

MMM-A-110B
June 10, 1974
SUPERSEDING
Fed. Spec. MMM-A-110A
March 16, 1966

FEDERAL SPECIFICATION

ADHESIVE, ASPHALT, CUT-BACK TYPE (FOR ASPHALT AND VINYL ASBESTOS TILES

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE

1.1 This specification covers one cut-back type of asphalt adhesive suitable for the installation of asphalt and vinyl asbestos tiles

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

Federal Specifications

TT-P-143 - Paint, Varnish, Lacquer, and Related Materials, Packaging, Packing and Marking of.

Federal Standards

Fed Test Method Std. No. 141/GEN. - Paint, Varnish, Lacquer, and Related Materials, Methods of Inspection, Sampling, and Testing

Fed Test Method Std. No. 141/4061 - Drying Time of Coatings

Fed Test Method Std. No. 141/5132 - Chlorinated Compounds (Presence of)

Fed Test Method Std. No. 141/7356 - Solvent Content of Enamels and Enamel Thinners (Gas Liquid Chromatography).

(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 and Standards 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, DC 20402.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA

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

Military Standards

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

(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.)

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2.2 Other publications The following documents form a part of this specification to the extent specified herein Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM) Standards

- D 56 - Flash Point by Tag Closed Tester.
- D 86 - Distillation of Petroleum Products
- D 1084 - Viscosity of Adhesives.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Technical society and technical association specifications and standards are generally available for reference from libraries They are also distributed among technical groups and using Federal agencies)

3 REQUIREMENTS

3.1 Materials The adhesive shall consist of an asphaltic base material, a volatile solvent, and an asbestos fiber or other mineral filler modified to the extent that the requirements of this specification are met (see 4.1.1).

3.1.1 The manufacturer is given latitude in the selection of solvents or blend of solvents provided the material meets the requirements specified in 3.1.1.1 and 3.1.1.2

3.1.1.1 The volatile solvent when tested as specified in 4.4.2 shall contain no benzene (benzol) or halogenated compounds (see 4.3.3)

3.1.1.2 The volatile solvent when tested as specified in 4.4.2 shall conform by volume to the requirements controlling the emission of solvents into the atmosphere as called out in (a), (b), (c), (d), and (e) (see 4.3.3).

- a. A combination of hydrocarbons having branched chain structures, alcohols, aldehydes, esters, or ethers 5 percent maximum
- b. A combination of aromatic compounds with eight or more carbon atoms to the molecule except ethylbenzene 8 percent maximum
- c. A combination of ethylbenzene or toluene 20 percent maximum
- d. Total of (a) + (b) + (c) = 20 percent maximum.
- e. A combination of ketones and solvents with an olefinic or cyclo-olefinic type of unsaturation trace

3.2 Viscosity. The viscosity of the adhesive shall be not less than 15,000 nor more than 98,000 cps when tested as specified in 4.4.3 (see 4.3.3)

3.3 Shelf storage life When stored as specified in 4.4.4, the adhesive shall meet the requirements of 3.2, 3.4, 3.6, 3.7, and 3.11 (see 4.3.3)

3.4 Drying time When tested as specified in 4.4.5, the adhesive shall dry to touch in not more than 3 hours (see 4.3.3)

3.5 Retained volatile solvent When tested as specified in 4.4.6, the dried film of adhesive shall contain not more than 10 percent by weight of the volatile solvent (see 4.3.3)

3.6 Sag When tested as specified in 4.4.7, the adhesive shall show an amount of sag not to exceed 1/2 inch (see 4.3.3)

3.7 Dry film sensitivity to pressure When tested as specified in 4.4.8, the dried film of adhesive shall retain the properties of an adhesive sensitive to pressure (see 4.3.3)

3.8 Accelerated aging. When tested as specified in 4.4.9, the adhesive shall show an amount of sag not to exceed 1/2 inch (see 4.3.3).

3.9 Alkali resistance When tested as specified in 4.4.10, the adhesive shall produce no turbidity or coloration of the alkaline solution (see 4.3.3)

3.10 Flash point. The flash point of the adhesive shall not be less than 35°F (1.7°C) when tested as specified in 4.4.11 (see 4.3.3).

3.11 Workmanship. The adhesive shall be homogeneous and free from lumps, skins, and coarse fibers and fillers. Any settling or caking shall be soft and capable of being redispersed to form a uniform adhesive easily and quickly at a temperature of between 70 and 80°F (21.1° and 26.7°C).

4 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.1.1 The supplier shall submit to the contracting officer a certificate of compliance indicating that the adhesive is composed of an asphaltic base material as specified in 3.1 and that the adhesive complies with the shelf storage life requirement as specified in 3.3. When certificates of compliance are submitted, the Government reserves the right to check test such items to determine the validity of the certificate.

4.2 Sampling.

4.2.1 Lot. For the purposes of sampling, a lot of the adhesive shall consist of a manufacturer's batch. A batch is defined as the end product of all raw materials mixed, blended, or processed in a single operation.

4.2.2 Sampling for inspection of filled containers. A random sample of filled containers shall be selected in accordance with MIL-STD-105 at inspection level I and acceptable quality level (AQL) = 2.5 percent defective to verify compliance with this specification regarding fill, closure, and marking and other requirements not involving tests.

4.3 Inspection

4.3.1 Inspection of containers. Each sample filled container shall be examined for defects of construction of the container and the closure, for evidence of leakage, and for unsatisfactory markings; each filled container shall also be gaged to determine the amount to contents. Any container in the sample having one or more defects or under required fill shall be rejected, and if the number of defective containers in any sample exceeds the acceptance number for the appropriate sampling plan of MIL-STD-105, the lot represented by the sample shall be rejected.

4.3.2 Inspection of preparation for delivery requirements. An inspection shall be made to determine that the packaging, packing, and marking comply with the requirements of section 5. Defects shall be scored in accordance with table I. For examination of interior packaging the sample unit shall be one shipping container fully prepared for delivery selected at random just prior to the closing operations. Sampling shall be in accordance with MIL-STD-105. Defects of closure listed shall be examined on shipping containers fully prepared for delivery. The lot size shall be the number of shipping containers in the end item inspection lot. The inspection level shall be S-2 and the AQL shall be 4.0 defects per hundred units.

TABLE I Classification of preparation for delivery

Examine	Defects
Markings (exterior and interior)	Omitted, improper size, location, sequence, or method of application
Materials	Any component missing or damaged.
Workmanship	Inadequate application of components such as incomplete closure of container flaps, loose strapping, inadequate stapling. Bulging or distortion of container

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4.3.3 Testing of the end item The methods of testing specified in 4.4 shall be followed. For purposes of sampling, the lot shall be expressed in units of gallons of adhesive. The sample unit for testing shall be one quart of adhesive, randomly selected from containers in the lot. The adhesive shall be placed in separate clean, dry metal or glass containers, sealed, marked, and forwarded to the testing laboratories. The sample size shall be as follows:

Lot size (gallons)	Sample size
800 or less	2
801 up to and including 22,000	3
22,001 and more	5

Tests shall be performed on a sample unit basis. All test reports shall contain the individual values utilized in expressing the final result. The lot shall be unacceptable if one or more sample unit fails to meet any test requirement specified.

4.4 Test procedures.

4.4.1 Standard test conditions. Unless otherwise specified, all test specimens shall be prepared and tested in a room having a temperature of $73.5^{\circ} \pm 2^{\circ}\text{F}$ ($23.1^{\circ} \pm 1.1^{\circ}\text{C}$) and a relative humidity of 50 ± 5 percent.

4.4.2 Solvent analysis.

4.4.2.1 Solvent extraction. The solvent shall be distilled from 100 milliliters of the adhesive according to ASTM D 86.

4.4.2.2 Solvent composition. The solvent composition shall be determined in accordance with 4.4.2.2.1, method 7356 of Fed. Test Method Std. No. 141, 4.4.2.2.2, 4.4.2.2.3, and 4.4.2.2.3 to determine compliance with the requirement of 3.1.1.

4.4.2.2.1 Aromatic and oxygenated solvents. The 6-ft. column shall be installed and the operating conditions described in method 7356 shall be followed. About 3 microliters of the isolated distillate shall be injected and the chromatogram scanned. The aliphatic solvents will emerge within 1 minute and the complete chromatogram should develop in about 5 minutes. From the position of the peaks observed on the chromatogram, and internal standard that will be free of interference shall be selected, such as cyclopentanol or cyclohexanol. Six-tenths of a milliliter of internal standard shall be added to 3 milliliters of the distillate. The sample shall be analyzed according to the above procedure. Peaks emerging after 1 minute are aromatic solvents along with any oxygenated solvents that may be present. The percent of aromatic and oxygenated solvents shall be calculated as follows:

$$\% \text{ aromatic and oxygenated solvent, v/v} = \frac{20 \times A}{1.02^{**} \times B}$$

Where

A = area of aromatic and oxygenated solvents

B = area of internal standard

* = is percent of internal standard added

** = is correction factor if cyclopentanol is used. If another internal standard is used, calibrate to determine the correction factor.

NOTE If the above determination exceeds 8 percent, proceed with method 7356.

4.4.2.2.2 Ketones.

4.4.2.2.2.1 Reagent. Two grams of 2,4-dinitrophenylhydrazine + 4 milliliters of concentrated sulfuric acid + 30 milliliters of methanol (slowly added) + 10 milliliters of water.

4.4.2.2.2.2 Procedure. One milliliter of reagent shall be pipetted into a 20 x 170 mm. test tube. Ten drops of distillate shall be added and the test tube shaken for 30 seconds. A yellow precipitate or cloud in the reagent layer indicates the presence of ketones. A blank shall be run using one milliliter of reagent and 10 drops of mineral spirits.

4.4.2.2.3 Halogenated compounds. The presence of halogenated compounds shall be determined in accordance with method 5132 of Fed. Test Method Std. No. 141.

4.4.2.2.4 Benzene When the solvent is tested in accordance with 4.4.2.2.1, a trace benzene peak of not more than 2 percent of the toluene peak will be allowed.

4.4.3 Viscosity The viscosity shall be determined in accordance with method B of ASTM D 1084 to determine compliance with the requirement of 3.2. A Brookfield Synchro-Electric viscosimeter, or equal, equipped with a No. 5 spindle and operated at 4 r.p.m. shall be used.

4.4.4 Shelf storage life. A one pint container, or an equivalent amount of smaller size containers, of the adhesive shall be stored in the original unopened container or containers for 18 months from the date of manufacture at standard conditions (see 4.4.1) and then shall be tested to determine compliance with the requirement of 3.3. If settling or caking occurs the adhesive shall be mixed to the original homogeneous condition by hand stirring.

4.4.5 Drying time The adhesive shall be stirred until uniform. A specimen shall be taken from the mixed sample and spread over an aluminum plate 1 3/4- by 6- by 0.031-inch by means of a Bird Film Applicator set with a gap clearance of 0.010 inch. The aluminum plate with adhesive film shall be allowed to dry in the open air at standard conditions (see 4.4.1) for a period not to exceed 3 hours to determine compliance with the requirement of 3.4. The film shall be considered as dry when it does not transfer to the finger under light pressure.

4.4.6 Retained volatile solvent Two aluminum plates 1 3/4- by 6- by 0.031-inch shall be cleaned and weighed (W_1) and films of the adhesive prepared as specified in 4.4.5. The specimens shall be dried for 3 hours at standard conditions (see 4.4.1) and weighed (W_2). The specimens shall then be placed in an oven at $220^\circ \pm 5^\circ\text{F}$ ($104.4^\circ \pm 2.7^\circ\text{C}$) for 1 hour, removed from the oven allowed to cool, and weighed. The specimens shall be placed in the oven for an additional half hour, and the drying procedure shall be continued until the specimens respectively reach constant weight (W_3). The percent of the retained volatile solvent shall be calculated as follows:

$$\text{Percent retained volatile solvent} = \frac{W_2 - W_3}{W_3 - W_1} \times 100$$

W_1 = Weight of clean plate

W_2 = Weight of plate and adhesive after 3 hours drying at standard conditions (see 4.4.1)

W_3 = Weight of plate and adhesive after oven drying

All weights shall be determined to the nearest hundredth of a gram. The retained volatile solvent in the two specimens shall agree with each other within 1 percent. The average value shall be taken to determine compliance with the requirement of 3.5.

4.4.7 Sag The adhesive shall be equilibrated at standard conditions (see 4.4.1), stirred until uniform and spread rapidly and evenly on a clean dry steel plate 12- by 12- by 1/8-inch, with a standard notched trowel held at an angle of approximately 45° . The plate containing the adhesive shall be conditioned for 1.5 hours at standard conditions (see 4.4.1). A piece of asphalt tile 4 1/2- by 4 1/2- by 1/8-inch shall be placed without pressure on the adhesive film. A steel plate weighing 3.6 ± 1 pounds (approximately 7- by 7- by 1/4-inch) shall be placed without added pressure on the piece of tile, thereby applying an evenly distributed bonding pressure of about 0.18 pounds per square inch. After a period of 1 hour, the steel pressure plate shall be removed from the tile and the adhesive film marked along one edge of the tile with a sharp pointed instrument or by other means. The steel plate with adhesive film and the tile attached shall be arranged in an approximately vertical position (about 80° from the horizontal) against a rigid support with the marked line of the film at the top. The steel plate shall be permitted to remain in this position for a period of 1 hour, permitting the tile to sag downward unencumbered. At the end of 1 hour, the amount of sag of the tile shall be determined for compliance with the requirement of 3.6 by measuring the distance from the marked line on the adhesive film to the top edge of the tile at the center to the nearest 1/16 inch.

4.4.8 Dry film sensitivity to pressure The adhesive shall be tested for sensitivity to pressure in accordance with 4.2.4 (tack free) of method 4061 of Fed. Test Method Std. No. 141 with the following exceptions:

- (a) No preliminary tests shall be made.
- (b) The test specimen shall be that which was prepared in 4.4.5.
- (c) The film shall be considered to have complied with the requirement of 3.7 when the tack tester does not tip over immediately upon removal of the weight.

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4.4.9 Accelerated aging. The adhesive shall be tested as specified in 4.4.7 except that the plate containing the adhesive shall be conditioned for 72 hours at $158^{\circ} \pm 2^{\circ}\text{F}$ ($70^{\circ} \pm 1.1^{\circ}\text{C}$) and then cooled at standard conditions (see 4.4.1). The amount of sag shall be determined for compliance with the requirement of 3.8.

4.4.10 Alkali resistance. The adhesive shall be equilibrated at standard conditions (see 4.4.1), stirred until uniform, and spread over one face of a glass plate 4- by 3- by 1/8-inch by means of a film applicator having a 0.010 inch gap clearance. The adhesive shall be allowed to dry for 48 hours at standard conditions (see 4.4.1). The plate with the dried film shall be immersed in a 5 percent by weight sodium hydroxide solution in such a manner that about 80 percent of the total area of the plate is below the surface of the solution. After 18 hours immersion in the alkaline solution, the plate shall be removed and the solution examined to determine compliance with the requirement of 3.9.

4.4.11 Flash point. The flash point shall be determined in accordance with ASTM D 56 to determine compliance with the requirement of 3.10.

5 PREPARATION FOR DELIVERY

5.1 Packaging, packing, and marking. The adhesive shall be packaged, packed, and marked in accordance with IT-P-143. The level of packaging shall be A, B, or C and the level of packing shall be A, B, or C as specified (see 6.3). The adhesive shall be furnished in 1-, 2-, 3-, or 3-1/2-gallon containers and 5-, 30- or 55-gallon drums.

5.2 Special marking. In addition to markings specified in 5.1 as applicable, information shall appear on each unit container and shipping container as follows:

- (a) Manufacturers instructions for use (to include thinning directions if applicable)
- (b) Date of manufacture (by month and year, not by code)
- (c) Date of first reinspection (date 18 months from date of manufacture)
- (d) Flash point in degrees Centigrade and degrees Fahrenheit

6. NOTES

6.1 Intended use. This adhesive is intended for adhering asphalt tile and vinyl asbestos tile to primed and unprimed concrete subfloors, either suspended, on grade, or below grade. It may be used also for bonding these floor coverings to steel or other metal subfloors and suspended plywood or hardwood subfloors that have been properly primed.

6.2 Priming. In cases where asphalt tile is to be applied to cement finished concrete slabs or floor fills, a suitable cut-back primer should first be applied to such surfaces.

6.3 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- (a) Title, number, and date of this specification
- (b) Size and type of container required (see 5.1)
- (c) Quantity required
- (d) Level of packaging and packing required (see 5.1)
- (e) Special marking required (see 5.2)

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