in fig. 4 shall be used to protect the flask from air currents and to prevent radiation. The cover (top) may be of asbestos cement board made in two parts, or it may be of galvanized iron lined with $\frac{1}{4}$ inch asbestos.

F-2g (1) d. Receiver.—Any satisfactory receiver may be used for collecting the distillate. An Erlenmeyer flask having a capacity of 25 ml has been found convenient.

F-2g (1) e. Thermometer.—The thermometer shall conform to the following requirements. These specifications cover a total immersion thermometer graduated in either Centigrade or Fahrenheit degrees as specified, the range being from 0 to 400° C. or 30 to 760° F., respectively.

Type.—Etched stem, glass.

Liquid.—Mercury.

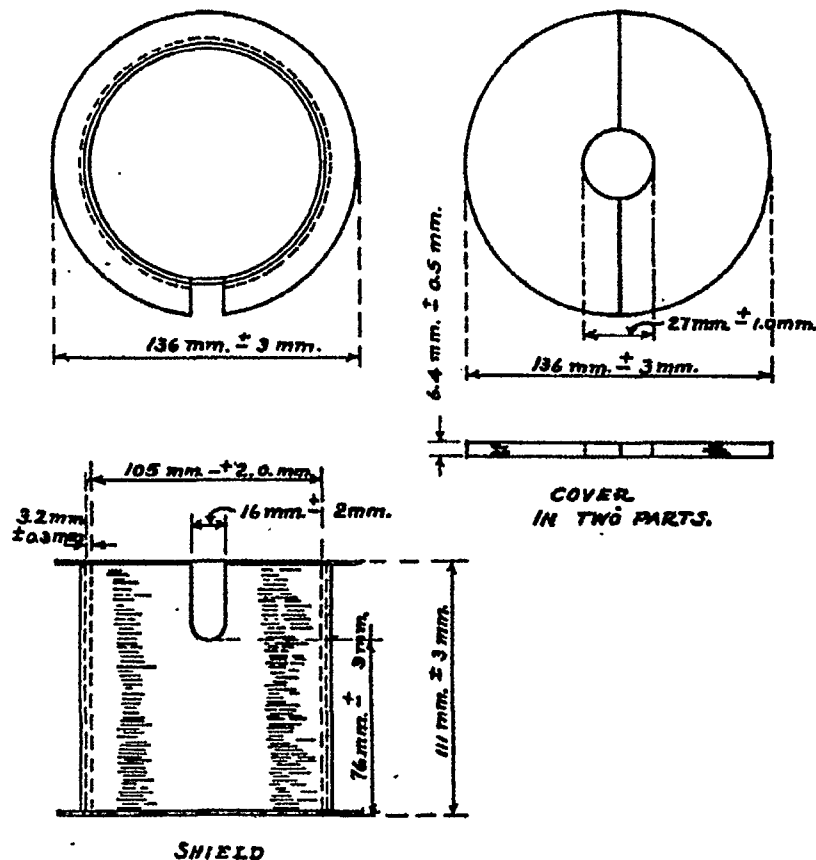
Range and subdivision.—0 to 400° C. in 1° C. or 30 to 760° F. in 2° F.

Total length.—378 to 384 mm (14.88 to 15.12 in.).

Stem.—Plain front, enamel back, suitable thermometer tubing. Diameter, 6.0 to 7.0 mm (0.24 to 0.28 in.).

FEDERAL STANDARD STOCK CATALOG
(Section IV, Part 5)

B-P-361-9
(June 1933)



FLANGED OPEN END CYLINDER,
MADE OF 22 GAGE GALVANIZED
IRON WITH $\frac{1}{8}$ IN. ASBESTOS LINING
RIVETED TO METAL

FIGURE 4.

Bulb.—Corning normal or equally suitable thermometric glass.
Length, 10 to 15 mm (0.39 to 0.59 in.). Diameter, 5.0 to 6.0 mm
(0.20 to 0.24 in.).

Distance to 0° C. or 32° F. line from bottom of bulb: 25 to 35 mm
(0.98 to 1.38 in.).

Distance to 400° C. or 752° F. line from top of thermometer:
30 to 45 mm (1.18 to 1.77 in.).

Filling above mercury.—Nitrogen gas.

Top finish.—Glass ring.

Graduation.—All lines, figures, and letters clear cut and distinct.

The first and each succeeding 5° C. or 10° F. line to be longer than the remaining lines. Graduations to be numbered at each multiple of 10° C. or 20° F.

Immersion.—Total.

Special marking.—"A.S.T.M. High Distillation", a serial number, and the manufacturer's name or trade mark shall be etched on the stem.

Scale error.—The error at any point of the scale up to 370° C. or 700° F. when the thermometer is standardized as provided below shall not exceed 1° C. or 2° F.

Standardization.—The thermometer shall be standardized immersed in the testing bath to the top of the mercury column, at the ice point and at temperature intervals of approximately 50° C. or 100° F. up to 370° C. or 700° F.

Test for permanency of range.—After being subjected to a temperature between 360 and 370° C. or 680 and 700° F. for 24 hours, the accuracy shall be within the limit specified.

Case.—The thermometer shall be supplied in a suitable case on which shall appear the marking: "A.S.T.M. High Distillation, 0 to 400° C.", or "A.S.T.M. High Distillation, 30 to 760° F.", according to the type of thermometer.

Note.—For the purpose of interpreting these specifications the following definitions apply:

The total length is the over-all length of the finished instrument.

The diameter is that measured with a ring gage.

The length of the bulb is the distance from the bottom of the bulb to the beginning of the enamel backing.

The top of the thermometer is the top of the finished instrument.

F-2g (1) *f. Burner and shield.*—A Bunsen burner and a suitable shield or chimney to protect the burner from draughts.

F-2g (2) *Procedure.*—

F-2g (2) *a. Assembly of apparatus.*—The flask shall be supported on a tripod or rings over two sheets of 20 mesh gauze, 150 mm

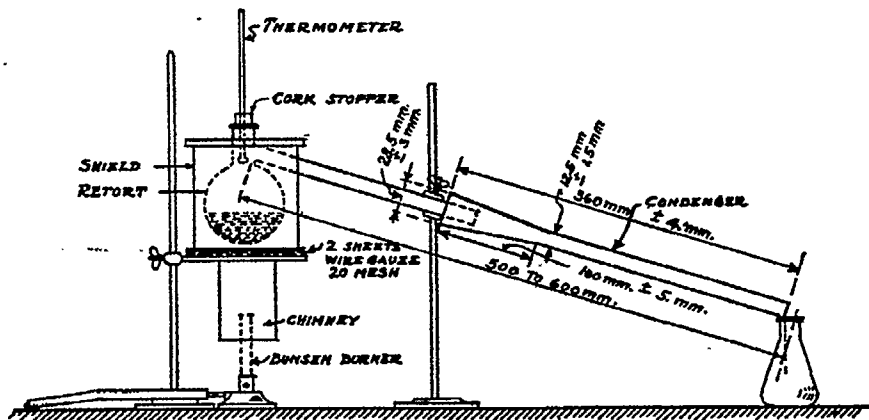


FIG-5- DISTILLATION APPARATUS ASSEMBLY.

FIGURE 5.

square, as shown in fig. 5. It shall be connected to the condenser tube by a tight cork joint. The thermometer shall be inserted through a cork in the neck with the top of the bulb level with the lowest point of juncture of the tubulature and neck of the flask.

The axis of the flask through the neck shall be vertical.

The distance from the bulb of the thermometer to the outlet end of the condenser tube shall be not more than 600 nor less than 500 mm.

F-2g (2) b. Distillation.—Place 100 grams ± 0.1 gram of the pitch in the flask and apply heat so that the first drop comes over in from 5 to 15 minutes. Conduct the distillation at the rate of between 50 and 70 drops per minute, collecting the distillate in the weighed receiver and stopping the distillation when the thermometer registers 300° C. (572° F.). During the distillation the condenser tube shall be warmed whenever necessary to prevent the accumulation of solid distillates. Weigh the distillate and calculate the percentage of distillate under 300° C. (572° F.).

F-2h. Specific gravity of distillate at 38°/15.5° C. (100°/60° F.)—Any approved method that gives results accurate to the third decimal place may be used for determining the specific gravity of the distillate, but the Westphal balance is recommended for small amounts. The specific gravity is not determined on distillates weighing less than five grams.

G. PACKAGING, PACKING, AND MARKING

G-1. Packaging.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. Packing.—Unless otherwise specified the subject commodity shall be delivered in standard commercial containers, so constructed as to insure acceptance by common or other carriers, for safe transportation, at the lowest rate, to the point of delivery.

G-3. Marking.—Each package shall be legibly marked with a description of the contents, the name of the manufacturer, the place of manufacture, the brand (if any), the net weight of net liquid measure of the contents, and some means of identification of "the particular contract on which purchase and shipment were made". Each shipment of the material shall be accompanied by printed directions for its use.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall respectively form a part of this specification:

H-1a. Army.—United States Army Specification No. 100-2, Standard Specification for Marking Shipments.

H-1b. Navy Department purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, roofing, siding, and sheet metal work; damp-proofing and membrane waterproofing, copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D.C.

FEDERAL STANDARD STOCK CATALOG
(Section IV, Part 5)

I. NOTES

I-1. Type I coal-tar pitch is intended for use with coal-tar saturated felt for roofing and waterproofing in the construction of built-up roofing over board sheathing with inclines not exceeding 3 inches to the foot and over concrete surfaces with inclines not exceeding 1 inch per foot.

I-2. Type II coal-tar pitch is intended for use with coal-tar saturated felt for roofing and waterproofing, as a plying cement in the construction of membrane waterproofing, or alone as a damp proofing coating.

This coal-tar pitch may be used for damp proofing and waterproofing tanks, retaining walls, dams, conduits, foundations of buildings, tunnels, subways, pools, reservoirs, etc., where not exposed except during installation to temperatures exceeding 38° C. (100° F.) and where not subject to vibration.

I-3. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-4. This specification governs all United States Government purchases of this commodity. Users are requested to retain this specification in permanent file until a revision is issued.

I-5. Interested parties are advised that an Alphabetical Index of Federal Specifications may be obtained upon application as noted in paragraph next below, price to be obtained from the Superintendent of Documents.

I-6. Copies of this specification may be obtained upon application, accompanied by money order or coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D.C. Price, 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE

For sale by the Superintendent of Documents, Washington, D.C. . . . Price 5 cents

R-P-381
AMENDMENT-1
FEBRUARY 5, 1953

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**PITCH; COAL-TAR (FOR) MINERAL SURFACED
BUILT-UP ROOFING, WATERPROOFING AND
DAMPPROOFING**

This amendment, which forms a part of Federal Specification R-P-381, dated June 6, 1933, was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

Page 2, paragraph E-2, the softening point (cube in water method), type I, maximum: Delete "66° C. (150° F.)" and substitute "68° C. (155° F.)".

Page 11, paragraph H-1a: Delete and substitute:

H-1a. *Army, Navy, and Air Force.—Marking of shipments.*—Interior packages and exterior shipping containers shall be marked in accordance with Military Standard MIL-STD-129, Marking of Shipments. The nomenclature shall be as follows:

Pitch, Coal Tar, Type _____ *

Fed. Spec. R-P-381

*Applicable data to be entered by the contractor.

Paragraph H-1b: Immediately following H-1b insert as follows:

NAVY INTEREST: Y.

R-P-381
AMENDMENT—1
FEBRUARY 5, 1953

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**PITCH; COAL-TAR (FOR) MINERAL SURFACED
BUILT-UP ROOFING, WATERPROOFING AND
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Pitch, Coal Tar, Type -----
Fed. Spec. R-P-381

*Applicable data to be entered by the contractor.

Paragraph H-1b: Immediately following H-1b insert as follows:

NAVY INTEREST: Y.

R-P-381

AMENDMENT-1
FEBRUARY 5, 1953

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**PITCH; COAL-TAR (FOR) MINERAL SURFACED
BUILT-UP ROOFING, WATERPROOFING AND
DAMP-PROOFING**

This amendment, which forms a part of Federal Specification R-P-381, dated June 6, 1933, was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

Page 2, paragraph E-2, the softening point (cube in water method), type I, maximum: Delete "60° C. (150° F.)" and substitute "68° C. (155° F.)".

Page 11, paragraph H-1a: Delete and substitute:

H-1a, Army, Navy, and Air Force.—Marking of shipments.—Interior packages and exterior shipping containers shall be marked in accordance with Military Standard MIL-STD-129, Marking of Shipments. The nomenclature shall be as follows:

Pitch, Coal Tar, Type _____ *

Fed. Spec. R-P-381

* Applicable data to be entered by the contractor.

Paragraph H-1b: Immediately following H-1b insert as follows:

NAVY INTEREST: X

7007
500

SS-S-451

JULY 26, 1932

FEDERAL STANDARD STOCK CATALOGUE

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

SLATE; ROOFING

This specification was approved for promulgation by the Federal Specification Board on July 26, 1932, for the use of the departments and independent establishments of the Government in the purchase of this commodity, and shall become mandatory for all departments and independent establishments of the Government not later than February 15, 1933. It may be put into effect, however, at any earlier date, after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS.

A-1. There are no other Federal specifications applicable to this specification.

A-2. Any special requirements of individual departments of the Government are noted in section H.

B. TYPES, GRADES, CLASSES, ETC.

B-1. This specification covers only one type, i. e., commercial standard thicknesses and sizes of roofing slate, and three grades—

Grade A.

Grade B.

Grade C.

NOTE.—For color requirements see paragraph E-1.

C. MATERIAL AND WORKMANSHIP, ETC.

C-1. Slate shall conform to the following requirements:

C-1a. Unless otherwise specified surfaces shall be of reasonably smooth cleavage. (See I-5b.)

C-1b. Slate shall be free from knots or knurls that would lessen the durability or weather tightness of the finished work.

C-1c. Unless otherwise specified slate shall be rectangular, with straight cut edges.

C-1d. Unless otherwise specified corners shall be reasonably full on exposed edges, with no broken corners on covered ends that would diminish the nailing strength or weather tightness.

C-1e. Thickness shall be approximately three-sixteenth inch, measuring 22 to 25 inches per 100 pieces when closely piled for smooth-surface slate and 25 to 30 inches per 100 pieces for rough-surface slate.

FEDERAL STANDARD STOCK CATALOGUE

(Section IV, Part 5)

C-1f. *Flatness*.—The maximum bend shall not exceed one-eighth inch in 12 inches. Slate if curved shall be made so that it can be laid with the convex side up.

C-1g. Unless otherwise specified, holes shall be machine punched for 3-inch double lap.

D. GENERAL REQUIREMENTS.

D-1. Slate shall be whole and clean. Not more than 2 per cent of broken slate will be accepted.

E. DETAIL REQUIREMENTS.

E-1. *Color*.—The color designations for slates shall be as follows:

Black.	Blue gray.	Green.
Blue black.	Purple.	Purple variegated.
Gray.	Mottled purple and green.	Red.

If a definite ultimate color effect in grade A is desired these color designations shall be preceded by the word "unfading" or "weathering." (See I-5d).

E-2. *Strength*.

E-2a. The average modulus of rupture across the grain shall not be lower than 9,000 pounds per square inch.

E-3. *Absorption*.

E-3a. The average absorption shall be not more than the following:

	Per cent
Grade A.....	0.25
Grade B.....	.35
Grade C.....	.45

E-4. *Acid resistance*.

E-4a. The slate shall, under the acid test, show no softening to an average depth greater than the following:

	Inch
Grade A.....	0.002
Grade B.....	.008
Grade C.....	.014

F. METHODS OF SAMPLING, INSPECTION, AND TESTS.

F-1. The inspection of the slate may be made at the discretion of the Government either before or after delivery.

F-2. Samples for test, when required, shall be selected by the inspector and shall be representative of the material. At least one sample of 6 slate shall be selected from each carload or fraction thereof. Additional samples may be taken for test at any time or place at the discretion of the Government.

F-3. *Absorption test*.

F-3a. The specimen shall consist of a square or rectangular slab not less than 4 inches on any side, cut from the slate shingle so that the saw cut is nowhere nearer than 1 inch to the sheared edge. At

FEDERAL STANDARD STOCK CATALOGUE

SS-S-451-3
(July, 1932)

(Section IV, Part 5)

least six specimens each from a separate slate shall be prepared from each sample, the sample being considered as any number of shingles selected from a particular consignment. The specimens shall be scrubbed with a fiber brush and water, then dried in a well-ventilated oven for 24 hours at $110^{\circ} \pm 3^{\circ}$ C. The specimens shall then be cooled in a desiccator and weighed to the nearest 0.01 gram for the dry weight W_1 . They shall then be completely immersed in water at $20^{\circ} \pm 3^{\circ}$ for 48 hours, surface dried with a damp cloth and immediately weighed, as before, for the saturated weight W_2 . The percentage of absorption is then computed by the formula

$$A = \frac{100(W_2 - W_1)}{W_1}$$

F-4. Modulus of rupture test.

F-4a. The specimen shall consist of a piece 4 inches wide and 12 inches long sawed with the long dimensions of the specimen parallel to the long dimension of the slate, so that the saw cut is not nearer than 1 inch to the sheared edge of the shingle. At least five specimens each from a separate slate shall be prepared and tested from each sample. The specimens shall be dried for at least 4 hours in an oven at approximately 105° C. The width at the middle B shall then be determined to within 0.01 inch and the average thickness at the middle D shall be determined to the nearest 0.001 inch. The test piece shall be supported on two knife-edges of the rocker type with edges spaced 10 inches and adjusted perpendicular to the long dimension. The load shall be applied through the third knife-edge at the middle of the specimen along a line parallel to the supporting knife-edges. The load shall be increased at a rate of about 100 pounds per minute until rupture occurs, at which the breaking load W is recorded. The modulus of rupture R is then computed by the formula

$$R = \frac{3WL}{2BD^3}$$

where L is the distance in inches between the lines of support.

F-5. Acid test.

F-5a. Acid tests shall be made by immersing at least four 4 by 6 inch slabs of each sample, each from separate slate, in glass trays containing 1 part by weight of sulphuric acid and 99 parts pure water for 7 days. The slates shall be spaced in such a way that the acid has free access to all surfaces, and the acid solution shall be renewed daily. At the end of 7 days the specimens shall be removed from the acid bath, washed free of acid, and surface dried with a cloth without rubbing. At least three representative areas about one-half inch square shall be marked near the edge of each specimen and the thickness at these areas measured with a micrometer. The softened material at the chosen areas shall then be removed from both faces with a putty knife by scraping with the side of the blade. The thickness of the slab at the scraped areas shall be determined as originally and the depth of softening taken as half of the average loss in thickness. Where ribbons or veins are present, at least half of the tests shall be made on such parts.

FEDERAL STANDARD STOCK CATALOGUE

(Section IV, Part 5)

G. PACKAGING, PACKING, AND MARKING.

G-1. *Packing*.—For domestic shipment, current commercial packing, which will insure delivery in good order; for export, respective specifications of individual departments referred to in section H shall govern.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS.

H-1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall respectively form a part of this specification.

H-1a. Army: United States Army Specification No. 100-2, Standard Specification for Marking Shipments.

H-2. Navy Department purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, Roofing, Siding, and Sheet-Metal Work; Damp proofing and Membrane Waterproofing (copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D. C.).

I. NOTES.

I-1. Each purchase order shall specify the required color.

I-2. If thicknesses other than three-sixteenths inch are desired they should be specified in conformity with Simplified Practice Recommendation R 14-28.

I-3. *Sizes*.—The following is a list of standard sizes given in inches.

1. SLOPING ROOFS

10×6	12×8	14×9	16×10	18×12	22×11
10×7	12×9	14×10	16×12	20×10	22×12
10×8	12×10	14×12	18×9	20×11	22×14
12×6	14×7	16×8	18×10	20×12	24×12
12×7	14×8	16×9	18×11	20×14	24×14

2. FLAT ROOFS

6×6	10×6	12×6
6×8	10×7	12×7
6×9	10×8	12×8

NOTE.—Thickness of flat roof slates for ordinary service may be three-sixteenths inch and for promenade or extraordinary service one-fourth to three-eighths inch.

I-4. Certain sizes of slate are at times more plentiful than other sizes, and certain sizes usually cost more than other sizes of the same grade. It will be economical both in cost and time to specify a range of sizes as acceptable and to permit the use of random widths. Smaller sizes should be selected for smaller surfaces, even when larger sizes are desired for the larger surfaces of the same project.

I-5. *General information for purchasing agents*.

I-5a. *Knots and knurls*.—These terms refer to rounded protuberances which sometimes occur in slate and affect the smoothness of the split surface.

I-5b. *Texture*.—This term is used to designate the character and appearance of the split surface. Rough splitting or rough-textured slates are preferred by many architects to avoid the appearance of a

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(July, 1932)
(Section IV, Part 5)

milled or molded roofing material. The smooth and rough splitting slates are as follows:

Maine.....	Smooth.
Vermont.....	Smooth and rough.
New York.....	Do.
Pennsylvania soft vein.....	Smooth.
Pennsylvania hard vein.....	Smooth and rough.
Peach Bottom, Pa.....	Rough.
Virginia.....	Smooth and rough.

I-5c. *Colors.*—All slates from Pennsylvania except the “gray beds,” as well as those from the Peach Bottom district of Pennsylvania and Maryland, from Monson, Me., and from Arvonis, Va., known as Buckingham slates, are dark gray to blue-black. The purple, red, and green slates are produced in Vermont or in the contiguous region around Granville, N. Y. Production of red slate is intermittent. Vermont also produces a limited quantity of dark mottled gray slate and black slate.

I-5d. *Color changes.*—Some dark slates upon exposure may fade to a gray color. This change is not always uniform and may result in an undesirable appearance. Such color changes have led to use of the terms “unfading” and “weathering.” Since there is no satisfactory laboratory test for determining permanence of color in slate, the classification of Dale in United States Geological Survey Bulletin No. 586, page 188, shall be taken as a guide.

Another type of color change occurs in certain green slates from Vermont and New York which become buff or brown after a few months’ exposure. These are known as weathering green or sea green slates. Although referred to by Dale as fading, this is a type of color aging that does not detract from the quality and is usually considered as a desirable change.

I-5e. This specification governs all United States Government purchases of this commodity except as covered by paragraph H-2. Users should retain this specification in permanent file until a revision is issued.

I-6. Interested parties are advised that an alphabetical index of Federal Specifications may be purchased as noted in paragraph next below, price to be obtained from the Superintendent of Documents.

I-7. Copies of this specification may be obtained upon application, accompanied by money order or coupon or cash, to Superintendent of Documents, Government Printing Office, Washington, D. C. Price, 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever, and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1932

For sale by the Superintendent of Documents, Washington, D. C. . . . Price 5 cents

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SS-R-501a
AMENDMENT-1
JANUARY 18, 1952

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**ROOFING, PREPARED; ASPHALT,
SMOOTH-SURFACED**

This amendment was approved by the Comptroller, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

The following changes shall be made in Federal Specification SS-R-501a, dated September 28, 1948:

Page SS-R-501a-1:

Paragraph C-1:

Line 3: Insert "may" before "include".

Page SS-R-501a-2:

Paragraph C-1 (cont'd.):

Line 1: Insert ", when present," after "stabilizer".

Page SS-R-501a-3:

Paragraph E-1: Table 1: Mineral stabilizer in coating passing No. 100 sieve, including mineral surfacing material passing No. 100 sieve, percent by weight—Minimum: Class A (65-pound) and Class B (55-pound), delete "15".

SS-R-501a

AMENDMENT—2

APRIL 29, 1952

SUPERSEDING

AMENDMENT—1

January 18, 1952

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**ROOFING, PREPARED; ASPHALT,
SMOOTH-SURFACED**

This amendment, which forms a part of Federal Specification SS-R-501a, dated September 28, 1948, was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

Page 1, paragraph C-1, line 3: Insert "may" before "include".

Page 2, paragraph C-1 (continued), line 1: Insert "when present," after "stabilizer".

Page 3, paragraph E-1:

Table I: Mineral stabilizer in coating passing No. 100 sieve, including mineral surfacing material passing No. 100 sieve, percent by weight—Minimum: Class A (85-pound) and Class B (55-pound), delete "15".

Page 8, paragraph H-3: Delete and substitute:

H-3 Air Bore.—Interior packages and exterior shipping containers shall be marked in accordance with Military Standard MIL-STD-129, Marking of Shipment.

The nomenclature shall be as follows:

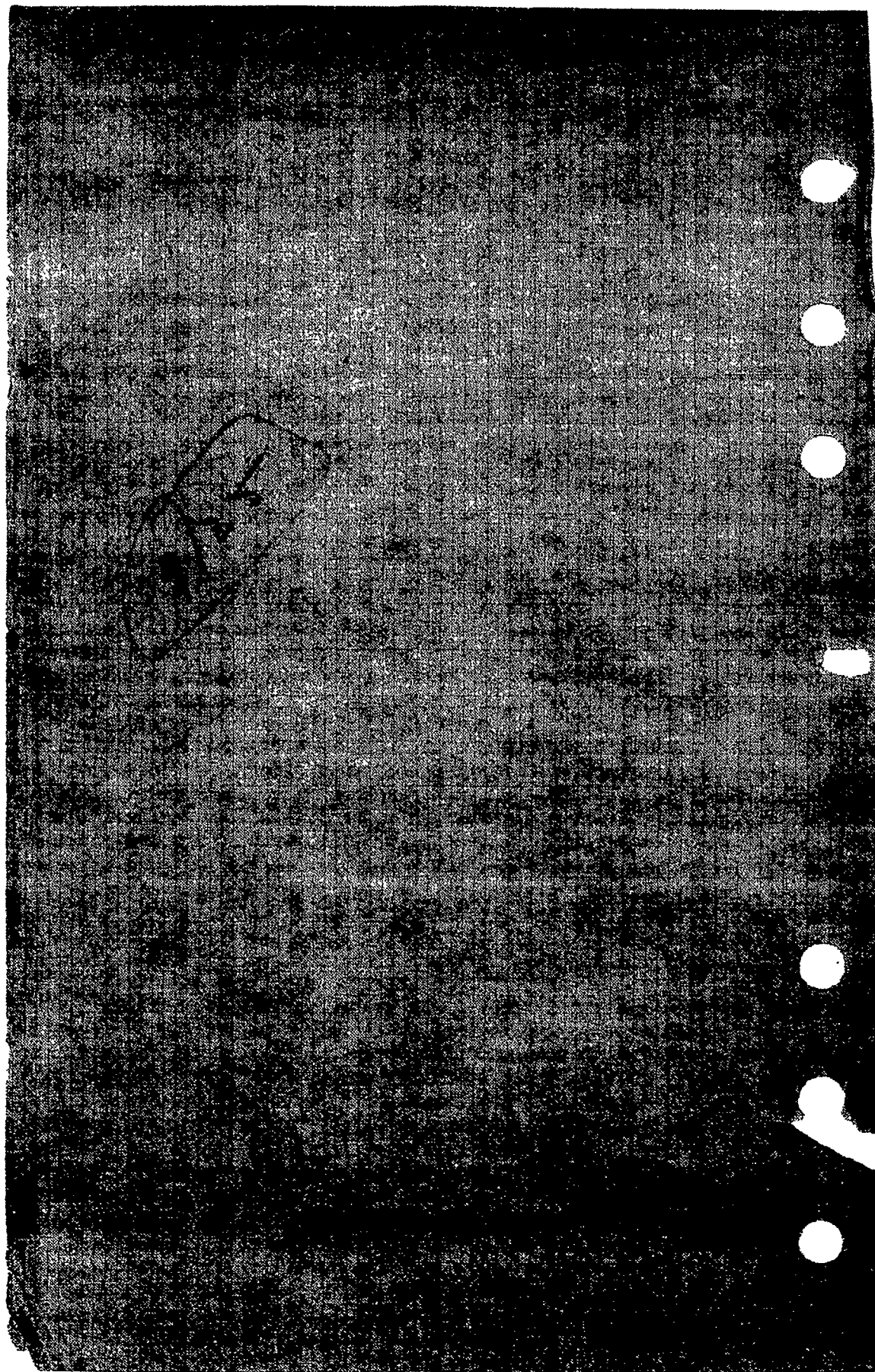
Roofing, Prepared; Asphalt, Smooth-Surfaced

Class

Width

Fed. Spec. SS-R-501a

(Copies of specifications and standards required by contractors in connection with specific procurement functions may be obtained from the procuring agency or as directed by the contracting officer.)



BIRD 006527

SS-R-501a

SEPTEMBER 28, 1948

SUPERSEDING
Fed. Spec. SS-R-501
August 1, 1933, and
EMERGENCY ALTERNATE
E-SS-R-501
October 21, 1941

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

ROOFING, PREPARED; ASPHALT, SMOOTH-SURFACED

This specification was approved on the above date by the Director, Bureau of Federal Supply, for the use of all departments and establishments of the Government, and shall become effective not later than January 1, 1949, for use in procurement initiated on or after that date. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE SPECIFICATIONS AND OTHER PUBLICATIONS

A-1. There are no other specifications applicable to this specification except those referenced in section H by individual departments.

A-2. The following Underwriters' Laboratories, Inc., publication, of the issue in effect on date of invitation for bids, shall form a part of this specification:

List of Inspected Fire Protection Equipment and Materials.

B. CLASSES, WIDTHS, AND GRADE

B-1. *Classes.*—Prepared roofing shall be furnished in the following classes, as specified in the invitation for bids, contract, or purchase order.

Class A.—65-pound.

Class B.—55-pound.

B-2. *Widths.*—Prepared roofing shall be furnished in rolls $36 \pm \frac{1}{4}$ inches or $32 \pm \frac{1}{4}$ inches wide, as specified in the invitation for bids, contract, or purchase order.

B-3. *Grade.*—Prepared roofing shall be furnished in one grade only.

C. MATERIAL AND WORKMANSHIP

C-1. *Material.*—The prepared roofing shall be composed of roofing felt made of organic fibers, saturated with asphalt and coated on both sides with asphaltic compounds that include mineral stabilizers, and surfaced with powdered talc, mica, or any suitable surfacing material which will prevent sticking in the rolls. The

SS-R-501a-2 FEDERAL STANDARD STOCK CATALOG
(Sept. 1948) (Section IV, Part 5)

mineral stabilizer shall consist of mica, slate, talc, limestone, or any other suitable inorganic material.

C-2. *Workmanship.*—The surface of the roofing shall be smooth or finely veined in appearance. The coating on both sides of the sheet shall be uniformly applied and shall extend to both edges of the sheet, and no uncoated spots or defects, such as blisters or lumps of coating, shall be perceptible.

D. GENERAL REQUIREMENTS

D-1. *Underwriters' Laboratories requirements.*—

D-1a. The contractor shall submit proof to the purchasing agency that the material he furnishes under this specification conforms to the requirements of the Underwriters' Laboratories, Inc., regarding fire and casualty hazards. The label (class C), listing, marker, or certified report of the Underwriters' Laboratories, Inc., will be accepted as evidence of compliance with this requirement.

D-1b. In lieu of Underwriters' Laboratories evidence, the contractor may submit evidence from other sources that his material conforms to Underwriters' Laboratories requirements. The acceptance or rejection of such proof of conformance shall be decided by the purchasing agency.

D-1c. Compliance with the Underwriters' Laboratories requirements regarding fire and casualty hazards does not absolve the contractor from complete compliance with the requirements of this specification in order to secure the acceptance of his material. In the event of differences between any of the requirements of this specification and those of Underwriters' Laboratories, Inc., the requirements of this specification shall govern.

D-2. *Area of rolls.*—The roofing shall be furnished in rolls containing not less than 108 square feet or 216 square feet, as specified in the invitation for bids, contract, or purchase order. (See par. I-2.)

D-3. *Average gross weight.*—The average gross weight per 108 square feet of roofing, complete with wrapping, packing, nails, and lap cement, shall be not less than 65 pounds for the 65-pound class (class A) and 55 pounds for the 55-pound class (class B).

D-4. *Weight per roll of wrapping.*—The total weight of the wrapping, packing, nails, and cement per roll of roofing shall be not greater than 3 pounds for rolls containing 108 square feet, or 6 pounds for rolls containing 216 square feet.

D-5. *Nails.*—

D-5a. *Dimensions.*—The gage of the wire shall be not greater than Washburn and Moen No. 10 (0.135 inch) nor less than Washburn and Moen No. 12 (0.105 inch). The head shall be not less than $\frac{3}{8}$ inch in diameter, nor less than 0.025 inch in thickness. The shank shall be not less than $\frac{3}{4}$ inch in length for class B, 55-pound roofing, and $\frac{7}{8}$ inch in length for class A, 65-pound roofing, except that $\frac{3}{4}$ -inch nails may be supplied for both classes when the roofing is to be applied by the "blind" or concealed nailing method. If barbed, the barbing shall not increase the diameter of the lower two thirds more than 0.01 inch. The lower end of the shank shall be pointed. If square and twisted (spiral), the cross-sectional area shall be equivalent to that specified above.

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(Section IV, Part 5)

SS-B-501a-3
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D-5b. *Protective coating.*—Nails shall be galvanized or sherardized, and shall resist four 1-minute dips in a copper sulfate solution when tested in accordance with the Standard Method of Test for Uniformity of Coating by the Preece Test (Copper Sulfate Dip) on Zinc-Coated (Galvanized) Iron or Steel Articles (A.S.T.M. designation A 239) of the American Society for Testing Materials.¹

D-5c. *Quantity.*²—There shall be furnished per 108 square feet of roofing an average of not less than 252 nails for 36-inch roofing and not less than 275 nails for 32-inch roofing.

D-6. *Lap cement.*—The lap cement shall be such that it can be readily applied by brush or trowel and will firmly bind the laps without any injurious effect upon the roofing. The lap cement shall consist of a bituminous base dissolved in a volatile organic solvent. Organic products or inorganic filler may be added to improve working and adhesive properties. Not less than $\frac{3}{4}$ pint per 108 square feet shall be furnished for 36-inch roofing and not less than 1 pint per 108 square feet for 32-inch roofing.

D-7. *Condition.*—The roofing shall not crack or be so sticky as to cause damage when unrolled at temperatures between 50° and 90°F.

E. DETAIL REQUIREMENTS

E-1. The roofing shall comply with the requirements shown in table I.

TABLE I.—Physical and chemical requirements.

	Class A, 65-pound		Class B, 55-pound	
	Maximum	Minimum	Maximum	Minimum
Weight per 108 square feet of roofing pounds		60	....	50
Pliability at 25°C. (77°F.) (cracking on bending 90° over a rounded edge of $\frac{1}{4}$ -inch radius)....		None	....	None
Heat test at 80°C. (176°F.) (sliding, blistering, or absorption of the coating asphalt)		None	....	None
Weight of moisture-free desaturated felt per 108 square feet pounds		13.0	....	10.8
Ash of moisture-free desaturated felt percent by weight	10	....	10	....
Thickness of desaturated felt.... inch		0.06	....	0.05
Saturation of felt*..... percent		160	....	160
Weight of coating per 108 square feet pounds		13	....	13
Mineral stabilizer in coating passing No. 100 sieve, including mineral surfacing material passing no. 100 sieve.....		15	....	15
Mineral matter retained on a No. 100 sieve, in and on coating, per 108 square feet.... pounds	5.0	....	5.0	....

* The sheet of felt shall be thoroughly and uniformly saturated.

¹ 1946 Edition of A. S. T. M. Standards, Part I-A.

² Nails may be furnished in bulk as agreed between buyer and seller.

E-2. Piecing.—No roll shall contain more than two pieces of roofing nor shall there be more than 3 percent of such rolls in a shipment. No piece of roofing shall be less than 10 feet in length.

F. METHODS OF SAMPLING, INSPECTION, AND TESTS

F-1. Sampling for inspection.—From each shipment or fraction thereof representing a product of the same class and width, a number of rolls shall be taken at random as follows:

Rolls in shipment	Number of rolls to be taken
Up to 1,000.....	5
1,001-1,728	6
1,729-2,744	7
2,745-4,096	8
4,097-5,832	9
5,833-8,000	10
8,001-10,648	11
10,649 and over...	12

F-2. Inspection.—The sample rolls taken shall be inspected to determine compliance with this specification with respect to workmanship, condition, width, and weight.

F-2a. Gross weight of roll, packing material, nails, and cement.—Each roll taken (see par. F-1) shall be weighed intact to the nearest ¼ pound. The wrappers, packing material, nails, and cement from each roll shall be weighed together to the nearest ¼ pound. The quantity and character of nails and lap cement shall be recorded.

F-2b. Weight per 108 square feet of finished roofing.—The width and length of each roll taken shall be measured to the nearest ¼ inch and weighed to the nearest ¼ pound. From this data the weight per 108 square feet of finished roofing can be conveniently calculated by the following formula:

$$\frac{\text{Weight in pounds}}{\text{Length in feet} \times \frac{\text{width in inches}}{12}} \times 108 = \text{Weight of 108 square feet of roofing}$$

If the calculated weight of 108 square feet of finished roofing of any roll taken as in paragraph F-1 is less than 50 pounds for the 55-pound class and 60 pounds for the 65-pound class, additional rolls equal to twice the number originally taken shall be inspected. If the calculated weight of 108 square feet of finished roofing of any of these additional rolls is less than the minimum specified, the entire lot shall be rejected by the inspector and no samples taken for laboratory examination.

F-3. Sampling for laboratory examination.—From the rolls examined in sampling for inspection, select one the weight of which is nearest the average weight of the lot examined. Unroll, and at approximately 10-feet from the outside end, cut two samples the full width of the roll and approximately 40 inches long. The sheet shall be cut at right angles to the edge of the roll. Measure

and weigh the strips and calculate the weight per 108 square feet of each. Discard any strip whose weight varies by more than 1.5 percent from the weight obtained in paragraph F-2a. Divide each strip into four equal parts, identifying the inside of the roll and the direction of the fiber grain on each section. (The direction of the fiber grain is parallel to the edge of the roll.) Label and pack flat between supports wide and stiff enough to prevent crushing. Transmit one sample (the four sections cut from one sheet) to the testing laboratory and retain the other for check tests if necessary.

F-4. Laboratory examination.—

F-4a. Weight.—Assemble the pieces and 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 108 square feet. Designate the weight as A. The weight so determined is only to be used in making the laboratory calculations and shall not be used as a basis for acceptance or rejection. (See par. F-2b.)

F-4b. Appearance.—Examine both sides of the sample and note the appearance. The coating should extend to the edges of the sheet, which should not be ragged. No uncoated spots or defects, such as blisters or large lumps of coating, should be perceptible.

F-4c. Pliability.—Cut five strips 1 inch wide and 6 inches long in the direction of the fiber grain and immerse them in water at 25°C. (77°F.) for 10 to 15 minutes. Remove the strips from the water and immediately bend each strip, with the exposure side up, 90° over the edge of a block (which has been rounded to an arc whose radius is $\frac{3}{4}$ inch) at a uniform speed in approximately 2 seconds' time. Dry thoroughly and examine. If one or more of these five strips crack on this test, cut 10 strips from another part of the sample and repeat the test. If one or more of these strips crack, the material shall be reported as failing the pliability test.

F-4d. Behavior on heating at 80°C. (176°F.) for 5 hours.—Cut a strip of the roofing approximately 8 by 8 inches and suspend it vertically for 5 hours in an oven maintained at 80°C. (176°F.) $\pm 3^\circ\text{C}$. (5°F.). Remove at the end of this period, and note any flowing, sagging, blistering, or absorption of the coating asphalt.

F-4e. Weight of moisture-free desaturated felt.—Cut a strip approximately 2 inches wide and 16 inches long from the area corresponding to the original center of the sheet, the 16-inch dimension being perpendicular to the fiber grain. Measure accurately and weigh to the nearest milligram. From this data calculate the weight in pounds of 108 square feet of roofing. If this weight varies by more than 1.5 percent from that calculated in paragraph F-4a, discard and cut additional strips until a sample within this limit is obtained. Extract with carbon tetrachloride, benzol, or carbon bisulfide until free from soluble constituents. Dry the extracted felt in air until free from organic solvent and brush off any adhering mineral matter. Determine the thickness as specified in paragraph F-4f. Place the desaturated felt in an uncapped, tared weighing bottle and dry in an oven for 1 hour at 105° $\pm 5^\circ\text{C}$.; cap the bottle. Cool in a desiccator and weigh; designate this

weight as *a*. (Note.—This weight includes the moisture-free desaturated felt plus any absorbed and adhering mineral stabilizer from the coating asphalt.) Incinerate the strip at a temperature not exceeding 600°C. in a muffle furnace or over an open flame, until all the organic matter is consumed. Cool in a desiccator and weigh; designate this weight as *b*.

Calculate the weight of 108 square feet of moisture-free desaturated felt as follows: (See par. F-4i for the quantity F.)

$$\frac{(a - b) \times 34.29}{\text{Area in sq. in.}} \times \frac{100}{100 - F} = \text{weight, pounds per 108 sq. ft.}$$

Designate this weight as B.

F-4f. Thickness of moisture-free desaturated felt.—Measure the thickness of the moisture-free desaturated felt obtained in paragraph F-4e with a dead weight micrometer gage having a cylindrical foot and anvil, with flat bearing surfaces 1 square inch in area. The load used shall be 2 pounds per square inch. The thickness of the felt shall be measured at 10 equally spaced points along the long dimension of the strip.

F-4g. Total ash of roofing.—Cut a strip 2 inches wide and 16 inches long from the area corresponding to the original center of the sheet, with the 16-inch dimension perpendicular to the fiber grain. Measure accurately and weigh to the nearest milligram. From this data calculate the weight in pounds of 108 square feet of roofing. If this weight varies by more than 1.5 percent from that calculated in paragraph F-4a, discard and cut additional strips until a sample within this limit is obtained. Roll the strip, place it in an evaporating dish (approximately 4 inches in diameter), and ignite from above until the greater portion of the combustible matter is consumed, then in a muffle furnace at a temperature not greater than 600°C. until free from organic matter. Cool in a desiccator and weigh. Calculate from this weight the weight of total mineral matter contained in 108 square feet of roofing. Designate this weight as C. Place total ash obtained as above on a 100-mesh sieve and wash with a gentle stream of water until free from fines (material passing the 100-mesh sieve). Dry the material retained on the 100-mesh sieve for 1 hour at 105° ± 5°C., cool in a desiccator, and weigh. Calculate from this weight the weight of mineral matter retained on a 100-mesh sieve contained in 108 square feet of roofing. Designate this weight as D.

F-4h. Saturation of felt.—Cut three strips 2 inches wide and 8 inches long at random from the sheet and warm in an oven at about 80°C. (176°F.) until the coating asphalt can be easily stripped from the saturated felt. In removing the coating asphalt, care should be taken to remove as little felt as possible and that none of the coating asphalt remains on the felt. The felt so exposed shall be uniformly saturated, showing no gray or unsaturated spots. Weigh the stripped sample, and extract with carbon tetrachloride, benzol, or carbon bisulfide until free from soluble constituents. Dry the extracted felt in air until free from solvent and then in an uncapped, tared, weighing bottle in an oven at 105° ± 5°C. for 1 hour. Cool in a desiccator and weigh. Calculate the percentage saturation in the following manner:

Weight of saturated felt—weight of
desaturated felt

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

Designate this percentage as E.

F-4i. Ash of moisture-free desaturated felt.—Incinerate the felt obtained in paragraph F-4h, in a weighed crucible in a muffle furnace or over an open flame until all the organic matter is consumed. Cool in a desiccator, weigh, and compute the percentage ash in the moisture-free desaturated felt. Designate this percentage as F. Place this ash on a 100-mesh sieve and wash until free from fines (material passing the 100-mesh sieve). Dry the material retained on the 100-mesh sieve at $105^{\circ} \pm 5^{\circ}\text{C.}$ for 1 hour, cool, and weigh. Calculate from this weight the weight contained in 108 square feet of roofing. Designate this weight as G.

F-4j. Mineral matter in and on coating.—The weight of mineral matter retained on a 100-mesh sieve, in and on the asphalt coating, per 108 square feet is obtained by subtracting G (weight of ash of the felt retained on a 100-mesh sieve per 108 square feet (par. F-4i)) from D (weight of total ash of the roofing retained on a 100-mesh sieve per 108 square feet (par. F-4g)).

F-4k. Weight of coating and percentage of mineral stabilizer in coating.—Determine the weight of coating per 108 square feet and the percentage of mineral stabilizer passing a 100-mesh sieve as follows:

A—Weight of 108 square feet of finished roofing. (See par. F-4a.)

B—Weight of 108 square feet of moisture-free desaturated felt. (See par. F-4e.)

C—Weight of total mineral matter (ash) in 108 square feet of roofing. (See par. F-4g.)

D—Weight of total mineral matter (ash) in 108 square feet of roofing retained by 100-mesh sieve. (See par. F-4g.)

E—Percentage saturation of moisture-free desaturated felt. (See par. F-4h.)

F—Percentage ash of moisture-free desaturated felt. (See par. F-4i.)

G—Weight of mineral matter (ash) in 108 square feet of moisture-free desaturated felt retained on a 100-mesh sieve. (See par. F-4i.)

Weight of coating:

$$A - \left(B + \frac{(B \times E)}{100} + (D - G) \right) = \text{weight of mineral-stabilized coating per 108 square feet.}$$

Percentage mineral stabilizer in coating:

$$C - \left(D + \frac{(B \times F)}{(100)} - G \right) \times 100 = \text{percentage of mineral stabilizer passing 100-mesh sieve.}$$

Weight of mineral-stabilized coating per 108 square feet

G. PACKAGING, PACKING, AND MARKING FOR SHIPMENT

G-1. *Packaging*.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. *Packing*.—Unless otherwise specified, the rolls shall be securely taped or some other equally protective wrapping shall be employed. A standard label shall be attached to each roll to identify the material. The ends of the rolls need not be covered except to retain the nails and lap cement when packed in the rolls.

G-3. *Marking*.—Unless otherwise specified, each package shall be marked with the name of the item, the class, width, and quantity contained therein, as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications and other publications, of the issues in effect on date of invitation for bids, and special requirements, shall form a part of this specification, and shall be applicable to purchases made under this specification by the respective departments:

H-2. *Army*.—U. S. Army Specification 100-2, Standard Specification for Marking Shipments by Contractors, copies of which may be obtained without cost upon application to the procuring agency.

H-3. *Air Force*.—U. S. Army Specification 94-40645, Marking; Exterior, Domestic and Export Shipment, by Contractors, copies of which may be obtained without cost, upon application to the Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio.

H-4. *Navy*.—

H-4a. *Applicable specifications and other publications*.—

Joint Army-Navy Specification:

JAN-P-132—Packaging and Packing for Overseas Shipment—Crates; Unsheathed, Wood; Nailed (for Maximum Net Load of 2,500 Pounds).

Navy Department Specification:

General Specifications for Inspection of Material.

Bureau of Supplies and Accounts Publication:

Navy Shipment Marking Handbook.

Copies of Federal and Joint Army-Navy specifications (required for Navy purchases), Navy Department specifications, and the Navy Shipment Marking Handbook may be obtained without cost upon application to the Bureau of Supplies and Accounts, Navy

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(Section IV, Part 5)

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(Sept. 1948)

Department, Washington 25, D. C., except that Naval activities should make application to the Supply Officer in Command, Naval Supply Center, Norfolk 11, Va. When requesting specifications, refer to both title and number (or symbol).

H-4b. Packaging.—Asphalt roofing shall be furnished in rolls of the size and type commonly used. The rolls shall be securely taped or some other equally protective wrapping shall be employed.

H-4c. Packing.—

H-4c(1). For domestic shipment.—Rolls shall be packed according to best commercial practice to withstand handling and shipping. On less-than-carload-lot shipments rolls shall be packed in unsheathed crates not exceeding 500 pounds gross weight and conforming to the requirements of Joint Army-Navy Specification JAN-P-132.

H-4c(2). For overseas shipment.—Packing will be the same as for domestic shipment, except that the entire shipment shall be packed in unsheathed crates not exceeding 500 pounds gross weight and conforming to the requirements of Joint Army-Navy Specification JAN-P-132.

H-4d. Marking.—In addition to any special marking required by the contract or order, marking of interior packages and shipping containers shall be in accordance with the requirements of the Navy Shipment Marking Handbook.

H-4e. Ordering information.—Requests, requisitions, schedules, and contracts or orders should specify whether the subject commodity is to be packed and shipping containers marked for domestic or overseas shipment. (See pars. H-4c and H-4d.)

NAVY: AMCY

I. NOTES

I-1. Purchasers should exercise any desired options offered herein and should specify the class and width required. (See pars. B-1, B-2, D-2, G-1, G-2, and G-3.)

I-2. A roll of roofing containing 108 square feet will cover 100 square feet of roof area, and a roll containing 216 square feet will cover 200 square feet of roof area when the roofing is laid with a lap of 2 inches.

I-3. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-4. Federal specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, etc., which are suitable for Federal Government requirements.

SS-R-501a-10 FEDERAL STANDARD STOCK CATALOG
(Sept. 1948) (Section IV, Part 5)

I-5. An Index of Federal specifications may be purchased as noted in the paragraph below, price to be obtained from the Superintendent of Documents.

I-6. Copies of the listings of the Underwriters' Laboratories, Inc., referred to herein, may be obtained without cost from the Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago 11, Illinois.

I-7. Copies of this specification may be obtained upon application, accompanied by postal note, money order, coupon, or cash, to the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Price 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1948—501529(52)

For sale by the Superintendent of Documents, Washington 25, D. C.
Price 5 cents.

SS-R-501a

AMENDMENT
APRIL 21, 1963

SUPPLEMENTING
AMENDMENT -1
January 18, 1961

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

ROOFING, PREPARED; ASPHALT,
SMOOTH SURFACED

This amendment, which forms a part of Federal Specification SS-R-501a, dated September 26, 1949, was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

Page 1, paragraph C-1, line 3: Insert "may" before "include".

Page 2, paragraph C-1 (continued), line 1: Insert "when practical" after "stabilizer".

Page 3, paragraph E-1:

Table 1: Mineral stabilizer in coating passing No. 100 sieve, including mineral surfacing material passing No. 100 sieve, per cent by weight—Minimum: Class A (45-pound) and Class B (55-pound), delete "15".

Page 8, paragraph H-3: Delete and substitute:

H-3 Air Force.—Interior packages and exterior shipping containers shall be marked in accordance with Military Standard MIL-STD-128, Marking of Shipment.

The nomenclature shall be as follows:

Roofing, Prepared; Asphalt, Smooth Surfaced

Class

Width

Fed. Spec. SS-R-501a

(Copies of specifications and standards required by contractors in connection with specific Government functions may be obtained from the procuring agency or as directed by the contracting officer.)

SS-R-501a

AMENDMENT-3

APRIL 27, 1956

SUPERSEDING

AMENDMENT-2

April 29, 1953

FEDERAL SPECIFICATION

**ROOFING, PREPARED; ASPHALT,
SMOOTH-SURFACED**

This amendment, which forms a part of Federal Specification SS-R-501a dated September 28, 1948, was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

Page 1, paragraph C-1, line 3: Insert "may" before "include".

Page 2, paragraph C-1 (continued), line 1: Insert "when present" after "stabilizer".

Page 3, paragraph E-1:

Table F; Mineral stabilizer in coating passing No. 100 sieve, including mineral surfacing material passing No. 100, percent by weight—Minimum: Class A (65-pound) and Class B (55-pound), delete "15".

Page 8, paragraph G-2: Delete in its entirety and substitute:

G-2. Packing.—The rolls of roofing shall be tightly wound, and shall be securely wrapped with a substantial grade of paper completely encircling the roll, and pasted or gum stripped at the overlap in such a manner as to prevent shifting from position. The nails and lap cement shall be packed in the core of each roll and secured in such a manner that they cannot shift or work loose and fall out of the core of the roll. Either a printed wrapper or a standard label shall be attached to each roll to identify the material.

Page 8, paragraph H-3: Delete and substitute:

H-3. Air Force.—Interior packages and exterior shipping containers shall be marked in accordance with Military Standard MIL-STD-129, Marking for Shipment and Storage.

The nomenclature shall be as follows:

Roofing, Prepared; Asphalt, Smooth-Surfaced

Class

Width

Federal Specification SS-R-501a

(Copies of specifications and standards required by contractors in connection with specific procurement functions may be obtained from the procuring agency or as directed by the contracting officer.)

Page 8, paragraph H-4 through H-4e. Delete in their entirety and substitute:

H-4. Navy.

H-4a. Applicable specification and standard:

Military specification:

MIL-P-3423—Packaging of Roofing: Asphalt-Prepared; Asphalt and Asbestos-Prepared (In Rolls) Including Nails and Cement For Overseas Shipment.

362218-56—No. 5

Military Standard:

MIL-STD-129—Marking for Shipment and Storage.

(Copies of specifications and standards required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

H-4b. Preparation for delivery.

H-4b (1). Domestic shipment.

H-4b (1) a. Immediate use.—The roofing shall be packaged and packed in a manner which will insure arrival at destination in satisfactory condition and which will be acceptable to the carrier at lowest rates.

H-4b (1) b. Storage.—The roofing shall be packaged and packed as specified for overseas shipment.

H-4b (2). Overseas shipment.—The roofing shall be packaged and packed in accordance with Military Specification MIL-P-3423.

H-4b (3). Marking.—Interior packages and shipping containers shall be marked in accordance with Military Standard MIL-STD-129. The approved item name is Roofing, Prepared; Asphalt, Smooth-Surfaced.

H-4b (4). Ordering data.—Procurement documents should specify whether domestic (immediate use or storage) or overseas packaging are required (see H-4b (1) a, H-4b (1) b, and H-4b (2)).

MILITARY INTERESTS:

Army—E

Navy—Y S MC

Air Force.

Page 10. Following paragraph I-7 insert:

I-8. Transportation Description.

I-8a. Transportation description applicable to this item is:

Roofing, composition or prepared, not otherwise indexed by name:

Carload minimum weight 40,000 pounds

Truckload minimum weight 40,000 pounds

Delete paragraphs which give instructions for obtaining copies of Federal Specifications and Standards and the Index of Federal Specifications and Standards, substituting the following:

(Activities outside the Federal Government may obtain copies of Federal Specifications and Standards as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.)

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, Seattle, and Washington, D. C.)

(Federal Government activities may obtain copies of Federal Specifications and Standards and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Page 10, bottom of page: Delete "For Sale" statement and substitute:

Copies of this specification may be purchased for 5 cents each.

SS-R-501

AUGUST 1, 1933

SUPERSEDING
F.S. No. 214
September 30, 1924

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

ROOFING; ASPHALT-PREPARED, SMOOTH-SURFACED

This specification was approved for promulgation by the Federal Specifications Board on August 1, 1933, for the use of the departments and independent establishments of the Government in the purchase of this commodity, and shall become mandatory for all departments and independent establishments of the Government not later than February 1, 1934. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. There are no other Federal specifications applicable to this specification.

A-2. Special requirements of individual departments of the Government are noted under section H.

B. GRADES

B-1. Smooth-surfaced prepared roofing shall be of the following grades. (The grade or grades desired shall be specified in the invitation for bids.)

Grade A.—Heavy weight.

Grade B.—Medium weight.

C. MATERIAL

C-1. This asphalt-prepared roofing shall be composed of roofing felt made of organic fibers, saturated and coated on both sides with asphaltic compounds and surfaced with finely powdered talc or mica, which must prevent sticking in the rolls.

D. GENERAL REQUIREMENTS

D-1. Basis of purchase shall be by the roll (to cover 100 or 200 square feet, according to agreement between purchaser and the seller).

E. DETAIL REQUIREMENTS

E-1. Appearance.—The surface in both grades of roofing shall be smooth or finely veined in appearance. Deeply ribbed roofing will

FEDERAL STANDARD STOCK CATALOG

(Section IV, Part 5)

not be acceptable. The coating shall be uniformly applied on both sides and up to the edge of the sheet, and no uncoated spots or defects—such as blisters or large lumps of coating—shall be perceptible.

E-2. Physical and chemical requirements.—

Width, inches, $36 \pm \frac{1}{4}$ or $32 \pm \frac{1}{4}$, as specified	Grade A		Grade B	
	Max.	Min.	Max.	Min.
Area of roll.....square feet.....		{ 108 216 }		{ 108 216 }
Average gross weight per 108 square feet.....pounds.....		55		45
Weight per roll of wrapping, packing, nails, and cement pounds.....	3		3	
Weight per 108 square feet of roofing.....pounds.....		50		40
Pliability at 23° C. (77° F.) (cracking on bending 90° over a rounded edge of $\frac{1}{4}$ -inch radius).....		None		None
Heat test at 80° C. (176° F.) (sliding, blistering, or absorption of the surface coating).....		None		None
Weight of moisture-free desaturated felt per 108 square feet.....pounds.....		13.5		10.8
Thickness of desaturated felt.....inch.....		0.060		0.048
Weight of total ash of roofing per 108 square feet.....pounds.....	9		9	
Saturation of felt.....percent.....		150		150
Nails (zinc-coated):				
Gage of wire.....	12	10½	12	10½
Diameter of heads.....inch.....		¾		¾
Thickness of heads.....do.....		0.025		0.025
Length of shank.....do.....	1	¾	1	¾
Number per 108 square feet of 36-inch roofing.....		250		250
Number per 108 square feet of 32-inch roofing.....		275		275

1 The sheet of felt shall be thoroughly and uniformly saturated.

E-3. Lap cement.—The lap cement shall be of such nature as firmly to bind the laps without injurious effect upon the roofing. It shall consist of a suitable bituminous material dissolved in a volatile solvent. Not less than three fourths of a pint per 108 square feet shall be furnished for 36-inch roofing and not less than one pint per 108 square feet for 32-inch roofing.

F. METHODS OF INSPECTION, DETERMINATION OF WEIGHT AND WIDTH, SAMPLING, AND TESTING

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

F-1. Sampling for inspection.—From each shipment take at random rolls of roofing equivalent to the cube root of the total number included in the lot. If the cube root is a fractional number, express it as the next higher digit.

F-2. Determination of weight and width.—The weight per 108 square feet of material, and its variation in weight: The width and its variation must be determined by the inspector and the results transmitted to the testing laboratory with the sample. Material

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which does not conform to the specification in these respects should be rejected by the inspector and only deliveries which conform in these respects sampled for laboratory tests.

F-2a. Remove the wrappers, other packing material, nails, and cement 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 width of the rectangular portion of the roll to the nearest one fourth inch, and reroll. Observe the appearance of the roofing while unrolling and rerolling. Satisfactory roofing will not stick and will be free from visible external defects, such as holes, ragged or untrue edges, breaks, rents, cracks, indentations, or lumps of coating. Unless the coating covers both sides and extends to the edge of the sheet, the material should be rejected.

Compute the area and weight per 108 square feet of each roll selected, and from these weights compute the average weight of the shipment. Should the weight of any 108 square feet be less than the minimum weight specified (40 pounds for medium and 50 pounds for heavy) it shall be cause for the rejection of the whole shipment. Compute also the average weight of the packing materials, nails, and cement.

F-3. Sampling for laboratory examination.—From the rolls examined for sampling, select one, the weight of which is near the average weight of the lot. Unroll, and at approximately 10 feet from the end cut two samples the full width of the roll and approximately 40 inches long, label, roll carefully, but do not crease, wrap, and transmit one to the testing laboratory. Retain the other for use in case of dispute.

F-4. Laboratory examination.—

F-4a. 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 108 square feet. The weight so determined is only to be used in making the laboratory calculations and shall not be used as a basis for acceptance or rejection. (See F-2.)

F-4b. Appearance.—Examine both sides of the sample and note the appearance. The coating should extend to the edge of the sheet, which should not be ragged. No uncoated spots or defects, such as blisters or large lumps of coating, should be perceptible.

F-4c. Pliability.—Cut five strips 1 inch wide and 6 inches long in the direction of the fiber grain and immerse them in water at 25° C. (77° F.) for 10 to 15 minutes. Remove the strips from the water and immediately bend each strip, with the exposure side up, 90° over the edge of a block (which has been rounded to a radius of ¾ inch) at a uniform speed, in approximately 2 seconds' time. Dry thoroughly and examine. If one or more of these five strips crack on this test, cut 10 strips from another part of the sample and repeat the test. If one or more of these strips crack, the material is reported as failing on the pliability test.

F-4d. Behavior on heating at 80° C. (176° F.) for five hours.—Cut a strip of the roofing approximately 8 by 8 inches and suspend it vertically for five hours in an oven maintained at 80° C. (176° F.)

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plus or minus 3° C. (5° F.). Remove at the end of this period, and note any flowing, sagging, blistering, or absorption of the surface coating.

F-4e. Weight of moisture-free, desaturated felt.—Cut two strips approximately 2 inches wide and 8 inches long from the roofing, weigh accurately, and extract with benzol (carbon tetrachloride, chloroform or carbon bisulphide will usually give the same results, but benzol should be used in case of dispute) in a suitable extraction apparatus until the benzol runs through colorless and contains no soluble material. The roofing may be cut into squares approximately 1 inch on each side in case an extraction apparatus of sufficient size to accommodate the whole strips is not available. Remove the desaturated felt from the extractor, dry in air until free from the odor of benzol, and brush off any adhering mineral matter. Place the desaturated felt in a tared weighing bottle, dry in an oven at 105° to 110° C. (221° to 230° F.) for one half hour, cool in a desiccator, and weigh. Calculate the percentage of moisture-free desaturated felt in the sample taken for extraction and compute the weight of moisture-free desaturated felt per 108 square feet from the weight obtained in F-4a.

F-4f. Thickness of desaturated felt.—Cut one of the strips of felt obtained in F-4e into four equal portions and caliper each piece at four equally spaced points at least three quarters of an inch from a cut edge with a micrometer having flat bearing surfaces, or if the strips were cut into pieces in F-4e take at random 16 pieces of the felt and caliper each piece at its center. Average the readings.

F-4g. Total ash of roofing.—Cut two strips of the roofing approximately 2 inches wide and 8 inches long into squares about 1 cm on each side and mix thoroughly. Take at random enough pieces to weigh about 10 grams, dry in an oven at 105° to 110° C. (221° to 230° F.) for one half hour, cool in a desiccator, weigh accurately, and incinerate in a weighed crucible in a muffle furnace or over an open flame until all of the carbon is consumed. Cool, weigh, and calculate the percentage ash of the roofing and compute the weight per 108 square feet from the weight obtained in F-4a.

F-4h. Saturation of felt.—Cut two strips of the original roofing approximately 2 inches wide and 8 inches long and warm them in an oven at about 80° C. (176° F.). Strip off the surfacing and coatings, taking care that as little as possible of the saturated felt is removed with the coatings and that none of the coatings adhere to the felt. Weigh the saturated felt obtained and extract in a suitable extractor with benzol (see F-4e) until the benzol runs through colorless and contains no soluble material.

Remove the desaturated felt from the extractor and dry in air until free from the odor of benzol. Place in a tared weighing bottle, dry at 105° to 110° C. (221° to 230° F.) for one half hour, and weigh. From the weight obtained and the original weight compute the percentage saturation of the moisture-free felt as follows:

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

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Cut three 2-inch strips of the roofing at random across the entire sheet and split them open for their full length. The felt so exposed shall be uniformly saturated, showing no gray or unsaturated spots.

G. PACKAGING, PACKING, AND MARKING

G-1. Packaging.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. Packing.—The asphalt-prepared roofing shall be put up in rolls of 108 or 216 square feet as specified in the order. No roll shall contain more than two pieces of roofing nor shall there be more than 3 percent of such rolls in a shipment. The rolls shall be tightly wound and their ends shall be protected with metal caps, scrap roofing cloth, or other suitable means. The wrapper shall be of a substantial grade of paper of the same width of the fabric and shall completely encircle the roll.

G-3. Marking.—Each package shall be legibly marked with a description of the contents, the name of the manufacturer, the place of the manufacture, the brand (if any), the net weight of the contents, and some means of identification of "the particular contract on which purchase and shipment were made." Each roll shall contain printed directions for laying. Nails and lap cement shall be furnished either in each roll or in bulk, as specified in the contract.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall respectively form a part of this specification.

H-1a. ARMY: United States Army Specification No. 100-2, Standard Specification for Marking Shipments.

H-1b. NAVY DEPARTMENT purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, Roofing, Siding, and Sheet-metal Work; dampproofing and membrane waterproofing; copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D.C.

I. NOTES

I-1. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-2. This material is intended primarily for use on temporary buildings.

I-3. This specification governs all United States Government purchases of this commodity. Users are requested to retain this specification in permanent file until a revision is issued.

I-4. Interested parties are advised that an alphabetical Index of Federal Specifications may be obtained upon application as noted

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in paragraph next below, price to be obtained from the Superintendent of Documents.

I-5. Copies of this Specification may be obtained upon application, accompanied by money order, coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D.C. Price 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility or any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE : 1941

For sale by the Superintendent of Documents, Washington, D.C. . . . Price 5 cents

SS-R-501a

SEPTEMBER 28, 1948

SUPERSEDING
Fed. Spec. SS-R-501
August 1, 1933, and
EMERGENCY ALTERNATE
E-SS-R-501
October 21, 1941

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Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

ROOFING, PREPARED; ASPHALT, SMOOTH-SURFACED

This specification was approved on the above date by the Director, Bureau of Federal Supply, for the use of all departments and establishments of the Government, and shall become effective not later than January 1, 1949, for use in procurement initiated on or after that date. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE SPECIFICATIONS AND OTHER PUBLICATIONS

A-1. There are no other specifications applicable to this specification except those referenced in section H by individual departments.

A-2. The following Underwriters' Laboratories, Inc., publication, of the issue in effect on date of invitation for bids, shall form a part of this specification:

List of Inspected Fire Protection Equipment and Materials.

B. CLASSES, WIDTHS, AND GRADE

B-1. *Classes.*—Prepared roofing shall be furnished in the following classes, as specified in the invitation for bids, contract, or purchase order.

Class A.—65-pound.

Class B.—55-pound.

B-2. *Widths.*—Prepared roofing shall be furnished in rolls $36 \pm \frac{1}{4}$ inches or $32 \pm \frac{1}{4}$ inches wide, as specified in the invitation for bids, contract, or purchase order.

B-3. *Grade.*—Prepared roofing shall be furnished in one grade only.

C. MATERIAL AND WORKMANSHIP

C-1. *Material.*—The prepared roofing shall be composed of roofing felt made of organic fibers, saturated with asphalt and coated on both sides with asphaltic compounds that include mineral stabilizers, and surfaced with powdered talc, mica, or any suitable surfacing material which will prevent sticking in the rolls. The

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mineral stabilizer shall consist of mica, slate, talc, limestone, or any other suitable inorganic material.

C-2. *Workmanship.*—The surface of the roofing shall be smooth or finely veined in appearance. The coating on both sides of the sheet shall be uniformly applied and shall extend to both edges of the sheet, and no uncoated spots or defects, such as blisters or lumps of coating, shall be perceptible.

D. GENERAL REQUIREMENTS

D-1. Underwriters' Laboratories requirements.—

D-1a. The contractor shall submit proof to the purchasing agency that the material he furnishes under this specification conforms to the requirements of the Underwriters' Laboratories, Inc., regarding fire and casualty hazards. The label (class C), listing, marker, or certified report of the Underwriters' Laboratories, Inc., will be accepted as evidence of compliance with this requirement.

D-1b. In lieu of Underwriters' Laboratories evidence, the contractor may submit evidence from other sources that his material conforms to Underwriters' Laboratories requirements. The acceptance or rejection of such proof of conformance shall be decided by the purchasing agency.

D-1c. Compliance with the Underwriters' Laboratories requirements regarding fire and casualty hazards does not absolve the contractor from complete compliance with the requirements of this specification in order to secure the acceptance of his material. In the event of differences between any of the requirements of this specification and those of Underwriters' Laboratories, Inc., the requirements of this specification shall govern.

D-2. *Area of rolls.*—The roofing shall be furnished in rolls containing not less than 108 square feet or 216 square feet, as specified in the invitation for bids, contract, or purchase order. (See par. I-2.)

D-3. *Average gross weight.*—The average gross weight per 108 square feet of roofing, complete with wrapping, packing, nails, and lap cement, shall be not less than 65 pounds for the 65-pound class (class A) and 55 pounds for the 55-pound class (class B).

D-4. *Weight per roll of wrapping.*—The total weight of the wrapping, packing, nails, and cement per roll of roofing shall be not greater than 3 pounds for rolls containing 108 square feet, or 6 pounds for rolls containing 216 square feet.

D-5. Nails.—

D-5a. *Dimensions.*—The gage of the wire shall be not greater than Washburn and Moen No. 10 (0.135 inch) nor less than Washburn and Moen No. 12 (0.105 inch). The head shall be not less than $\frac{3}{8}$ inch in diameter, nor less than 0.025 inch in thickness. The shank shall be not less than $\frac{1}{4}$ inch in length for class B, 55-pound roofing, and $\frac{3}{8}$ inch in length for class A, 65-pound roofing, except that $\frac{1}{4}$ -inch nails may be supplied for both classes when the roofing is to be applied by the "blind" or concealed nailing method. If barbed, the barbing shall not increase the diameter of the lower two thirds more than 0.01 inch. The lower end of the shank shall be pointed. If square and twisted (spiral), the cross-sectional area shall be equivalent to that specified above.

D-5b. Protective coating.—Nails shall be galvanized or sherardized, and shall resist four 1-minute dips in a copper sulfate solution when tested in accordance with the Standard Method of Test for Uniformity of Coating by the Preece Test (Copper Sulfate Dip) on Zinc-Coated (Galvanized) Iron or Steel Articles (A.S.T.M. designation A 239) of the American Society for Testing Materials.¹

D-5c. Quantity.²—There shall be furnished per 108 square feet of roofing an average of not less than 252 nails for 36-inch roofing and not less than 275 nails for 32-inch roofing.

D-6. Lap cement.—The lap cement shall be such that it can be readily applied by brush or trowel and will firmly bind the laps without any injurious effect upon the roofing. The lap cement shall consist of a bituminous base dissolved in a volatile organic solvent. Organic products or inorganic filler may be added to improve working and adhesive properties. Not less than $\frac{3}{4}$ pint per 108 square feet shall be furnished for 36-inch roofing and not less than 1 pint per 108 square feet for 32-inch roofing.

D-7. Condition.—The roofing shall not crack or be so sticky as to cause damage when unrolled at temperatures between 50° and 90° F.

E. DETAIL REQUIREMENTS

E-1. The roofing shall comply with the requirements shown in table I.

TABLE I.—Physical and chemical requirements.

	Class A, 65-pound		Class B, 55-pound	
	Maxi- mum	Mini- mum	Maxi- mum	Mini- mum
Weight per 108 square feet of roofing pounds	....	60	....	50
Pliability at 25°C. (77°F.) (cracking on bending 90° over a rounded edge of $\frac{3}{4}$ -inch radius)....	....	None	....	None
Heat test at 80°C. (176°F.) (sliding, blistering, or absorption of the coating asphalt) .....	....	None	....	None
Weight of moisture-free desaturated felt per 108 square feet pounds	....	13.0	....	10.8
Ash of moisture-free desaturated felt percent by weight	10	....	10	....
Thickness of desaturated felt....inch	....	0.06	....	0.05
Saturation of felt*.....percent	....	160	....	160
Weight of coating per 108 square feet pounds	....	18	....	18
Mineral stabilizer in coating passing No. 100 sieve, including mineral surfacing material passing no. 100 sieve.....	....	15	....	15
.....percent by weight	40	15	40	15
Mineral matter retained on a No. 100 sieve, in and on coating, per 108 square feet.....pounds	5.0	....	5.0	....

* The sheet of felt shall be thoroughly and uniformly saturated.

¹ 1946 Edition of A. S. T. M. Standards, Part I-A.

² Nails may be furnished in bulk as agreed between buyer and seller.

E-2. Piecing.—No roll shall contain more than two pieces of roofing nor shall there be more than 3 percent of such rolls in a shipment. No piece of roofing shall be less than 10 feet in length.

F. METHODS OF SAMPLING, INSPECTION, AND TESTS

F-1. Sampling for inspection.—From each shipment or fraction thereof representing a product of the same class and width, a number of rolls shall be taken at random as follows:

Rolls in shipment	Number of rolls to be taken
Up to 1,000.....	5
1,001-1,728	6
1,729-2,744	7
2,745-4,096	8
4,097-5,832	9
5,833-8,000	10
8,001-10,648	11
10,649 and over...	12

F-2. Inspection.—The sample rolls taken shall be inspected to determine compliance with this specification with respect to workmanship, condition, width, and weight.

F-2a. Gross weight of roll, packing material, nails, and cement.—Each roll taken (see par. F-1) shall be weighed intact to the nearest $\frac{1}{4}$ pound. The wrappers, packing material, nails, and cement from each roll shall be weighed together to the nearest $\frac{1}{4}$ pound. The quantity and character of nails and lap cement shall be recorded.

F-2b. Weight per 108 square feet of finished roofing.—The width and length of each roll taken shall be measured to the nearest $\frac{1}{4}$ inch and weighed to the nearest $\frac{1}{4}$ pound. From this data the weight per 108 square feet of finished roofing can be conveniently calculated by the following formula:

$$\frac{\text{Weight in pounds}}{\text{Length in feet} \times \frac{\text{width in inches}}{12}} \times 108 = \text{Weight of 108 square feet of roofing}$$

If the calculated weight of 108 square feet of finished roofing of any roll taken as in paragraph F-1 is less than 50 pounds for the 55-pound class and 60 pounds for the 65-pound class, additional rolls equal to twice the number originally taken shall be inspected. If the calculated weight of 108 square feet of finished roofing of any of these additional rolls is less than the minimum specified, the entire lot shall be rejected by the inspector and no samples taken for laboratory examination.

F-3. Sampling for laboratory examination.—From the rolls examined in sampling for inspection, select one the weight of which is nearest the average weight of the lot examined. Unroll, and at approximately 10 feet from the outside end, cut two samples the full width of the roll and approximately 40 inches long. The sheet shall be cut at right angles to the edge of the roll. Measure

and weigh the strips and calculate the weight per 108 square feet of each. Discard any strip whose weight varies by more than 1.5 percent from the weight obtained in paragraph F-2a. Divide each strip into four equal parts, identifying the inside of the roll and the direction of the fiber grain on each section. (The direction of the fiber grain is parallel to the edge of the roll.) Label and pack flat between supports wide and stiff enough to prevent crushing. Transmit one sample (the four sections cut from one sheet) to the testing laboratory and retain the other for check tests if necessary.

F-4. Laboratory examination.—

F-4a. Weight.—Assemble the pieces and 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 108 square feet. Designate the weight as A. The weight so determined is only to be used in making the laboratory calculations and shall not be used as a basis for acceptance or rejection. (See par. F-2b.)

F-4b. Appearance.—Examine both sides of the sample and note the appearance. The coating should extend to the edges of the sheet, which should not be ragged. No uncoated spots or defects, such as blisters or large lumps of coating, should be perceptible.

F-4c. Pliability.—Cut five strips 1 inch wide and 6 inches long in the direction of the fiber grain and immerse them in water at 25°C. (77°F.) for 10 to 15 minutes. Remove the strips from the water and immediately bend each strip, with the exposure side up, 90° over the edge of a block (which has been rounded to an arc whose radius is $\frac{3}{4}$ inch) at a uniform speed in approximately 2 seconds' time. Dry thoroughly and examine. If one or more of these five strips crack on this test, cut 10 strips from another part of the sample and repeat the test. If one or more of these strips crack, the material shall be reported as failing the pliability test.

F-4d. Behavior on heating at 80°C. (176°F.) for 5 hours.—Cut a strip of the roofing approximately 8 by 8 inches and suspend it vertically for 5 hours in an oven maintained at 80°C. (176°F.) $\pm 3^\circ\text{C}$. (5°F.). Remove at the end of this period, and note any flowing, sagging, blistering, or absorption of the coating asphalt.

F-4e. Weight of moisture-free desaturated felt.—Cut a strip approximately 2 inches wide and 16 inches long from the area corresponding to the original center of the sheet, the 16-inch dimension being perpendicular to the fiber grain. Measure accurately and weigh to the nearest milligram. From this data calculate the weight in pounds of 108 square feet of roofing. If this weight varies by more than 1.5 percent from that calculated in paragraph F-4a, discard and cut additional strips until a sample within this limit is obtained. Extract with carbon tetrachloride, benzol, or carbon bisulfide until free from soluble constituents. Dry the extracted felt in air until free from organic solvent and brush off any adhering mineral matter. Determine the thickness as specified in paragraph F-4f. Place the desaturated felt in an uncapped, tared weighing bottle and dry in an oven for 1 hour at $105^\circ \pm 5^\circ\text{C}$.; cap the bottle. Cool in a desiccator and weigh; designate this

weight as *a*. (Note.—This weight includes the moisture-free desaturated felt plus any absorbed and adhering mineral stabilizer from the coating asphalt.) Incinerate the strip at a temperature not exceeding 600°C. in a muffle furnace or over an open flame, until all the organic matter is consumed. Cool in a desiccator and weigh; designate this weight as *b*.

Calculate the weight of 108 square feet of moisture-free desaturated felt as follows: (See par. F-4i for the quantity F.)

$$\frac{(a - b) \times 34.29}{\text{Area in sq. in.}} \times \frac{100}{100 - F} = \text{weight, pounds per 108 sq. ft.}$$

Designate this weight as B.

F-4f. Thickness of moisture-free desaturated felt.—Measure the thickness of the moisture-free desaturated felt obtained in paragraph F-4e with a dead weight micrometer gage having a cylindrical foot and anvil, with flat bearing surfaces 1 square inch in area. The load used shall be 2 pounds per square inch. The thickness of the felt shall be measured at 10 equally spaced points along the long dimension of the strip.

F-4g. Total ash of roofing.—Cut a strip 2 inches wide and 16 inches long from the area corresponding to the original center of the sheet, with the 16-inch dimension perpendicular to the fiber grain. Measure accurately and weigh to the nearest milligram. From this data calculate the weight in pounds of 108 square feet of roofing. If this weight varies by more than 1.5 percent from that calculated in paragraph F-4a, discard and cut additional strips until a sample within this limit is obtained. Roll the strip, place it in an evaporating dish (approximately 4 inches in diameter), and ignite from above until the greater portion of the combustible matter is consumed, then in a muffle furnace at a temperature not greater than 600°C. until free from organic matter. Cool in a desiccator and weigh. Calculate from this weight the weight of total mineral matter contained in 108 square feet of roofing. Designate this weight as C. Place total ash obtained as above on a 100-mesh sieve and wash with a gentle stream of water until free from fines (material passing the 100-mesh sieve). Dry the material retained on the 100-mesh sieve for 1 hour at 105° ± 5°C., cool in a desiccator, and weigh. Calculate from this weight the weight of mineral matter retained on a 100-mesh sieve contained in 108 square feet of roofing. Designate this weight as D.

F-4h. Saturation of felt.—Cut three strips 2 inches wide and 8 inches long at random from the sheet and warm in an oven at about 80°C. (176°F.) until the coating asphalt can be easily stripped from the saturated felt. In removing the coating asphalt, care should be taken to remove as little felt as possible and that none of the coating asphalt remains on the felt. The felt so exposed shall be uniformly saturated, showing no gray or unsaturated spots. Weigh the stripped sample, and extract with carbon tetrachloride, benzol, or carbon bisulfide until free from soluble constituents. Dry the extracted felt in air until free from solvent and then in an uncapped, tared, weighing bottle in an oven at 105° ± 5°C. for 1 hour. Cool in a desiccator and weigh. Calculate the percentage saturation in the following manner:

Weight of saturated felt—weight of
desaturated felt

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

Designate this percentage as E.

F-4i. Ash of moisture-free desaturated felt.—Incinerate the felt obtained in paragraph F-4h, in a weighed crucible in a muffle furnace or over an open flame until all the organic matter is consumed. Cool in a desiccator, weigh, and compute the percentage ash in the moisture-free desaturated felt. Designate this percentage as F. Place this ash on a 100-mesh sieve and wash until free from fines (material passing the 100-mesh sieve). Dry the material retained on the 100-mesh sieve at $105^{\circ} \pm 5^{\circ}\text{C.}$ for 1 hour, cool, and weigh. Calculate from this weight the weight contained in 108 square feet of roofing. Designate this weight as G.

F-4j. Mineral matter in and on coating.—The weight of mineral matter retained on a 100-mesh sieve, in and on the asphalt coating, per 108 square feet is obtained by subtracting G (weight of ash of the felt retained on a 100-mesh sieve per 108 square feet (par. F-4i)) from D (weight of total ash of the roofing retained on a 100-mesh sieve per 108 square feet (par. F-4g)).

F-4k. Weight of coating and percentage of mineral stabilizer in coating.—Determine the weight of coating per 108 square feet and the percentage of mineral stabilizer passing a 100-mesh sieve as follows:

A—Weight of 108 square feet of finished roofing. (See par. F-4a.)

B—Weight of 108 square feet of moisture-free desaturated felt. (See par. F-4e.)

C—Weight of total mineral matter (ash) in 108 square feet of roofing. (See par. F-4g.)

D—Weight of total mineral matter (ash) in 108 square feet of roofing retained by 100-mesh sieve. (See par. F-4g.)

E—Percentage saturation of moisture-free desaturated felt. (See par. F-4h.)

F—Percentage ash of moisture-free desaturated felt. (See par. F-4i.)

G—Weight of mineral matter (ash) in 108 square feet of moisture-free desaturated felt retained on a 100-mesh sieve. (See par. F-4i.)

Weight of coating:

$$A - \left(B + \frac{(B \times E)}{100} + (D - G) \right) = \text{weight of mineral-stabilized coating per 108 square feet.}$$

Percentage mineral stabilizer in coating:

$$C - \left(D + \frac{(B \times F)}{(100)} - G \right) \times 100 = \text{percentage of mineral stabilizer passing 100-mesh sieve.}$$

Weight of mineral-stabilized coating per 108 square feet

G. PACKAGING, PACKING, AND MARKING FOR SHIPMENT

G-1. *Packaging*.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. *Packing*.—Unless otherwise specified, the rolls shall be securely taped or some other equally protective wrapping shall be employed. A standard label shall be attached to each roll to identify the material. The ends of the rolls need not be covered except to retain the nails and lap cement when packed in the rolls.

G-3. *Marking*.—Unless otherwise specified, each package shall be marked with the name of the item, the class, width, and quantity contained therein, as defined by the contract or order under which the shipment is made, the name of the contractor, and the number of the contract or order.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications and other publications, of the issues in effect on date of invitation for bids, and special requirements, shall form a part of this specification, and shall be applicable to purchases made under this specification by the respective departments:

H-2. *Army*.—U. S. Army Specification 100-2, Standard Specification for Marking Shipments by Contractors, copies of which may be obtained without cost upon application to the procuring agency.

H-3. *Air Force*.—U. S. Army Specification 94-40645, Marking; Exterior, Domestic and Export Shipment, by Contractors, copies of which may be obtained without cost, upon application to the Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio.

H-4. *Navy*.—

H-4a. *Applicable specifications and other publications*.—

Joint Army-Navy Specification:

JAN-P-132—Packaging and Packing for Overseas Shipment—Crates; Unsheathed, Wood; Nailed (for Maximum Net Load of 2,500 Pounds).

Navy Department Specification:

General Specifications for Inspection of Material.

Bureau of Supplies and Accounts Publication:

Navy Shipment Marking Handbook.

Copies of Federal and Joint Army-Navy specifications (required for Navy purchases), Navy Department specifications, and the Navy Shipment Marking Handbook may be obtained without cost upon application to the Bureau of Supplies and Accounts, Navy

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Department, Washington 25, D. C., except that Naval activities should make application to the Supply Officer in Command, Naval Supply Center, Norfolk 11, Va. When requesting specifications, refer to both title and number (or symbol).

H-4b. Packaging.—Asphalt roofing shall be furnished in rolls of the size and type commonly used. The rolls shall be securely taped or some other equally protective wrapping shall be employed.

H-4c. Packing.—

H-4c(1). For domestic shipment.—Rolls shall be packed according to best commercial practice to withstand handling and shipping. On less-than-carload-lot shipments rolls shall be packed in unsheathed crates not exceeding 500 pounds gross weight and conforming to the requirements of Joint Army-Navy Specification JAN-P-132.

H-4c(2). For overseas shipment.—Packing will be the same as for domestic shipment, except that the entire shipment shall be packed in unsheathed crates not exceeding 500 pounds gross weight and conforming to the requirements of Joint Army-Navy Specification JAN-P-132.

H-4d. Marking.—In addition to any special marking required by the contract or order, marking of interior packages and shipping containers shall be in accordance with the requirements of the Navy Shipment Marking Handbook.

H-4e. Ordering information.—Requests, requisitions, schedules, and contracts or orders should specify whether the subject commodity is to be packed and shipping containers marked for domestic or overseas shipment. (See pars. H-4c and H-4d.)

NAVY: AMOY

I. NOTES

I-1. Purchasers should exercise any desired options offered herein and should specify the class and width required. (See pars. B-1, B-2, D-2, G-1, G-2, and G-3.)

I-2. A roll of roofing containing 108 square feet will cover 100 square feet of roof area, and a roll containing 216 square feet will cover 200 square feet of roof area when the roofing is laid with a lap of 2 inches.

I-3. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-4. Federal specifications do not include all types, classes, grades, sizes, etc., of the commodities indicated by the titles of the specifications, or which are commercially available, but are intended to cover the types, etc., which are suitable for Federal Government requirements.

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I-5. An Index of Federal specifications may be purchased as noted in the paragraph below, price to be obtained from the Superintendent of Documents.

I-6. Copies of the listings of the Underwriters' Laboratories, Inc., referred to herein, may be obtained without cost from the Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago 11, Illinois.

I-7. Copies of this specification may be obtained upon application, accompanied by postal note, money order, coupon, or cash, to the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Price 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1948—501259(59)

For sale by the Superintendent of Documents, Washington 25, D. C.
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FEDERAL STANDARD STOCK CATALOG

SECTION IV

(PART 5)

EMERGENCY ALTERNATE FEDERAL SPECIFICATION

FOR

ROOFING; ASPHALT-PREPARED, SMOOTH-SURFACED

IN THE INTEREST OF THE CONSERVATION OF CERTAIN STRATEGIC MATERIALS AND WITH THE PURPOSE OF SPECIFYING A PRODUCT THAT WILL BETTER SERVE THE NEEDS OF THE GOVERNMENT, THIS SPECIFICATION WAS APPROVED ON THE ABOVE DATE BY THE DIRECTOR OF PROCUREMENT, FOR THE USE OF ALL DEPARTMENTS AND ESTABLISHMENTS OF THE GOVERNMENT, AND SHALL BECOME EFFECTIVE IMMEDIATELY AS AN EMERGENCY ALTERNATE SPECIFICATION IN THE PURCHASE OF THE COMMODITY COVERED BY IT, WHERE IT MAY BE CONSIDERED A SUITABLE ALTERNATE FOR MATERIAL COVERED BY FEDERAL SPECIFICATION SS-R-501, ROOFING, ASPHALT-PREPARED, SMOOTH-SURFACED.

THE REQUIREMENTS OF THIS EMERGENCY ALTERNATE SPECIFICATION ARE COVERED BY FEDERAL SPECIFICATION SS-R-501, ROOFING; ASPHALT-PREPARED, SMOOTH-SURFACED, DATED AUGUST 1, 1933, WITH THE FOLLOWING CHANGES:

GRADES

SMOOTH-SURFACED PREPARED ROOFING SHALL BE OF THE FOLLOWING GRADES. (THE GRADE OR GRADES DESIRED SHALL BE SPECIFIED IN THE INVITATION FOR BIDS.)

65-LB. GRADE

55-LB. GRADE (SEE NOTE 2)

MATERIAL

THIS ASPHALT-PREPARED ROOFING SHALL BE COMPOSED OF ROOFING FELT MADE OF ORGANIC FIBERS, SATURATED AND COATED ON BOTH SIDES WITH ASPHALTIC COMPOUNDS AND SURFACED WITH FINELY POWDERED TALC OR MICA, WHICH MUST PREVENT STICKING IN THE ROLLS.

GENERAL REQUIREMENTS

BASIS OF PURCHASE SHALL BE BY THE ROLL (TO COVER 100 OR 200 SQUARE FEET, ACCORDING TO AGREEMENT BETWEEN PURCHASER AND THE SELLER).

DETAIL REQUIREMENTS

1. APPEARANCE. - THE SURFACE IN BOTH GRADES OF ROOFING SHALL BE SMOOTH OR FINELY VEINED IN APPEARANCE. DEEPLY RIBBED ROOFING WILL NOT BE ACCEPTABLE. THE COATING SHALL BE UNIFORMLY APPLIED ON BOTH SIDES AND UP TO THE EDGE OF THE SHEET, AND NO UNCOATED SPOTS OR DEFECTS - SUCH AS BLISTERS OR LARGE LUMPS OF COATING - SHALL BE PERCEPTIBLE.

(OVER)

(40459)

SS-R-511

AUGUST 1, 1933

SUPERSEDING

F.S. No. 423

July 9, 1924

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Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**ROOFING; ASPHALT AND ASBESTOS-PREPARED,
MINERAL-SURFACED**

This specification was approved for promulgation by the Federal Specifications Board on August 1, 1933, for the use of the departments and independent establishments of the Government in the purchase of this commodity, and shall become mandatory for all departments and independent establishments of the Government not later than February 15, 1934. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. There are no other Federal specifications applicable to this specification.

A-2. Any special requirements of the individual departments of the Government are noted under section H.

B. TYPE

B-1. Mineral-surfaced, asphalt, and asbestos-prepared roofing shall be of one type only.

C. MATERIAL

C-1. This prepared roofing shall be composed of asbestos roofing felt, containing at least 85 percent of asbestos fiber, saturated and coated with asphaltic compounds. One side shall be surfaced with mineral granules. The other side may be dusted with talc or mica to prevent sticking in the rolls.

D. GENERAL REQUIREMENTS

D-1. Basis of purchase.—

D-1a. Basis of purchase shall be by the roll or by the square (to cover 100 or 200 square feet) according to agreement between purchaser and the seller.

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E. DETAIL REQUIREMENTS

E-1. Color and appearance.—The mineral granules shall be uniformly distributed over the entire surface (except as noted below) and when so specified the color shall substantially match a sample mutually agreed upon by buyer and seller. The coating and mineral surfacing must extend to the edge of the sheet on one side and may have an unsurfaced lapping edge approximately 2 inches wide on the other side. The edges of the sheet shall not be ragged.

E-2. Physical and chemical requirements.—

Width, inches, $36 \pm \frac{1}{4}$ or $32 \pm \frac{1}{4}$, as called for

	Maximum	Minimum
Area of roll.....square feet.....		108
Weight per roll of wrapping, packing, nails, and cement.....pounds.....	5	
Weight per 108 square feet of roofing.....pounds.....		80
Heat test at 80° C. (176° F.) (sliding, blistering, absorption of the surface coating, or loss of mineral granules).....		None
Volatile matter at 80° C. (176° F.).....percent.....	$1\frac{1}{4}$	
Weight of moisture-free desaturated felt per 108 square feet.....pounds.....		18
Thickness of desaturated felt.....inch.....		0.045
Ash of desaturated felt.....percent.....		70
Composition of felt: Asbestos fiber, percent (remainder may be hair, cotton rags or lint, starch or other suitable binding materials).....		85
Saturation of felt.....percent.....		60
Weight of material other than mineral surfacing, and mineral matter in the coating per 108 square feet.....pounds.....		45
Nails (zinc-coated):		
Gage of wire.....	12	10
Diameter of heads.....inch.....		$\frac{3}{4}$
Thickness of heads.....inch.....		0.025
Length of shank.....inch.....	1	$\frac{3}{4}$
Number per 108 square feet of 34-inch roofing.....		250
Number per 108 square feet of 32-inch roofing.....		275

E-3. Lap cement.—The lap cement shall be of such nature as to firmly bind the laps without injurious effect upon the roofing. It shall consist of a suitable bituminous material dissolved in a volatile solvent. Not less than three fourths of a pint per 108 square feet shall be furnished for 36-inch roofing and not less than one pint per 108 square feet for 32-inch roofing.

F. METHODS OF INSPECTION, DETERMINATION OF WEIGHT AND WIDTH, SAMPLING, AND TESTING

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

F-1. Sampling for inspection.—From each shipment select at random rolls of roofing equivalent to the cube root of the total number included in the lot. If the cube root is a fractional number, express it as the next higher digit.

F-2. Determination of weight and width.—The weight per 108 square feet of material and its variation in weight: The width and its variation must be determined by the inspector and the results

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transmitted to the testing laboratory with the sample. Material which does not conform to the specification in these respects should be rejected by the inspector and only deliveries which conform in these respects sampled for laboratory tests.

F-2a. Remove the wrappers, other packing material, nails and cement 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 width of the rectangular portion of the roll to the nearest $\frac{1}{4}$ inch and reroll. Observe the appearance of the roofing while unrolling and rerolling. Satisfactory roofing will not stick and will be free from visible external defects, such as holes, ragged or untrue edges, breaks, rents, cracks, indentations, or lumps of coating. The mineral granules should be uniformly distributed over the entire surface (except as noted below), and when so specified the color should substantially match the mutually agreed-upon sample. The coating and surfacing may extend to the edge of the sheet of roofing, but an unsurfaced lapping edge approximately 2 inches wide along one side is permissible. The edges of the sheet should not be ragged. Compute the area and weight per 108 square feet of each roll taken. Should the weight of any roll per 108 square feet be less than the minimum weight specified, 80 pounds, it shall be cause for the rejection of the whole shipment. Compute also the average weight of the packing materials, nails, and cement.

F-3. Sampling for laboratory examination.—From the rolls examined for sampling, select one, the weight of which is near the average weight of the lot. Unroll and, at approximately 10 feet from the end, cut two samples the full width of the roll and approximately 40 inches long, label, roll carefully but do not crease, wrap, and transmit one to the testing laboratory. Retain the other for use in case of dispute.

F-4. Laboratory examination.—

F-4a. Color and appearance.—Examine both sides of the roofing and note the color and general appearance and compare them with the mutually agreed upon sample.

F-4b. Weight.—Trim the sample so that it is 36 inches long and the full width of the roll (except that material having an unsurfaced lapping edge shall have that edge trimmed off). Measure accurately and weigh to the nearest gram (15 grains). From the measurements and weights so obtained compute the weight per 108 square feet. The weight so determined is only to be used in making the laboratory calculations and shall not be used as a basis for acceptance or rejection.

F-4c. Behavior on heating at 80° C. (176° F.) for 2 hours.—Cut two strips from the roofing approximately 8 by 8 inches, weigh, and suspend vertically for 2 hours in an oven at 80° C. (176° F.) plus or minus 3° C. (5° F.). Remove at the end of this period and note any flowing, sagging, blistering, or absorption of the surface coating. Cool, weigh, and compute the loss in weight.

F-4d. Weight of moisture-free, desaturated felt.—Cut two strips approximately 2 inches wide and 8 inches long from the roofing,

weigh accurately, and extract with benzol¹ in a suitable extraction apparatus until the benzol runs through colorless and contains no soluble material. The roofing may be cut into squares approximately one inch on each side in case an extraction apparatus of sufficient size to accommodate the whole strip is not available. Retain the extract for any mineral matter it may contain. Remove the desaturated felt from the extractor, dry in air until free from the odor of benzol and brush off any adhering mineral matter, retaining it with the mineral matter in the extractor. Place the desaturated felt in a tared weighing bottle, dry in an oven at 105° to 110° C. (221° to 230° F.) for one half hour, cool in a desiccator, and weigh. Calculate the percentage of moisture-free, desaturated felt in the sample taken for extraction and compute the weight of moisture-free desaturated felt per 108 square feet from the weight obtained in F-4b.

F-4e. Thickness of desaturated felt.—Cut one of the strips of felt obtained in F-4d into four equal portions and caliper each piece at four equally spaced points at least three fourths of an inch from a cut edge with a micrometer having flat bearing surfaces or, if the strips were cut into pieces in F-4d, take at random 16 pieces of the felt and caliper each piece at its center. Average the readings.

F-4f. Ash of moisture-free desaturated felt.—Cut the desaturated felt obtained in F-4d into squares about 1 cm on each side and mix thoroughly. Take at random enough pieces to weigh about 10 grams, dry in an oven at 105° to 110° C. (221° to 230° F.) for one half hour, cool in a desiccator, weigh accurately, and incinerate in a weighed crucible in a muffle furnace or over an open flame until all of the carbon is consumed. Cool, weigh, and compute the percentage ash of the moisture-free desaturated felt.

F-4g. Material other than mineral surfacing and mineral matter in the coating per 108 square feet.—Combine the mineral matter from the extractor and from the surface of the desaturated felt with that obtained by the filtration or evaporation and ignition of the benzol extract from F-4d, dry in air until free from the odor of benzol, heat for one half hour in an oven at 105° to 110° C. (221° to 230° F.), cool, and weigh. Calculate the percentage of mineral matter other than in the felt in the sample taken for extraction and compute this total mineral matter per 108 square feet from the weight obtained in F-4b. This weight, plus the weight of moisture-free desaturated felt subtracted from the weight obtained in F-4b, is the weight of material other than mineral matter in 108 square feet of roofing.

F-4h. Saturation of felt.—Cut two strips of the original roofing approximately 2 inches wide and 8 inches long and warm them in an oven at about 80° C. (176° F.). Strip off the surfacing and coatings, taking care that as little as possible of the saturated felt is removed with the coatings and that none of the coatings adhere to the felt. Weigh the saturated felt obtained and extract in a suitable extractor with benzol¹ until the benzol runs through colorless and contains no soluble material.

¹ Carbon tetrachloride, chloroform, or carbon bisulphide will usually give the same results, but benzol should be used in case of dispute.

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Remove the desaturated felt from the extractor and dry in air until free from the odor of benzol. Place in a tared weighing bottle, dry at 105° to 110° C. (221° to 230° F.) for one half hour, and weigh. From the weight obtained and the original weight compute the percentage saturation of the moisture-free felt as follows:

$$\frac{\text{Weight of saturated felt} - \text{Weight of desaturated felt}}{\text{Weight of desaturated felt}} \times 100$$

= Percentage saturation of moisture-free felt

G. PACKAGING, PACKING, AND MARKING

G-1. Packaging.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. Packing.—The prepared roofing shall be put up in rolls of 108 square feet. No rolls shall contain more than two pieces of roofing nor shall there be more than 3 percent of such rolls in a shipment. The rolls shall be tightly wound and their ends shall be protected with metal caps, scrap roofing cloth, or other suitable means. The wrapper shall be of a substantial grade of paper of the same width of the fabric and shall completely encircle the roll.

G-3. Marking.—Each package shall be legibly marked with a description of the contents, the name of the manufacturer, the place of manufacture, the brand (if any), the net weight of the contents, and some means of identification of "the particular contract on which purchase and shipment were made." Each roll shall contain printed directions for laying. Nails and lap cement shall be furnished either in each roll or in bulk, as specified in the contract. Roofing for export shipment shall be packed as mutually agreed upon by purchaser and seller.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall respectively form a part of this specification.

H-1a. ARMY: United States Army Specification No. 100-2, standard specification for marking shipments.

H-1b. NAVY DEPARTMENT PURCHASES will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, Roofing, Siding, and Sheet-Metal Work; Damp-proofing and Membrane Waterproofing, copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D.C.

I. NOTES

I-1. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

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I-2. This specification governs all United States Government purchases of this commodity. Users are requested to retain this specification in permanent file until a revision is issued.

I-3. An alphabetical index of Federal Specifications may be obtained upon application as noted in paragraph next below, price to be obtained from the Superintendent of Documents.

I-4. Copies of this Specification may be obtained upon application, accompanied by money order, coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D.C. Price 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation or conveying any rights or permission to manufacturer, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1933

For sale by the Superintendent of Documents, Washington, D.C. . . . Price 5 cents

SS-R-521

AUGUST 1, 1933

SUPERSEDING

F.S. No. 296

May 20, 1925

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Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**ROOFING AND SHINGLES; ASPHALT-PREPARED,
MINERAL-SURFACED**

This specification was approved for promulgation by the Federal Specifications Board on August 1, 1933, for the use of the departments and independent establishments of the Government in the purchase of this commodity, and shall become mandatory for all departments and independent establishments of the Government not later than February 1, 1934. It may be put into effect, however, at any earlier date, after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. There are no other Federal specifications applicable to this specification.

A-2. Any special requirements of the individual departments of the Government are noted under section H.

B. TYPES

B-1. Mineral-surfaced prepared roofing shall be of the following types. (The type or types desired shall be specified in the invitation for bids.)

Type I. Mineral-surfaced asphalt prepared, ready or roll roofing.

Type II. Mineral-surfaced asphalt shingles.

C. MATERIAL

C-1. Mineral-surfaced asphalt prepared roofing and shingles shall be composed of roofing felt made of organic fibers saturated and coated on both sides with asphalt and surfaced on the side to be exposed to the weather with mineral granules. The other side may be dusted with talc or mica to prevent sticking in the package.

D. GENERAL REQUIREMENTS

D-1. Basis of purchase.

D-1a. Basis of purchase shall be by the roll or by the square (to cover 100 square feet) according to agreement between purchaser and seller.

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D-2. Color and appearance.—The mineral granules shall be distributed uniformly over the entire surface (except as noted below) and when so specified the color shall substantially match a sample mutually agreed upon by buyer and seller. The coating and surfacing must extend to the edge of the sheet of roofing or of the shingles, except that roll roofing may have an unsurfaced lapping edge approximately 2 inches wide along one side of the sheet. The edges of the sheet of roofing or of the shingle shall not be ragged. Satisfactory roofing will not stick and will be free from visible external defects, such as holes, ragged or untrue edges, rents, cracks, indentations, or lumps of coating.

D-3. Trimmings.—If desired, trimmings shall be as specified in order

D-4.—Physical and chemical requirements applicable to both types of roofing.

	Maximum	Minimum
Heat test at 80° C. (176° F.) (sliding, blistering, absorption of the surface coating or loss of mineral granules)		None
Volatile matter at 80° C. (176° F.) (percent)	1½	
Weight of moisture-free desaturated felt per 108 square feet (pounds)		10.8
Thickness of desaturated felt (inch)		0.05
Total weight of organic fibers and bitumen per 108 square feet (pounds)		45

E. DETAIL REQUIREMENTS

E-1. Requirements applicable to type I roofing.—Width (inches), 36 ($\pm \frac{1}{4}$ inch), or 32 ($\pm \frac{1}{4}$ inch), as called for.

	Maximum	Minimum
Area of roll.....square feet		108
Weight per roll of wrapping, packing, nails, and cement.....pounds	5	
Weight per 108 square feet of roofing.....do.		80
Pliability at 25° C. (77° F.). (cracking on bending 90 degrees over a rounded edge of ¾-inch radius)	None	
Saturation of felt.....percent		160
Nails (zinc coated):		
Gauge of wire.....	12	10
Diameter of heads.....inch		¾
Thickness of heads.....do.		0.025
Length of shank.....do.		¾
Number per 108 square feet of 36-inch roofing		250
Number per 108 square feet of 32-inch roofing		275

Lap cement.—The lap cement shall be of such nature as to firmly bind the laps without injurious effect upon the roofing. It shall consist of a suitable bituminous material dissolved in a volatile

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solvent. Not less than three fourths of a pint per 108 square feet shall be furnished for 36-inch roofing and not less than 1 pint per 108 square feet for 32-inch roofing.

E-2. Requirements applicable to type II roofing.—The size and form of the shingles shall be as specified in the invitation for bids and they shall also meet the following requirements:

	Maximum	Minimum
Weight per 108 square feet.....pounds.....		83
Saturation of felt.....percent.....		175

Nails.—Nails shall be as specified for type I roofing except that they shall be 1 inch long when the shingles are laid on solid sheathing and 1½ to 1¾ inches long when laid over old shingles. Nails for shingles shall be purchased separately and the number required will depend upon the size and form of the shingles and shall be agreed upon by the purchaser and seller.

F. METHODS OF INSPECTION, DETERMINATION OF WEIGHT AND WIDTH, SAMPLING AND TESTING

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

F-1. Sampling for inspection.—From each shipment select at random rolls of roofing or packages of shingles equivalent to the cube root of the total number included in the lot. If the cube root is a fractional number, express it as the next higher digit.

F-2. Determination of weight and width.—The weight per 108 square feet of material, and its variation in weight: The width of roll roofing and its variation must be determined by the inspector and the results transmitted to the testing laboratory with the sample. Material which does not conform to the specification in these respects should be rejected by the inspector and only deliveries which conform in these respects sampled for laboratory tests.

F-2a. Type I mineral-surfaced asphalt prepared roofing.—Remove the wrappers, other packing material, nails, and cement 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 width of the rectangular portion of the roll to the nearest one-fourth inch and reroll. Observe the appearance of the roofing while unrolling and rerolling. The mineral granules should be uniformly distributed over the entire surface (except as noted below) and when so specified the color shall substantially match the sample mutually agreed upon by buyer and seller. The coating and surfacing may extend to the edge of the sheet of roofing, but an unsurfaced lapping edge approximately 2 inches wide along one side is permissible. The edges of the sheet should not be ragged. Compute the area, and the weight per 108 square feet of each roll taken. Should the weight of any roll per 108

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square feet be less than the minimum weight specified, 80 pounds, it shall be cause for rejection of the whole shipment. Compute also the weight of the packing materials, nails, and cement.

F-2b. Type II mineral-surfaced asphalt shingles.—Remove the wrappers and other packing material from each package of shingles taken and weigh the shingles and also the packing material to the nearest one-fourth pound. Count the number of shingles or strips in each package taken, compute the area, and from these results and the weight compute the weight per 108 square feet. A minimum weight of less than 83 pounds shall be cause for rejection of the whole shipment. Observe the color and general appearance of the shingles while counting them and compare with the mutually agreed upon sample. The mineral granules should be uniformly distributed over the entire surface of the shingles. The coating and surfacing should extend to the edge of each shingle. The edges should not be ragged. No patches of coating should show through the mineral surfacing nor should the coating be broken from the edges. The shingles should be of the specified shape and should not stick together in the package to such an extent as to injure the coating when unpacked.

F-3. Sampling for laboratory examination.—

F-3a. Type I mineral-surfaced asphalt prepared roofing.—From the rolls examined for sampling, select one, the weight of which is near the average weight of the lot. Unroll, and at approximately 10 feet from the end cut two samples the full width of the roll and approximately 40 inches long, label, roll carefully, but do not crease, wrap, and transmit one to the testing laboratory. Retain the other for use in case of dispute.

F-3b. Type II mineral-surfaced asphalt shingles.—For sampling take, in the case of individual shingles, two shingles from each package examined or, in the case of strip shingles, one strip from each two packages examined. Carefully wrap, label, and transmit to the testing laboratory. The sample submitted to the laboratory shall contain at least six individual shingles or two strips. Samples similar to those transmitted to the testing laboratory should be taken and retained for use in case of dispute.

F-4. Laboratory examination.—

F-4a. Color and appearance.—Examine both sides of the roofing or shingles and note the color and general appearance and compare them with the mutually agreed upon sample.

F-4b. Weight.—

F-4b (1). Type I mineral-surfaced asphalt prepared roofing.—Trim the sample so that it is 36 inches long and the full width of the roll (except that material having an unsurfaced lapping edge shall have that edge trimmed off). Measure accurately and weigh to the nearest gram (15 grains). From the measurements and weight so obtained compute the weight per 108 square feet. The weight so determined is only to be used in making the laboratory calculations and shall not be used as a basis for acceptance or rejection (see F-2).

F-4b (2). Type II mineral-surfaced asphalt shingles.—Weigh each shingle or strip submitted to the nearest gram (15 grains); measure

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(Aug. 1933)

to the nearest one sixteenth inch and from the weights and area so obtained compute the weight per 108 square feet. The weight so determined is only to be used in making laboratory calculations and shall not be used as a basis for acceptance or rejection (see F-2).

F-4c. Pliability (type I only).—Cut five strips 1 inch wide and 6 inches long in the direction of the fiber grain and immerse them in water at 25° C. (77° F.) for 10 to 15 minutes.

Remove the strips from the water and immediately bend each strip with the exposure side up, 90 degrees over the edge of a block (which has been rounded to a radius of $\frac{1}{4}$ inch), at a uniform speed, in approximately 2 seconds time. Dry thoroughly and examine.

If 1 or more of these 5 strips crack on this test, cut 10 strips from another part of the sample and repeat the test. If one or more of these strips crack, the material is reported as failing on the pliability test.

F-4d. Behavior on heating at 80° C. (176° F.) for two hours.—Cut two strips from the roofing or shingles approximately 8 inches by 8 inches, weigh, and suspend vertically for two hours in an oven at 80° C. (176° F.), plus or minus 3° C. (5° F.). Remove at the end of this period and note any flowing, sagging, blistering, or absorption of the surface coating. Cool, weigh, and compute the loss in weight.

F-4e. Weight of moisture-free, desaturated felt.—Cut two strips approximately 2 inches wide and 8 inches long from the roofing, weigh accurately and extract with benzol¹ in a suitable extraction apparatus until the benzol runs through colorless and contains no soluble material. The roofing may be cut into squares approximately 1 inch on each side in case an extraction apparatus of sufficient size to accommodate the whole strips is not available. Retain the extract for any mineral matter it may contain. Remove the desaturated felt from the extractor, dry in air until free from the odor of benzol, and brush off any adhering mineral matter, retaining it with the mineral matter in the extractor. Place the desaturated felt in a tared weighing bottle, dry in an oven at 105° to 110° C. (221° to 230° F.) for one half hour, cool in a desiccator, and weigh. Calculate the percentage of moisture-free desaturated felt in the sample taken for extraction and compute the weight of moisture-free desaturated felt per 108 square feet from the weight obtained in F-4b.

F-4f. Thickness of desaturated felt.—Cut one of the strips of felt obtained in F-4d into four equal portions and caliper each piece at four equally spaced points at least three quarters of an inch from a cut edge with a micrometer having flat bearing surfaces, or if the strips were cut into pieces in F-4d take at random 16 pieces of the felt and caliper each piece at its center. Average the readings.

F-4g. Total weight of organic fiber and bitumen.—Combine the mineral matter from the extractor and from the surface of the desaturated felt with that obtained by the filtration or evaporation and ignition of the benzol extract from F-4e, dry in air until free from the odor of benzol, heat for one half hour in an oven at 105° to 110° C. (221° to 230° F.), cool and weigh. Calculate the percentage of mineral

¹ Carbon tetrachloride, chloroform or carbon bisulphide will usually give the same results but benzol should be used in case of dispute.

FEDERAL STANDARD STOCK CATALOG

(Section IV, Part 5)

matter in the sample taken for extraction and compute the total mineral matter per 108 square feet from the weight obtained in F-4b. Subtract this weight from the weight computed in F-4b.

F-4h. Saturation of felt.—Cut two strips of the original roofing or shingle approximately 2 inches wide and 8 inches long and warm them in an oven at about 80° C. (176° F.). Strip off the surfacing and coatings, taking care that as little as possible of the saturated felt is removed with the coatings, and that none of the coatings adhere to the felt. Weigh the saturated felt obtained and extract in a suitable extractor with benzol² until the benzol runs through colorless and contains no soluble material.

Remove the desaturated felt from the extractor and dry in air until free from the odor of benzol. Place in a tared weighing bottle, dry at 105° to 110° C. (221° to 230° F.) for one half hour and weigh. From the weight obtained and the original weight compute the percentage saturation of the moisture-free felt as follows:

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

G. PACKAGING, PACKING, AND MARKING

G-1. Packaging.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. Packing.

G-2a. The roofing shall be put up in rolls of 108 square feet. No roll shall contain more than two pieces of roofing, nor shall there be more than 3 percent of rolls containing two pieces in any shipment. The rolls shall be tightly wound and securely wrapped in a substantial grade of paper. The wrapper shall completely encircle the roll and shall be pasted at the overlap in a manner which will prevent it shifting from position. The ends of the roll shall be protected with metal caps, cloth, or other suitable means. The nails and lap-cement shall be furnished either in each roll or in bulk, as specified in the order. When furnished in bulk, the cloth or metal ends may be omitted. Rolls for export shipment shall be packed as agreed upon by the purchaser and seller.

G-2b. Shingles shall be packed in bundles weighing not more than 135 pounds gross. The bundles shall either be packed in cardboard cartons or between wooden or cardboard ends and tied with rope, wire or steel bands so as to make a substantial package, as may be agreed upon by the purchaser and seller.

G-3. Marking.—Each package or roll shall be legibly marked with a description of the contents, the name of the manufacturer, the place of manufacture, the brand (if any), the net weight of the contents, and some means of identification of "the particular contract on which purchase and shipment were made". Each shipment of the material shall be accompanied by printed directions for its use.

² See note under F-4e.

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SS-R-521-7
(Aug. 1931)

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall respectively form a part of this specification.

H-1a. Army.—United States Army Specification No. 100-2, Standard Specification for Marking Shipments.

H-1b. Navy.—Navy Department purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, roofing, siding, and sheet metal work; dampproofing, and membrane waterproofing, copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D.C.

L. NOTES

I-1. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary, prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects (see D-2).

I-2. This specification governs all United States Government purchases of this commodity. Users are requested to retain this specification in permanent file until a revision is issued.

I-3. An alphabetical index of Federal specifications may be obtained upon application as noted in paragraph next below, price to be obtained from the Superintendent of Documents.

I-4. Copies of this specification may be obtained upon application, accompanied by money order or coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D.C. Price 5 cents.

Notice.—When Government drawings, specifications, or other data, are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility or any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1933

For sale by the Superintendent of Documents, Washington, D.C. . . . Price 5 cents

UU-P-536

FEBRUARY 5, 1935

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

PAPER; SHEATHING, WATERPROOF

This specification was approved by the Director of Procurement for the use of all departments and establishments of the Government and shall become effective not later than August 15, 1935. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. The following Federal specification of the issue in effect on date of invitation for bids shall form a part of this specification:

Federal Specification UU-P-31, General Specifications for Paper.

A-2. Any special requirements of the individual departments are noted under section H.

B. GRADES AND USES

B-1. Sheathing paper shall be furnished in two grades:

Grade A. For permanent structures or for other uses where long-continued exposure to dampness may occur (see I-1).

Grade B. For temporary structures, or other uses where long service is not required.

C. MATERIAL AND WORKMANSHIP

C-1. Shall be free from visible defects and have a uniform appearance. The paper shall not stick together to an extent that will cause tearing when unrolling.

D. GENERAL REQUIREMENTS

D-1. Shall be waterproofed with asphalt.

D-2. Purchase shall be on a basis of 100 square feet.

E. DETAIL REQUIREMENTS

Grade A Grade B

E-1. Tensile breaking strength each direction not less than (pounds per inch width)-----

40 20

E-2. Water resistance.—Not less than (hours)-----

120 24

E-3. Pliability.—Shall not crack when bent.

E-4. Size.—Width, 36, 48, 60, 72; or 84 inches, as specified in invitation for bids, with a plus or minus tolerance of $\frac{1}{4}$ inch.

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F. METHODS OF SAMPLING, INSPECTION, AND TESTS

F-1. Any requirements applicable to individual departments are noted under section H.

F-2. All tests not herein specified shall be made in accordance with Federal Specification UU-P-31, General Specifications for Paper.

F-3. Each sample shall consist of not less than 5 sheets, each not less than 3 square feet, and each taken from a different roll.

F-4. Water resistance shall be determined by the ground-glass method as follows:

F-4a. Five specimens, 6 by 6 inches in size, shall be folded to form boxes 2 inches square and 2 inches high, open at the top, the tabs formed by folding being held by convenient fasteners, such as paper clips. The paper boxes shall be placed on the ground surface of a piece of ground glass resting on black paper or other suitable dark surface. The boxes shall be filled to within $\frac{1}{2}$ inch of the top with water at 65 to 90° F. temperature. They shall be lifted at the end of the time period corresponding to the specification requirement in paragraph E-2, and the ground glass under them observed for transuded moisture, this being visible as a dark film on the surface of the glass.

F-5. The number of square feet in the shipment shall be calculated from the weight of the entire shipment, the net weight of the sample rolls, and the weight per foot of paper calculated from the weight of the sample sheets.

F-6. A strip 1 inch wide shall be used in the tensile breaking strength test.

F-7. Cut five strips, 6 inches by 1 inch, in the machine direction of the paper. Bend them over a $\frac{1}{16}$ -inch mandrel at 32° F. through an arc of 180° at a uniform rate in 2 seconds. All strips shall remain uncracked.

G. PACKAGING, PACKING, AND MARKING

G-1. Unless otherwise specified, shall be furnished in commercial rolls.

G-2. The grade and the contents in square feet shall be plainly marked on the outside of each roll.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications of the issue in effect on date of invitation for bids shall respectively form a part of this specification, in so far as the activities noted are concerned:

H-1a. Army: United States Army Specification No. 100-2, Standard Specification for Marking Shipments.

H-1b. Navy: Navy Department General Specifications for Inspection of Material, copies of which may be obtained upon application to the Bureau of Supplies and Accounts, Navy Department, Washington, D. C.

H-1c. Marine Corps: Instructions issued by the quartermaster.

UU-P-536

**AMENDMENT-1
OCTOBER 18, 1948**

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

PAPER; SHEATHING, WATERPROOF*

This amendment was approved on the above date by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than Dec. 15, 1948. It may be put into effect, however, at any earlier date after promulgation.

The following changes shall be made in Federal Specification UU-P-536, dated February 5, 1935:

Page 1:

Paragraph E-1. Column "Grade A" delete "40" and substitute "32".

*Certain provisions of this amendment are intended to conserve critical or strategic materials. When the present emergency is over, this amendment will be considered for revision.

556579-48

U.S. GOVERNMENT PRINTING OFFICE

3/1/51

FS-PL

STANDARD SPECIFICATIONS

MINERAL SURFACED ROOFING - 90# - 32" or 36"
- 108 SQ. FT. - TO MEET FEDERAL SPECIFICATION
SS-R-521 - TYPE I.

Colors: - As specified.

<u>RAW MATERIALS PER SQ.</u>	<u>NET</u>	<u>GROSS</u>
Felt - 50 lb x 35 7/8 or 31 7/8"	11.2	12.5
Saturation - #14 1/2 - 160% (Min.)	17.9	18.8
Coating - #21 1/2	18.4	19.3
Filler - 15%	3.2	3.4
Surfacing - #11 Oiled	34.9	36.6
Back - Ga. Talc	1.9	2.0
Net Wt.	87.5	
Fixtures	2.5	
Shipping Wt.	90.0	

Variation in Shipping Wt. - Max. - 92.0#
Min. - 88.0#

Underwriters' Label - 1 Sq. Class C.
Direction Sheet, Date Mark each roll.

Fixtures

Printed Wrapper - Bands Printed - 2 Colors.
1 pt. Lap Cement in pt. or #2 cans.
1 pkg. 7/8" Galv. Nails 12 Ga. - 252 count,
each roll.
1-2"x15" Fibre Board Fixture Holder each
roll.

Length of Rolls

36'-0" for 36" Rolls. (No extra allowance)
40'-6" for 32" Rolls (For two piece rolls)
Wt. of Sheet per 100 Sq. Ft. - 81.0#.

Page #2

Production per hour ~ 440 (41/54)

NOTE: Each roll to have Government Purchase
Order stenciled on each roll. Each
roll to show "Conforms to Federal
Specification SS-R-521 Type I."

New Specification.

RNP/ae

FEDERAL STANDARD STOCK CATALOG UU-P-536-3
(February 1935)

(Section IV, part 5)

I. NOTES

I-1. Grade A is intended for sheathing permanent structures, and for other construction uses where long-continued exposure to dampness may occur, the curing and protecting of concrete and terrazzo, covering sand cushions, the protection of membrane waterproofing, and the protection of floor finishing materials following their installation.

I-2. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, sample with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-3. An alphabetical index of Federal specifications may be purchased as noted in paragraph next below, price to be obtained from the Superintendent of Documents.

I-4. Copies of this specification may be obtained upon application, accompanied by money order or coupon or cash, to Superintendent of Documents, Government Printing Office, Washington, D. C., price 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose, other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded, by implication or otherwise, as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE: 1935

For sale by the Superintendent of Documents, Washington, D. C. . . . Price 5 cents

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SS-A-666

AMENDMENT-1
NOVEMBER 4, 1943

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

ASPHALT; (FOR) BUILT-UP ROOFING, WATER- PROOFING, AND DAMP-PROOFING*

This amendment was approved on the above date by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than Jan. 15, 1944. It may be put into effect, however, at any earlier date after promulgation.

The following change shall be made in Federal Specification SS-A-666, dated June 8, 1933:

Page SS-A-666--2:

Paragraph E-2:

Table: Type II, Ductility (centimeters) at 25° C. (77° F.), Minimum: Delete "5" and substitute "4" for Grade 1 and "3" for Grade 2.

*This amendment is intended to conserve critical or strategic materials. When the present emergency is over, this amendment will be considered for revision.

559423*—43

U. S. GOVERNMENT PRINTING OFFICE, 1943

HH-C-581a

DECEMBER 18, 1935

SUPERSEDING
Fed. Spec. HH-C-581
September 5, 1933

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

COTTON FABRIC; WOVEN, ASPHALT-SATURATED

This specification was approved by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than July 15, 1936. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS.

A-1. Federal Specification CCC-T-191—Textiles; Test Methods—of the issue in effect on date of invitation for bids, shall form a part of this specification.

A-2. Any special requirements of the individual departments of the Government are noted under section H.

B. TYPES.

B-1. Asphalt-saturated woven cotton fabric shall be of but one type.

C. MATERIAL.

C-1. Material shall be composed of woven cotton fabric impregnated with an asphaltic saturant.

D. GENERAL REQUIREMENTS.

D-1. See Detail Requirements.

E. DETAIL REQUIREMENTS.

E-1. Appearance.—It must be free from visible external defects, such as ragged or untrue edges, breaks, and rents. The meshes of the fabric shall not be completely closed or sealed by the asphalt saturant. There shall be sufficient porosity to allow the moppings of asphalt plying cement to come through. The fabric shall not stick when unrolled at temperatures between 10° C. (50° F.) and 32° C. (90° F.) to such an extent as to cause injury. The surface of the fabric shall be uniformly smooth and free from irregularities, folds, and knots. It shall not be coated with talc, portland cement, or other substance which would tend to interfere with the adhesion between the fabric

FEDERAL STANDARD STOCK CATALOG

(Section IV, Part 5)

and the plying cement. The use of powdered silica or wood flour shall be permitted.

E-2. *Physical and chemical requirements.*—

	Maximum	Minimum
Width.....inches	38	30
Selvage.....inch	$\frac{1}{4}$	
Weight per roll. To be mutually agreed upon by buyer and seller but in no case more than 80 pounds.		
Weight per square yard.....ounces	15	11
Average strength (grab method):		
Direction of the warp.....pounds		50
Direction of the filling.....do.		40
Volatile matter at 105° C. (221° F.).....percent	2	
Pliability at 0° C. (32° F.). (Cracking on bending over a $\frac{1}{32}$ -inch mandrel through an arc of 180° in one direction and then through 360° over the same mandrel in the opposite direction)		None
Average weight of moisture-free desaturated fabric per square yard		
ounces.....		$3\frac{1}{2}$
Saturation of moisture-free fabric.....percent		200
Ash of moisture-free desaturated fabric.....do.	1	
Thread count per inch. (Both in the direction of the warp and the filling)	36	18
Cotton fiber content.....percent		100

¹ This shall not exclude the customary sizing materials in amounts not exceeding 8 percent by weight of the moisture-free cotton.

F. METHODS OF INSPECTION, DETERMINATION OF WEIGHTS AND WIDTH SAMPLING AND TESTING.

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

F-1. *Sampling for inspection.*—From each shipment of more than 1,000 rolls taken at random a number of rolls of fabric equivalent to one-half the cube root of the total included in the lot. If this proves to be a fractional number, express it as the next higher digit. From each shipment of 1,000 rolls or less take at random 5 in each case.

F-2. *Determination of weight and width.*—The weight per square yard of material, and its variation in weight; the width and its variation must be determined by the inspector and the results transmitted to the testing laboratory with the sample. Material which does not conform to the specification in these respects should be rejected by the inspector and only deliveries which conform in these respects sampled for laboratory tests.

F-2a. Remove wrappers and other packing material from each roll selected and weigh the roll and the packing materials, etc., separately to the nearest one-quarter pound, then unwind each roll and measure the length and width to the nearest one-quarter inch and observe the appearance of the material. (See E-1.) Compute the area of each roll and the weight per square yard of each roll of fabric examined.

FEDERAL STANDARD STOCK CATALOG

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(Dec. 1935)

(Section IV, Part 5)

F-3. Sampling for laboratory examination.—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 transmit one to the testing laboratory. Retain the other sample for check analysis in case of dispute.

F-4. Laboratory examination.—

F-4a. Appearance.—Examine both sides of the sheet of saturated fabric and note the color and general appearance.

F-4b. Weight.—Trim the sample so that it is 36 inches long and the full width of the roll, measure accurately to one-sixteenth inch, and weigh to the nearest gram (15 grains). From the measurements and weight so obtained compute the weight per square yard. The weight so determined is only to be used in making the laboratory calculations and shall not be used as a basis for acceptance or rejection. (See F-2.)

F-4c. Pliability.—Cut five strips 1 inch wide and 6 inches long in the direction of the warp and immerse in a cooling mixture of ice and water at 0° C. (32° F.) for 10 to 15 minutes. The strips shall then be removed from the water and each strip bent over a 1/32-inch mandrel through an arc of 180° at a uniform speed in approximately 2 seconds and then through 360° over the same mandrel in the opposite direction. Dry thoroughly and examine. If 1 or more of these 5 strips crack on this test, cut 10 strips from another part of the sample and repeat the test. If one or more of these strips crack the material is reported as failing on the pliability test.

F-4d. Breaking strength.—(Grab method.) Follow method given in section VI, Federal Specification CCC-T-191.

F-4e. Volatile matter.—Cut two strips of asphalt-saturated fabric 6 inches wide and 12 inches long. Weigh the strips separately and suspend them for 5 hours in an oven at 105° to 110° C. (221° to 230° F.), remove from the oven, cool in a desiccator, and weigh. Compute the percentage loss in weight and average the two results.

F-4f. Weight of desaturated fabric.—Cut a strip approximately 2 inches wide and the full width of the sample, weigh, and extract with benzol (carbon tetrachloride, chloroform, or carbon bisulphide will usually give the same results but benzol should be used in case of dispute) in a suitable extraction apparatus until the solvent runs through colorless. The saturated fabric may be cut into squares approximately 1 inch on each side in case an extraction apparatus of sufficient size to accommodate the whole strip is not available. Remove the desaturated fabric from the extraction apparatus, dry in air until free from the odor of benzol, and brush off any adhering particles of foreign matter. Place the desaturated fabric in a tared weighing bottle and heat in an oven at 105° to 110° C. (221° to 230° F.) for one half hour, cool in a desiccator and weigh. Calculate the percentage of moisture-free fabric in the sample taken for extraction and compute the weight of moisture-free desaturated fabric per square yard from the weight obtained in F-4b.

F-4g. Saturation of moisture-free fabric.—The weight of saturant in the fabric is the difference in weight between the original sample taken for extraction in F-4f and the weight of the desaturated fabric (plus any surfacing material present). The percentage saturation of the moisture-free fabric is obtained by the following formula:

$$\frac{\text{Weight of saturant}}{\text{Weight of moisture-free desaturated fabric}} \times 100 = \frac{\text{percentage}}{\text{saturation}}$$

F-4h. Thread count.—Count the number of threads to the inch in both the warp and filling at five different places. The average of these shall be taken as the threads per inch or thread count.

F-4i. Character of fiber.—From a piece of the desaturated fabric (from which any sizing has been removed by bringing to a boil in a 0.5 percent sodium hydroxide solution), take at random 5 threads in the direction of the warp and 5 in the direction of the filling and separate the fibers in water on a microscope slide, so that the fibers are uniformly distributed. Dry the slides so prepared until all the water is removed, cool and add a drop of zinc-chloriodide solution (Herzberg solution).¹

Cover the stained fibers with a cover glass, draw off the excess stain, and examine under a microscope with a magnification of about 100 diameters. The fibers should all be stained a wine-red color, and shall have the characteristic shape of cotton fiber.

G. PACKAGING, PACKING, AND MARKING.

G-1. Packaging.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. Packing.

G-2a. The rolls of treated cotton fabric shall be wound on mandrels² not less than 2 inches in diameter and extending 2 to 4 inches beyond the end of the rolls. They shall be securely tied or wrapped in a manner which will prevent unrolling in transit.

G-3. Marking.—Each package shall be legibly marked with a description of the contents, the name of the manufacturer, the place of manufacture, the brand (if any), the net weight of the contents, and some means of identification of "the particular contract on which the purchase and shipment were made." Each shipment of the material shall be accompanied by printed directions for its use.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS.

H-1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall respectively form a part of this specification.

¹ The Herzberg stain is made according to the following formula:

Solution A { 20 g zinc chloride,
10 ml distilled water.
Solution B { 2.1 g potassium iodide,
0.1 g iodine,
5.0 ml distilled water.

Dissolve solutions A and B separately, then mix and allow to stand several hours, or until all sediment has settled out. The clear liquid is then decanted into a dark-colored bottle and is ready for use. The stain shall be kept in the dark and should be tested before use on known fibers.

² The mandrel may be either round, square or polygonal.

FEDERAL STANDARD STOCK CATALOG HH-C-531a-5
(Dec. 1952)
(Section IV, Part 5)

H-1a. Army.—United States Army Specification No. 100-2, Standard Specification for Marking Shipments.

H-1b. Navy.—Navy Department purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, Roofing, Siding, and Sheet Metal Work; Dampproofing and Membrane Waterproofing, copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D. C.

I. NOTES.

I-1. Basis of purchase shall be by the roll or by the square (100 square feet) according to agreement between purchaser and the seller.

I-2. Asphalt-saturated fabric is intended for use with asphalt for waterproofing and dampproofing in the construction of membrane waterproofing.

I-3. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bid, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-4. An alphabetical index of Federal specifications may be obtained upon application as noted in paragraph next below, price to be obtained from the Superintendent of Documents.

I-5. Copies of this specification may be obtained upon application, accompanied by money order or coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D. C. Price 5 cents.

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U. S. GOVERNMENT PRINTING OFFICE : 1942

For sale by the Superintendent of Documents, Washington, D. C. Price 5 cents

HH-C-591

JULY 3, 1935

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

COTTON-FABRIC; WOVEN, COAL-TAR-SATURATED

This specification was approved by the Director of Procurement, for the use of all departments and establishments of the Government, and shall become effective not later than January 15, 1936. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. The following Federal Specification, of the issue in effect on date of invitation for bids, shall form a part of this specification:
CCC-T-191—Textiles; test-methods.

A-2. Any special requirements of the individual departments of the Government are noted under section H.

B. TYPES

B-1. Coal-tar-saturated woven cotton fabric shall be of but one type.

C. MATERIAL

C-1. Material shall be composed of woven cotton fabric impregnated with a coal-tar saturant.

D. GENERAL REQUIREMENTS

D-1. See Detail Requirements.

E. DETAIL REQUIREMENTS

E-1. Appearance.—It must be free from visible external defects, such as ragged or untrue edges, breaks, and rents. The meshes of the fabric shall not be completely closed or sealed by the coal-tar saturant. There shall be sufficient porosity to allow the moppings of coal-tar-pitch plying cement to come through. The fabric shall not stick when unrolled at temperatures between 10° C. (50° F.) and 32° C. (90° F.) to such an extent as to cause injury. The surface of the fabric shall be uniformly smooth and free from irregularities, folds, and knots. It shall not be coated with talc, portland cement, or other substance which would tend to interfere with the adhesion between the fabric and the plying cement. The use of powdered silica or wood flour shall be permitted.

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(Section IV, part 5)

E-2. Physical and chemical requirements.

	Maxi- mum	Mini- mum
Width.....inches	38	30
Selva.....inch	4	
Weight per roll. To be mutually agreed upon by buyer and seller but in no case more than 80 pounds.....		
Weight per square yard.....ounces	15	11
Average strength (grab method):		
Director of the warp.....pounds		50
Director of the filling.....do		40
Pliability at 0° C. (32° F.). (Cracking on bending over a 1/4-inch mandrel through an arc of 180° in one direction and then through 360° over the same mandrel in the opposite direction).....		None
Fabric:		
Thread count per inch. (Both in the direction of the warp and the filling).....	35	18
Cotton fiber content.....percent		100

F. METHODS OF INSPECTION, DETERMINATION OF WEIGHTS AND WIDTH SAMPLING, AND TESTING

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

F-1. Sampling for inspection.—From each shipment of more than 1,000 rolls take at random a number of rolls of fabric equivalent to one-half the cube root of the total included in the lot. If this proves to be a fractional number, express it as the next higher digit. From each shipment of 1,000 rolls or less take at random 5 in each case.

F-2. Determination of weight and width.—The weight per square yard of material, and its variation in weight; the width and its variation must be determined by the inspector and the results transmitted to the testing laboratory with the sample. Material which does not conform to the specification in these respects should be rejected by the inspector and only deliveries which conform in these respects sampled for laboratory tests.

F-2a. Remove wrappers and other packing material from each roll selected and weigh the roll and the packing materials, etc., separately to the nearest one-quarter pound, then unwind each roll and measure the length and width to the nearest one-quarter inch and observe the appearance of the material. See paragraph E-1. Compute the area of each roll and the weight per square yard of each roll of fabric examined.

F-3. Sampling for laboratory examination.—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 transmit one to the testing laboratory. Retain the other sample for check analysis in case of dispute.

F-4. Laboratory examination.—

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HH-C-591-3
(July 1935)

F-4a. Appearance.—Examine both sides of the sheet of saturated fabric and note the color and general appearance.

F-4b. Pliability.—Cut five strips 1 inch wide and 6 inches long in the direction of the warp and immerse in a cooling mixture of ice and water at 0° C. (32° F.) for 10 to 15 minutes. The strips shall then be removed from the water and each strip bent over a 1/2-inch mandrel through an arc of 180° at a uniform speed in approximately 2 seconds and then through 360° over the same mandrel in the opposite direction. Dry thoroughly and examine. If 1 or more of these 5 strips crack on this test, cut 10 strips from another part of the sample and repeat the test. If one or more of these strips crack the material is reported as failing on the pliability test.

F-4c. Breaking strength.—(Grab method.) Follow method given in section VI of Federal Specification CCC-T-191.

F-4d. Character of fiber.—Cut a strip approximately 2 inches wide and the full width of the sample, and extract with benzol (carbon tetrachloride, chloroform, or carbon bisulphide will usually give the same results but benzol should be used in case of dispute) in a suitable extraction apparatus until the solvent contains not more than a trace of soluble matter. The saturated fabric may be cut into squares approximately 1 inch on each side in case an extraction apparatus of sufficient size to accommodate the whole strip is not available. Remove the desaturated fabric from the extraction apparatus, dry in air until free from the odor of benzol, and brush off any adhering particles of foreign matter. From a piece of the desaturated fabric (from which any sizing has been removed by bringing to a boil in a 0.5 percent sodium hydroxide solution), take at random 5 threads in the direction of the warp and 5 in the direction of the filling and separate the fibers in water on a microscope slide, so that the fibers are uniformly distributed. Dry the slides so prepared until all the water is removed, cool, and add a drop of zinc-chlor-iodide solution.¹

Cover the stained fibers with a cover glass, draw off the excess stain, and examine under a microscope with a magnification of about 100 diameters. The fibers should all be stained a wine-red color and should have the characteristic shape of cotton fiber.

F-4e. Thread count.—Count the number of threads to the inch in both the warp and filling at five different places. The average of these shall be taken as the threads per inch or thread count.

G. PACKAGING, PACKING, AND MARKING

G-1. Packaging.—Unless otherwise specified, commercial packages are acceptable under this specification.

G-2. Packing.—The rolls of treated cotton fabric shall be wound on mandrels not less than 2 inches in diameter and extending 2 to 4 inches beyond the ends of the rolls. They shall be securely tied or wrapped in a manner which will prevent unrolling in transit.

G-3. Marking.—Each package shall be legibly marked with a description of the contents, the name of the manufacturer, the place

¹ The Herzberg stain is made according to the following formula:

Solution A: 20 grams zinc chloride, 10 milliliters distilled water.

Solution B: 2.1 grams potassium iodide, 0.1 gram iodine, 5 milliliters distilled water.

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of manufacture, the brand (if any), the net weight of the contents, and some means of identification of "the particular contract on which the purchase and shipment were made." Each shipment of the material shall be accompanied by printed directions for its use.

Dissolve solutions A and B separately, then mix and allow to stand several hours, or until all sediment has settled out. The clear liquid is then decanted into a dark-colored bottle and is ready for use. The stain shall be kept in the dark and should be tested before use on known fibers.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall respectively form a part of this specification.

H-1a. Army.—United States Army Specification No. 100-2, Standard Specification for Marking Shipments.

H-1b. Navy.—Navy Department purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7 Y, Roofing, Siding, and Sheet Metal Work; Dampproofing and Membrane Waterproofing, copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D. C.

I. NOTES

I-1. Basis of purchase should be by the roll or by the square (100 square feet) according to agreement between purchaser and the seller.

I-2. Coal-tar-saturated fabric is intended for use with coal-tar pitch for waterproofing and dampproofing in the construction of membrane waterproofing.

I-3. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bid, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-4. An alphabetical index of Federal Specifications may be obtained upon application as noted in paragraph next below, price to be obtained from the Superintendent of Documents.

I-5. Copies of this specification may be obtained upon application, accompanied by money order or coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D. C. Price 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever, and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

U. S. GOVERNMENT PRINTING OFFICE : 1942

For sale by the Superintendent of Documents, Washington, D. C. Price 5 cents

SS-A-666

JUNE 6, 1935

SUPPLEMENT

U.S. No. 24, 51

December 25, 1933

U.S. No. 24, 51

June 1, 1934

FEDERAL STANDARD STOCK CATALOG

Section IV

(Part 5)

FEDERAL SPECIFICATION

FOR

**ASPHALT; (FOR) BUILT-UP ROOFING,
WATERPROOFING, AND DAMP-PROOFING**

This specification was approved for promulgation by the Federal Specifications Board on June 4, 1935, for the use of the departments and independent establishments of the Government in the purchase of this commodity, and shall become mandatory for all departments and independent establishments of the Government not later than December 1, 1935. It may be put into effect, however, at any earlier date after promulgation.

A. APPLICABLE FEDERAL SPECIFICATIONS

A-1. There are no other Federal Specifications applicable to this specification.

A-2. Any special requirements of the individual departments of the Government are noted under section H.

B. TYPES, CLASSES, AND GRADES

B-1. Asphalt shall be of the following types, classes and grades as specified in the invitation for bids.

Type I. Asphalt for surfaced, built-up roofing which may be of the following classes:

Class A, free from inorganic matter.

Class B, containing finely divided mineral matter.

Type II. Asphalt for unsurfaced built-up roofing, which shall be one of two grades as specified in the contract, as follows:

Grade 1. For use on inclines not exceeding 3 inches to the foot over boards and 1 1/2 inches to the foot over concrete.

Grade 2. For use on inclines not exceeding 6 inches to the foot over boards and 3 inches to the foot over concrete.

Asphalt under either grade may be of the following classes:

Class A, free from inorganic matter.

Class B, containing finely divided mineral matter.

Type III. Asphalt for waterproofing and damp-proofing shall be free from inorganic matter.

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C. MATERIAL

C-1. Material shall be as specified under detail requirements.

D. GENERAL REQUIREMENTS

D-1. *Basis of purchase.*—Material is to be purchased by weight.

E. DETAIL REQUIREMENTS

E-1. *Appearance.*—Freshly melted material of both types shall be uniformly glossy, and on aging one week its surface shall not become dull or show any separation of oil, grease, paraffin scale, or similar material.

E-2. *Physical and chemical requirements.*—

	Type I		Type II		Type III	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
Softening point.....	74° C. (165° F.)	60° C. (140° F.)	74° C. (165° F.), grade 1; 88° C. (190° F.), grade 2	68° C. (150° F.), grade 1; 74° C. (165° F.), grade 2	77° C. (171° F.)	60° C. (140° F.)
Penetration (hundredths of a centimeter) at 0° C. (32° F.).....		10		10		10
Penetration (hundredths of a centimeter) at 25° C. (77° F.).....	50	25	50	25	50	25
Penetration (hundredths of a centimeter) at 45° C. (115° F.).....			100		100	
Ductility (centimeters) at 25° C. (77° F.).....						15
Volatile matter (percent) at 163° C. (325° F.).....	1.5		1.0		1.0	
Decrease in penetration (percent) at 25° C. (77° F.) after heating.....	40		40		40	
Ash (percent): Class A.....	40		40		40	
Class B.....	25	10	25	10	25	10
Coarse particles (inorganic matter retained on a no. 100 sieve) expressed as percentage of ash, class B only.....	2		2		2	

¹ The ash shall be mainly silica or silicates.

F. METHODS OF SAMPLING, INSPECTION, AND TESTS

Deliveries will, in general, be sampled and tested by the following methods, but the purchaser reserves the right to use any additional information to ascertain whether the material meets the specifications.

F-1. *Sampling.*—From each shipment select at random a number of packages equivalent to the cube root of the total number of packages.

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SS-1-100-3
(Rev. 1930)

(Section IV, Part 5)

ages included in the lot. If the cube root as calculated proves to be a fractional number, express it as the next higher digit.

Samples shall be taken at least 3 inches below the surface and at least 3 inches from the side of each container selected. A clean hatchet may be used if the material is hard enough to shatter and a broad, stiff putty knife if the material is soft. An auger, or brace and three fourths inch bit, or other suitable means may also be used. Avoid contamination with superficial water, wood slivers, or foreign matter.

The samples so taken shall be combined by melting together with constant stirring to prevent overheating, but the temperature must not exceed 200° C. (392° F.). When thoroughly melted, two 1-quart friction-top cans shall be filled with the well-mixed material, allowed to cool, tightly sealed, marked for identification with the manufacturer's name and brand, etc., and one transmitted to the testing laboratory. The other shall be retained for use in case of dispute.

F-2. Laboratory examination.

F-2a. *Appearance.*—Carefully melt about 10 g of the asphalt at a temperature not exceeding 200° C. (392° F.) and pour it into a small tin box or other suitable container provided with a cover. At least one half the surface shall be free from froth or bubbles. Allow the asphalt to cool in a place free from drafts and dust. When cool, examine the surface, then cover with the lid and set aside for one week, after which period examine again. Immediately after cooling the surface shall be glossy black, and after standing one week the surface shall not show any dulling or the separation of paraffin scale or greasy or oily material.

F-2b. *Softening point.*—Determine the softening point by the method given in Bureau of Standards Research Paper No. 142, "The Ring and Ball Method of Test for Softening Point of Bituminous Materials, Resins, and Similar Substances", Bureau of Standards Journal of Research, Vol. 4, February 1930. Reprints of this paper are for sale by the Superintendent of Documents, Government Printing Office, Washington, D.C. Price 5 cents. This method is essentially as follows:

F-2b(1). Apparatus.

F-2b(1)a. *Ring.*—A brass ring of the following dimensions:

Depth.— 6.35 ± 0.10 mm ($\frac{1}{4}$ inch).

Inside diameter at bottom.— 15.88 ± 0.10 mm ($\frac{5}{8}$ inch).

Inside diameter at top.—Not less than inside diameter at bottom nor more than 17.6 mm, preferably 17.48 mm ($1\frac{1}{8}$ inch).

Outside diameter at bottom.—Not less than 18.0 mm nor more than 21.0 mm.

Outside diameter at top.—Not less than outside diameter at bottom nor more than 21.0 mm.

The interior of the ring may be either tapered, within the tolerances given above, or cylindrical. (The tapered ring is to be preferred, as it can be used with all kinds of materials to which the ring and ball method is applicable. The cylindrical ring, while suitable for asphalts, cannot be used with materials that shrink away from the ring, such as resins and pitches.)

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The outside of the ring may be either uniformly cylindrical or smaller at the bottom provided the above dimensions are complied with. For convenience in mounting it is advisable to have it smaller at the bottom. (See fig. 1.)

F-2b (1)b. *Ball*.—A steel ball, such as used in ball bearings, 9.53 mm ($\frac{3}{8}$ inch) in diameter, weighing between 3.45 and 3.55 g.

F-2b (1)c. *Container*.—A glass vessel, capable of being heated, not less than 8.5 cm ($3\frac{1}{4}$ inches) in diameter and not less than 10.5 cm ($4\frac{1}{4}$ inches) in depth from the bottom of the flare. (A 600 ml beaker; low form.)

F-2b (1)d. *Thermometer*.—A total immersion thermometer meeting the following specification:

Type.—Etched stem, glass.

Liquid.—Mercury.

Ring and subdivision.—Minus 4° to $+104^{\circ}$ C. in 0.2° .

Total length.—454 to 460 mm.

Stem.—Plain front, enamel back; suitable thermometer tubing.

Diameter, 6.0 to 7.0 mm.

Bulb.—Corning normal or equally suitable thermometer glass.

Length, 20 to 30 mm. *Diameter*, not greater than stem.

Distance to -4° line from bottom of bulb.—50 to 70 mm.

Distance to $+104^{\circ}$ line from top of thermometer.—20 to 50 mm.

Filling above mercury.—Nitrogen gas.

Top finish.—Glass ring.

Graduation.—All lines, figures, and letters clear cut and distinct.

Lines corresponding to even degree marks to be longer than the remaining lines. Graduations to be numbered at each multiple of 2° .

Immersion.—Total.

Scale error.—The error at any point of the scale, when the thermometer is standardized at total immersion, shall not exceed 0.3° .

Special markings.—A serial number and the manufacturer's name or trade mark shall be etched on the stem.

Case.—The thermometer shall be supplied in a suitable case, on which shall appear " -4° to $+104^{\circ}$ C. in 0.2° , total immersion."

The A.S.T.M. low softening point, -2° to $+80^{\circ}$ C. thermometer (see A.S.T.M. D-36-26) gives within its range readings identical with the -4° to $+104^{\circ}$ C. thermometer specified above.

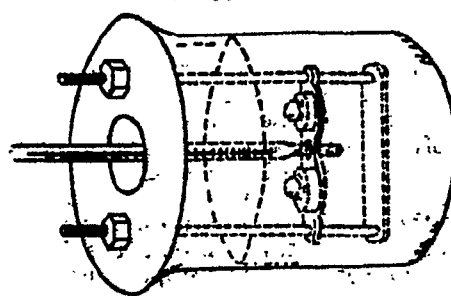
F-2b (1)e. *Support for ring and thermometer*.—Any convenient method for supporting the ring may be used provided it meets the following requirements: The ring must be supported in a substantially horizontal position; the top of the ring must be at least 8 cm below the top of the container and the bottom of the ring 2.54 ± 0.02 cm (1 inch) above a horizontal plate on the bottom of the container; the distance from the center of the ring to thermometer bulb must be not more than 16.5 mm.

A device for centering the ball is desirable, but not essential.

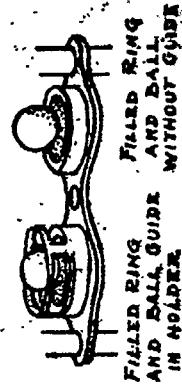
F-2b (2). *Preparation of sample*.—Melt the sample and stir it thoroughly, avoiding incorporating air bubbles in the mass, and then pour it into the ring so as to leave an excess on cooling. The ring while being filled should rest on a brass plate that has been

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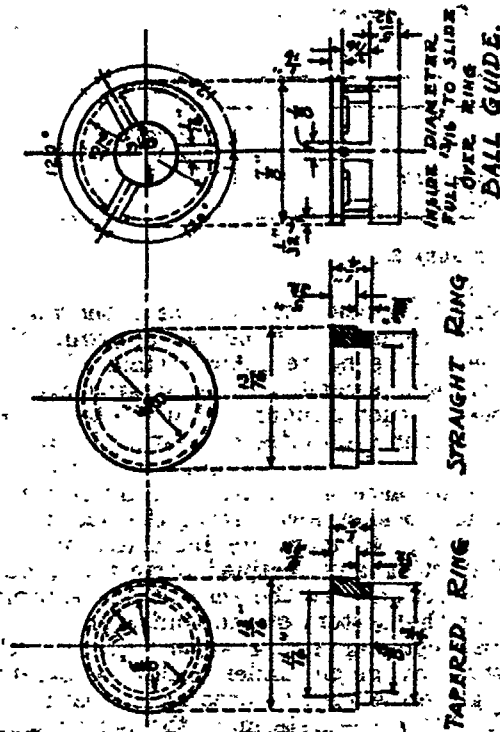
SS-A-400-5
(Rev. 1959)



ASSEMBLY
WITHOUT BALL CENTERING
DEVICE



FILLED RING
AND BALL GUIDE
WITHOUT GUIDE
IN HOLDER



TAPERED RING
STRAIGHT RING
BALL GUIDE

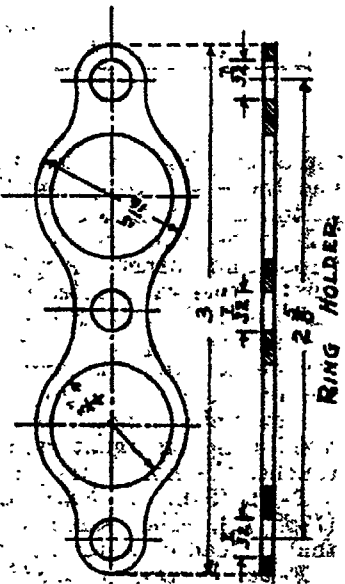


FIGURE 1.

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amalgamated to prevent the sample from adhering to it. After cooling, cut off the excess material cleanly with a slightly heated knife. Determine the softening point within three hours after the sample is prepared.

F-2b (3). Procedure.—

F-2b (3) a. *Asphalts having softening points 80° C. (176° F.) or lower.*—Fill the glass container to a depth of not less than 9 cm with freshly boiled distilled water that has been cooled to not less than 45° C. (81° F.) below the softening point of the material under test, provided such softening point is not below 50° C. (122° F.). If the softening point is below 50° C. the water shall be cooled to not above 5° C. (41° F.). Place the filled ring and ball, but not in contact, in the bath and maintain the initial temperature for 15 minutes. Then place the ball in the center of the upper surface of the material in the ring, and at once suspend the support carrying the ring, ball (ball guide if used), and horizontal plate so that the

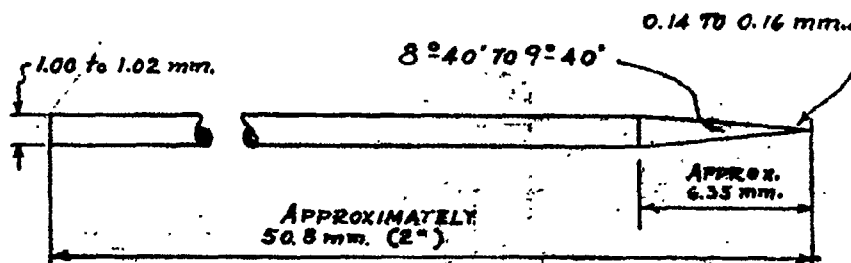


FIGURE 2.

top of the ring is not less than 5.1 cm below the surface of the water and the -4.0° to $+10.4^{\circ}$ C. thermometer is hanging approximately in the middle of the container. The figure shows details of ring, ball guide, support, container, and assembly of apparatus except tripod and burner. Apply heat in such a manner that the temperature of the water after the first three minutes of heating is raised uniformly 5° C. (9° F.) $\pm 0.5^{\circ}$ C. (1° F.) per minute. To facilitate uniform heating, it is advisable to place the burner midway between the center and the edge of the beaker away from the specimen. Report as the softening point the temperature indicated by the thermometer (adding or subtracting any certified corrections, but making no emergent stem corrections) at the instant the sample touches the horizontal plate or the bottom of the container.

F-2b (3) b. *Asphalts having softening points higher than 80° C. (176° F.).*—Use same method as given under F-2b(3) a. except that instead of water U.S.P. glycerine shall be used as the bath.

F-2c. *Penetration at 25° C. (77° F.).*—Determine the penetration by the "Standard Method of Test for Penetration of Bituminous Materials", D-5-25, A.S.T.M. Standards, 1930, part II, p. 647, which is essentially as follows:

F-2c (1). Apparatus.—

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BS-1-005-7
(June 1957)

F-2c (1)a. Container.—The container for holding the asphalt to be tested shall be a flat-bottomed cylindrical dish approximately 55 mm (2 $\frac{1}{8}$ inches) in diameter and 35 mm (1 $\frac{1}{4}$ inches) deep.¹

F-2c (1)b. Needle.—The needle (fig. 2) shall be a cylindrical steel rod approximately 50.8 mm (2 inches) long, having a diameter of 1.00 to 10.2 mm. This shall be symmetrically tapered at one end to a cone approximately 6.35 mm ($\frac{1}{4}$ inch) in height and whose angle shall be within the range of 8 degrees 40 minutes and 9 degrees 40 minutes. After tapering, the point shall be blunted by grinding off to a truncated cone, the smaller base of which shall be from 0.14 to 0.16 mm in diameter. The finished needle shall be hardened and highly polished.

F-2c (1)c. Water bath.—The water bath shall be maintained at a temperature not varying more than 0.1° C. from 25° C. (77° F.). The volume of the water shall be not less than 10 liters, and the sample shall be immersed to a depth of not less than 10 cm (4 inches) and shall be supported on a perforated shelf not less than 5 cm (2 inches) from the bottom of the bath.

F-2c (1)d. Penetration machine.—Any apparatus which will allow the needle to penetrate without appreciable friction and which is accurately calibrated to read in hundredths of a centimeter.

F-2c (1)e. Transfer dish.—The transfer dish for the container shall be a small dish or tray of such capacity as will insure complete immersion of the container during the test. It shall be provided with some means which will insure a firm bearing and prevent rocking of the container.

F-2c (2). Preparation of sample.—The sample shall be completely melted at the lowest possible temperature and stirred thoroughly until it is homogeneous and free from air bubbles. It shall then be poured into the sample container to a depth of not less than 15 mm (five eighths inch). The sample shall be protected from dust and allowed to cool in air at a temperature not lower than 18° C. (65° F.) for 1 hour. It shall then be placed in the water bath along with a transfer dish and allowed to remain 1 hour.

F-2c (3). Procedure.—In making the test the sample shall be placed in the transfer dish which has been filled with water from the water bath to a depth sufficient to completely cover the container. The transfer dish containing the sample shall then be placed upon the stand of the penetration machine. The needle, loaded with the specified weight (100 g) shall be adjusted to make contact with the surface of the sample and the dial adjusted to zero or its reading noted. The needle is then released for the specified period of time (5 seconds), after which its penetration is measured.

At least three tests shall be made at points on the surface of the sample not less than 1 cm (three eighths inch) from the side of the container, and not less than 1 cm (three eighths inch) apart. After each test, the sample and transfer dish shall be returned to the water bath, and the needle shall be carefully wiped toward its point with a clean dry cloth to remove all adhering asphalt. The penetration

¹ Gill style ointment box, deep pattern, made by the American Can Co., and of 4-ounce capacity, meets this requirement.

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reported shall be the average of at least three tests whose values shall not differ more than four hundredths of a centimeter between maximum and minimum.

F-2d. Penetration at 0° C. (32° F.).—This shall be determined as in F-2c at a temperature of 0° C. (32° F.) $\pm 0.2^\circ$ C. (0.4° F.), a 200 g load, and a period of 60 seconds instead of a temperature of 25° C. (77° F.), a load of 100 g, and a period of 5 seconds.

F-2e. Penetration at 46° C. (115° F.).—This shall be determined as in F-2c at a temperature of 46° C. (115° F.) $\pm 0.5^\circ$ C. (1° F.), a 50 g load and for a period of 5 seconds, instead of a temperature of 25° C. (77° F.), a load of 100 g, and a period of 5 seconds.

F-2f. Ductility.—The ductility shall be determined by "Tentative method of test for ductility of bituminous materials," D-113-26T, proceedings A.S.T.M., 1926, vol. 26, part I, page 886. This method is essentially as follows:

F-2f (1). Apparatus.—

F-2f (1)a. Mold.—The mold shall be of the shape shown in figure 3. It shall be made of brass, the ends b and b' being known as clips, and the parts a and a' as sides of the mold. The dimensions of the mold shall be as follows:

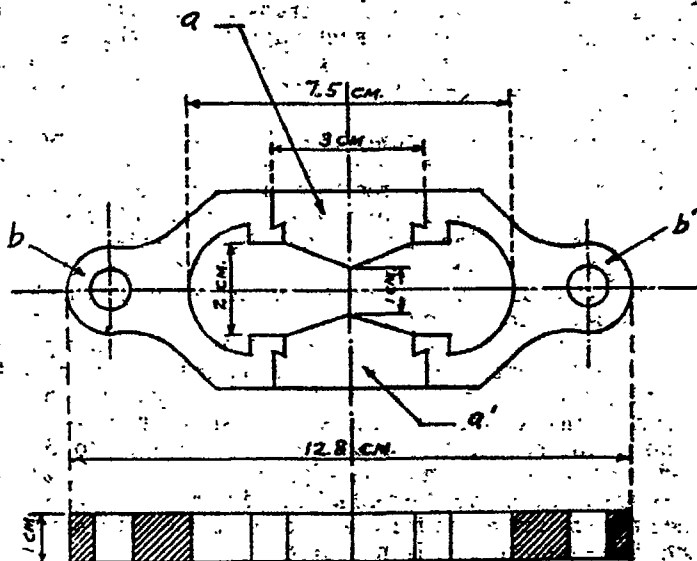


FIGURE 3.

	Cm
Total length (internal)	7.45-7.55
Distance between clips	2.97-3.06
Width of clips at mouth	1.98-2.02
Width of briquet at minimum cross section (half way between clips)	.99-1.01
Thickness of briquet throughout	.99-1.01

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(Section IV, Part 5)

ASTM A-401-4
(June 1939)

F-2f (1)b. *Water bath.*—Same as F-2c (1)c.

F-2f (1)c. *Testing machine.*—Any apparatus may be used for pulling the briquet of asphalt apart that is so constructed that the briquet will be continuously immersed in water and the two clips pulled apart at a uniform rate of 5 cm per minute.

F-2f (2). *Procedure.*—The mold shall be assembled on a brass plate, and the surface of the plate and the interior surfaces of the side pieces A and A' of the mold shall be thoroughly amalgamated, so as to prevent the asphalt from sticking. The asphalt shall be completely melted at the lowest temperature at which it will be thoroughly fluid and then poured into the standard mold. In filling, the asphalt shall be poured in a thin stream back and forth from end to end of the mold until it is more than level full. After cooling to room temperature for 30 minutes the excess asphalt shall be cut off by means of a hot putty knife, so that the mold will be just level full.

The brass plate and mold containing the briquet shall then be placed in the water bath and kept at a temperature of 25° C. (77° F.) for at least one and one half hours, when the briquet shall be removed from the plate and the side pieces A and A' detached.

The rings at each end of the clip shall then be attached to the pins or hooks in the ductility machine and the two clips pulled apart at a uniform rate of 5 cm per minute (± 5 percent). While the test is being made the water in the tank of the ductility machine shall cover the briquet by at least 2.5 cm and shall be kept continuously at a temperature of 25° C. (77° F.) ± 0.5 ° C. (1° F.). When the briquet of asphalt breaks, the distance from the original position of the clip before pulling to its present position shall be measured and shall be taken as the ductility. The average of three tests shall be taken, except that any obviously abnormal result shall be rejected.

F-2g. *Volatile matter.*—The volatile matter shall be determined by the "Standard Method of Test of Loss on Heating of Oil and Asphaltic Compounds", D-6-30, A.S.T.M. Standards, 1939, part II, page 638, which is essentially as follows:

F-2g (1) *Apparatus.*—

F-2g (1)a. *Oven.*—A constant temperature oven so constructed that the temperature in all parts of the oven will not vary more than 1° C. An oven with a revolving shelf is recommended. The oven shall be well ventilated, and shall be provided with a window so that the thermometer can be read without opening the door. The source of heat shall be either gas or electricity.

F-2g (1)b. *Thermometer.*—Use either the thermometer specified in A.S.T.M. D-6-30 or any short accurate thermometer having a range including 155° to 175° C. graduated in $\frac{1}{2}$ ° C. or smaller subdivisions (an Anschütz thermometer is convenient.)

F-2g (1)c. *Container.*—Same as F-2c (1)a.

F-2g (2). *Preparation of sample.*—The sample as received shall be melted and thoroughly stirred to insure a complete mixture before the portion for test is removed.

F-2g (3). *Procedure.*—Place approximately 50 g of the asphalt, accurately weighed, in a tarred container and place in the constant-temperature oven, which has previously been heated to 163° C.

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(325° F.) $\pm 0.5^{\circ}$ C. (1° F.). Maintain this temperature for 5 hours, then remove the sample from the oven, cool, weigh and compute the loss as volatile matter.

Place the thermometer so that it will record the actual temperature to which the asphalt is exposed. If an oven of the revolving-shelf type is used, the thermometer may be laid on the shelf which shall be rotated five to six revolutions per minute.

F-2h. Penetration at 25° C. (77° F.) after heating.—The sample from test F-2g shall be melted at a temperature not exceeding 200° C. (392° F.) until fluid and thoroughly mixed. It shall then be allowed to cool to room temperature and tested for penetration as in F-2c at a temperature of 25° C. (77° F.), a load of 100 g, and for a period of 5 seconds.

F-2i. Ash.—About 1 g of asphalt accurately weighed shall be placed in a crucible of about 30 ml capacity and incinerated until the carbon is consumed and only mineral matter remains. Cool in a desiccator, and weigh. From the weights of the original sample and the ash obtained compute the percentage of ash. Determine nature of ash by usual methods of qualitative analysis.

F-2j. Coarse particles (inorganic matter retained on a no. 100 sieve) expressed as percentage of ash, class B, only. Weigh accurately into a 400 ml beaker an amount of sample, calculated from the percentage ash that will yield about 1 gram of mineral matter. Add a suitable organic solvent (benzol, carbon tetrachloride or chloroform are suitable solvents but benzol must be used in case of dispute) and warm until the asphalt is dissolved. Pour the solution through a weighed no. 100 sieve, wash all residue on to the sieve and wash sieve (with organic solvent) until free from asphalt. Dry and weigh sieve and contents.

From the weight of sample taken, the percentage ash and the weight of the residue retained on the sieve, compute the percentage of coarse particles in the mineral matter.

G. PACKAGING, PACKING, AND MARKING

G-1. Packaging.—Unless other wise specified, commercial packages are acceptable under this specification.

G-2. Packing.—Unless otherwise specified, the subject commodity shall be delivered in standard commercial containers, so constructed as to insure acceptance by common or other carriers for safe transportation, at the lowest rate, to the point of delivery.

G-3. Marking.—Each package shall be legibly marked with a description of the contents, the name of the manufacturer, the place of manufacture, the brand (if any), the weight of the contents, and some means of identification of the particular contract on which purchase and shipment were made. Each shipment of the material shall be accompanied by printed directions for its use.

H. REQUIREMENTS APPLICABLE TO INDIVIDUAL DEPARTMENTS

H-1. The following departmental specifications, of the issue in effect on date of invitation for bids, shall, respectively, form a part of this specification:

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H-1a. Army.—United States Army Specification No. 100-2, Standard Specification for Marking Shipments.

H-1b. Navy.—Navy Department purchases will be made under the issue in effect on date of invitation for bids of Bureau of Yards and Docks Specification No. 7Y, roofing, siding, and sheet-metal work; dampproofing and membrane waterproofing, copies of which may be obtained without cost upon application to the Bureau of Yards and Docks, Navy Department, Washington, D.C.

I. NOTES

I-1. It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects.

I-2. This specification governs all United States Government purchases of this commodity. Users are requested to retain this specification in permanent file until a revision is issued.

I-3. Interested parties are advised that an Alphabetical Index of Federal Specifications may be obtained upon application as noted in paragraph next below, price to be obtained from the Superintendent of Documents.

I-4. Copies of this specification may be obtained upon application, accompanied by money order or coupon, or cash, to Superintendent of Documents, Government Printing Office, Washington, D.C. Price, 5 cents.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility or any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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