

MMM-A-002048 (GSA-FSS)  
April 1, 1978

## INTERIM FEDERAL SPECIFICATION

### ADHESIVE, FIRE-RESISTANT, THERMAL INSULATION

This Interim Federal Specification was developed by the General Services Administration, Federal Supply Service, Washington, DC 20406, 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.

#### 1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers fire-resistant adhesive for securing cloth and tape to certain thermal insulations and for securing certain thermal insulations to metal surfaces.

1.2 Classification. The adhesive shall be of the following classes, as specified (see 6.2):

##### Class 1

For bonding fibrous glass cloth to unfaced fibrous glass insulation.

For bonding cotton brattice cloth to faced and unfaced fibrous glass insulation board.

For sealing the edges of, and bonding fibrous glass tape to the joints of, fibrous glass board.

For bonding lagging cloth to thermal insulation.

##### Class 2

For attaching fibrous glass insulation to metal surfaces.

##### Class 3

For attaching cork and fibrous glass insulation board to metal surfaces.

#### 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:

HH-I-525 - Insulation Board, Thermal, Cork.  
PPP-B-636 - Boxes, Shipping, Fiberboard.

##### Federal Standards:

Fed. Test Method Std. No. 141 - Paint, Varnish, Lacquer, and Related Materials;  
Methods of Inspection, Sampling, and Testing.  
Fed. Std. No. 595 - Colors.

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(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 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, 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, Philadelphia, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Houston, 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 Specifications:

- MIL-I-742 - Insulation Board, Thermal, Fibrous Glass.
- MIL-C-788 - Cloth, Brattice, Cotton, Fire-Resistant.
- MIL-E-1790 - Enamel, Nonflaming (Dry) Chlorinated Alkyd Resin, Soft White, Semigloss, Formula No. 124/58.
- MIL-C-20079 - Cloth, Glass; Tape, Textile, Glass, and Thread, Glass.
- MIL-I-22023 - Inspection Felt, Thermal and Sound Absorbing Felt, Fibrous Glass, Flexible.

Military Standard:

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

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

Laws and Regulations:

- 49 CFR 178 - Transportation.

(The Code of Federal Regulations (CFR) and the Federal Register (FR) are for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. When indicated, reprints of certain regulations may be obtained from the Federal agency responsible for issuance thereof.)

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 93 - Flash Point by Pensky-Martens Closed Tester.
- D 217 - Cone Penetration of Lubricating Grease.
- D 562 - Consistency of Paints Using the Stormer Viscosimeter.
- D 781 - Puncture and Stiffness of Paperboard, Corrugated and Solid Fiberboard.
- D 903 - Peel or Stripping Strength of Adhesive Bonds.

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

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National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Classification.

(Application for copies should be addressed to the American Trucking Associations, Inc., Traffic Department, 1616 P Street, N.W., Washington, DC 20036.)

Uniform Classification Committee, Agent:

Uniform Freight Classification.

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

3. REQUIREMENTS

3.1 Condition in container. When tested as specified in 4.4.1, the adhesive shall be free from grit, lumps, and skins, and shall show no evidence of gelling, livering, or separation.

3.2 Consistency.

3.2.1 Class 1. When tested as specified in 4.4.2.1, the consistency of the class 1 adhesive shall be suitable for brush application to the surface of faced and unfaced fibrous glass insulation board and to the surface of cotton brattice cloth.

3.2.2 Class 2. When tested as specified in 4.4.2.2, the consistency of the class 2 adhesive shall be not less than 90 nor more than 130 Krebs units.

3.2.3 Class 3. When tested as specified in 4.4.2.3, the consistency of the class 3 adhesive shall be such as to allow a cone penetration of not less than 25 mm nor more than 35 mm.

3.3 Flash point.

3.3.1 Class 1. When tested as specified in 4.4.3, the flash point of the class 1 adhesive shall be higher than 43°C (110°F).

3.3.2 Classes 2 and 3. When tested as specified in 4.4.3, the flash point of the class 2 or 3 adhesives shall be higher than 27°C (80°F).

3.4 Freeze-thaw stability. After being subjected to the conditions specified in 4.4.4, the adhesive shall meet the requirements of 3.1, 3.2, and 3.6.

3.5 Drying time (class 1). When tested as specified in 4.4.5, the set-to-touch time of the class 1 adhesive shall be not longer than 48 hours.

3.6 Adhesive strength.

3.6.1 Strength before drying (class 1). When tested as specified in 4.4.6.1, the strength of the class 1 adhesive shall be sufficient to prevent the cotton brattice cloth from peeling away more than 25 mm (1 in) at any point from the faced and unfaced surfaces of the vertically mounted fibrous glass insulation board and from the lower (faced and unfaced) surfaces of the horizontally mounted fibrous glass insulation board.

3.6.2 Stripping strength.

3.6.2.1 Class 1. When tested as specified in 4.4.6.2.1, the class 1 adhesive shall have a strength of not less than 1.36 kg (3.0 lb).

3.6.2.2 Classes 2 and 3. When tested as specified in 4.4.6.2.2, the class 2 and 3 adhesives shall have a strength of not less than 300 g (10 oz).

3.6.3 Tensile strength (class 3). When tested as specified in 4.4.6.3.2, 4.4.6.3.3, and 4.4.6.3.4, the class 3 adhesive shall have a tensile strength of not less than 36.7 kg (125 lb), 45.4 kg (100 lb), and 22.7 kg (50 lb), respectively.

3.7 Corrosion resistance (class 3). When tested as specified in 4.4.7, the class 3 adhesive shall not corrode any of the steel disks.

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3.8 Color (class 1). When examined as specified in 4.4.8, the class 1 adhesive shall be white in accordance with color number 37875 of Fed. Std. No. 595.

3.9 Flexibility. When tested as specified in 4.4.9, the adhesive shall not develop cracks deep enough to expose the substrate.

3.10 Scrub resistance (class 1). When tested as specified in 4.4.10, the class 1 adhesive shall be scrubbable to the extent that there shall be no break-through or detachment of the adhesive.

3.11 Paintability (class 1). When tested as specified in 4.4.11, the class 1 adhesive shall not cause discoloration, bleeding through, cracking, or crazing of the enamel.

3.12 Fire resistance.

3.12.1 Vertical specimen test. When tested as specified in 4.4.12.1, no specimen of the adhesive shall continue to burn for more than 3 seconds after the flame is extinguished.

3.12.2 Horizontal specimen test.

3.12.2.1 Class 1. When the class 1 adhesive is tested as specified in 4.4.12.2, no continuous flaming shall issue from any specimen; any flame which occurs shall be limited to a duration of 3 seconds and to the area directly exposed to the burner flame; no flame from any specimen shall reach the angle frame at any point during or after the test period; flaming shall not continue for more than 2 minutes after the burner flame is extinguished; and at no time during the test period shall any piece of the specimen having an area greater than  $64.5 \text{ cm}^2$  ( $10 \text{ in}^2$ ) fall from any panel.

3.12.2.2 Classes 2 and 3. When tested as specified in 4.4.12.2, the class 2 and 3 adhesives shall flame only intermittently for not more than 3 seconds at a time. When the insulation board is pulled off the steel plate, the separation shall occur within the insulation rather than between the insulation and the steel plate.

3.13 Puncture resistance (class 1). When the class 1 adhesive is tested as specified in 4.4.13, the puncture resistance of the finished covering shall be not less than 800 inch-ounces per inch of tear.

3.14 Quantities. The adhesive shall be furnished in quantities of one gallon and five gallons, as specified (see 6.2).

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government.

4.2 Inspection of preparation for delivery requirements. An inspection shall be made to determine whether the packaging, packing and marking comply with the requirements of section 5. The sample unit shall be one shipping container. Sampling shall be in accordance with MIL-STD-105. The inspection level shall be S-2 with an AQL of 4.0 percent defective.

4.3 Testing of the end item. The methods of testing specified in 4.4 shall be followed. Sampling shall be in accordance with MIL-STD-105. The lot shall be expressed in units of gallons. The sample unit for testing shall be one quart. The adhesive shall be marked and forwarded to the testing laboratory. The inspection level shall be S-2 and the AQL shall be 1.5 defects per hundred units. Unless otherwise specified, all test specimens shall be prepared and tested in a room having a temperature of  $23 \pm 1^\circ\text{C}$  ( $74 \pm 2^\circ\text{F}$ ) and a relative humidity of  $50 \pm 5$  percent.

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#### 4.4 Test methods.

4.4.1 Condition in container. The adhesive shall be tested in accordance with method 3011 of Fed. Test Method Std. No. 141 to determine compliance with the requirement of 3.1.

#### 4.4.2 Consistency.

4.4.2.1 Class 1. The class 1 adhesive, after it has been stirred by hand, shall be applied with a brush to faced and unfaced fibrous glass insulation board conforming to MIL-I-742 and to the surface of cotton brattice cloth conforming to MIL-C-788 to determine compliance with the requirement of 3.2.1.

4.4.2.2 Class 2. The consistency of the class 2 adhesive shall be determined in accordance with ASTM method D 562 to determine compliance with the requirement of 3.2.2.

#### 4.4.2.3 Class 3.

4.4.2.3.1 Apparatus. The apparatus used shall be as specified in ASTM D 217, except that the total weight of the cone and rod shall be 75 grams.

4.4.2.3.2 Procedure. The open cup portion of the grease-worker shall be completely filled with the well-mixed class 3 adhesive. A straightedge shall be drawn across the surface of the sample to remove any excess material and to present a smooth surface. The apparatus shall be leveled and the plunger lowered until the tip of the penetrometer cone just touches the surface of the sample. The seal shall then be adjusted so that the scale actuating device is in contact with the top of the rod holding the penetrometer cone and the scale reading recorded. The plunger shall be released and kept released for 5 seconds. The scale-actuating device shall be moved until it is again in contact with the top of the rod holding the penetrometer cone, and the scale reading recorded. The penetration is the difference between the two readings. Five tests shall be made to determine compliance with the requirement of 3.2.3. The sample shall be smoothed over before each test.

4.4.3 Flash point. The flash point of the adhesive shall be determined in accordance with ASTM D 93 to determine compliance with the requirement of 3.3.

4.4.4 Freeze-thaw stability. The adhesive shall be subjected to a temperature of  $-9 \pm 1^{\circ}\text{C}$  ( $16 \pm 2^{\circ}\text{F}$ ) for a period of 16 hours and then allowed to equilibrate at the conditions specified in 4.3. The adhesive shall then be tested to determine compliance with the requirements of 3.4.

4.4.5 Drying time (class 1). The facing of a 30.5 cm (1 ft) square piece of type I fibrous glass insulation board conforming to MIL-I-742 shall be cleaned with a mixture of equal parts of xylene, methyl ethyl ketone, and ethyl alcohol to remove possible contaminants. The board, while still wet, shall be wiped dry with a clean, dry cloth in order to assure removal of the contaminants. A 30.5 by 15.24 cm (12 by 6 in) area of the facing of the board shall be coated with the class 1 adhesive to a thickness of 0.8 mm (1/32 in), leaving a similarly sized area uncoated. After the adhesive has dried for 5 minutes, a 30.5 cm (1 ft) square piece of cotton brattice cloth conforming to MIL-C-788 shall be superimposed on the facing of the board, and pressed and troweled sufficiently to extrude the adhesive through the interstices of the cloth. The adhered half of the cloth shall then be given a finish coating of adhesive, which shall be scraped off down to the fabric in order to remove excess adhesive. The adhesive shall be inspected for drying to touch at the end of 48 hours after application to determine compliance with the requirement of 3.5. The adhesive-coated insulation board shall be saved for use in 4.4.6.2.1.

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#### 4.4.6 Adhesive strength.

4.4.6.1 Strength before drying (class 1). A 30.5 cm (1 ft) square section of type I fibrous glass insulation board and a 30.5 cm (1 ft) square section of type II fibrous glass insulation board, both conforming to MIL-I-742, shall each be mounted in a vertical position. Two sections of insulation board identical to the vertically mounted boards shall be mounted in a horizontal position, so that the facing of the type I board is down. A prime or underlying coat of adhesive shall then be applied at a coverage of 60 square feet per gallon to one side of each of the vertically mounted boards and to the lower side of each of the horizontally mounted boards. The adhesive shall be allowed to set for a period ending 5 minutes after the application of the adhesive was started. After the end of that period and prior to the completion of an additional 5-minute period, a 30.5 cm (1 ft) square piece of cotton brattice cloth conforming to MIL-C-788 shall be superimposed upon the primed surface of the specimen and hand-troweled smooth, eliminating air pockets, and an overlying or finish coat of the adhesive shall be brushed over the cotton brattice cloth at a coverage of 60 square feet per gallon, and the cotton brattice cloth shall be peeled back 25 mm (1 in) from each of two opposite sides of the specimen. At the end of that additional 5-minute period, the cotton brattice cloth shall be allowed to stand without the aid of shoring, pinning, or other mechanical devices and shall be examined for separation from the insulation board to determine compliance with the requirement of 3.6.1.

#### 4.4.6.2 Stripping strength.

4.4.6.2.1 Class 1. The facing of the insulation board from 4.4.5 shall be carefully sliced away from the fibrous glass felt. The bonded assembly of the fibrous glass facing and cotton brattice cloth shall then be cut to provide five strips 5 cm (2 in) wide and 30.5 cm (12 in) long. A strip-adhesion test of each strip shall be conducted in accordance with ASTM D 903 to determine compliance with the requirement of 3.6.2.1 (see 6.3).

4.4.6.2.2 Classes 2 and 3. Six bare 16-gage cold-rolled steel plates, 12.7 by 25.4 cm (5 by 10 in) shall be cleaned with the solvent mixture specified in 4.4.5 and shall be coated with the adhesive to a thickness of 0.8 mm (1/32 in) and allowed to set until tacky, but not longer than 14 minutes. Six 7.6 by 30.5 cm (3 by 12 in) pieces of bonded fibrous glass insulation conforming to MIL-I-22023 shall then be applied to the coated steel plates and allowed to dry for 24 hours. Three of these specimens shall then be aged at a temperature of  $90 \pm 3^{\circ}\text{C}$  ( $194 \pm 5^{\circ}\text{F}$ ) for 24 hours. Six hours after removal from the oven, all six specimens shall be supported in a horizontal position with the bonded fibrous glass side down and a 300-gram weight attached by a hook to the free end of the insulation and suspended for a period of 10 minutes to determine compliance with the requirement of 3.6.2.1. If failure occurs in the glass insulation, a retest shall be made with specimens of insulation selected for higher strength.

#### 4.4.6.3 Tensile strength (class 3).

4.4.6.3.1 Eighteen cold-rolled high carbon steel disks, 10.1 cm (4 in) in diameter and 12.7 mm (0.5 in) thick, shall be drilled and tapped in the center to receive a 1/2-inch bolt. The tapped holes shall not be drilled entirely through the disks. Each bolt shall be drilled crosswise at the outer end to receive a steel pin for attaching to the testing machine. (In use, the pin at one end shall be in a plane 90 degrees to the plane of the pin at the other end, to provide freedom in both planes.) The adhesive shall be applied to the surface of the steel disks at a thickness of 1.6 mm (1/16 in) and allowed to set for 5 minutes. The coated steel disks shall then be applied to the two sides of pieces of cork insulation board 25.4 mm (1 in) in thickness and 10.1 cm (4 in) in diameter, conforming to HM-I-525, in such a manner that the cork shall be sandwiched between the steel disks. Both faces of the cork shall, if necessary, have been first sanded smooth, flat and parallel, and the dust removed. The nine specimens thus prepared shall be allowed to dry for 72 hours under a load of 2 psi.

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4.4.6.3.2 Three of the specimens shall be pulled to rupture in a load-cell type machine at a rate of 2.5 mm (0.1 in) per minute to determine compliance with the requirement of 3.6.3.

4.4.6.3.3 Three of the specimens shall be submerged in salt water (5 percent NaCl) for 2 hours. Upon removal, they shall immediately be tested as specified in 4.4.6.3.2.

4.4.6.3.4 The remaining three specimens shall be heated in an oven at  $93 \pm 5^{\circ}\text{C}$  ( $200 \pm 10^{\circ}\text{F}$ ) for 2 hours. The test for each specimen, as specified in 4.4.6.3.2, shall be completed within three minutes after removal from the oven.

4.4.7 Corrosion resistance. Upon completion of the testing in 4.4.6.3.4, the bonded surfaces of the steel discs shall be examined for corrosion after the removal of the cork to determine compliance with the requirement of 3.7.

4.4.8 Color (class 1). The specimens prepared for the tests specified in 4.4.6.1 shall be examined visually to determine the color of the adhesive when dried to determine compliance with the requirement of 3.8.

4.4.9 Flexibility. A film 0.5 mm (0.02 in) thick shall be applied in accordance with method 2162 of Fed. Test Method Std. No. 141 to tinplate in accordance with method 2012 of Fed. Test Method Std. 141. The coated specimen shall be dried for 24 hours and shall then be baked for 75 minutes at  $103 \pm 2^{\circ}\text{C}$  ( $217 \pm 4^{\circ}\text{F}$ ) in a circulating air oven. The coated specimen shall then be conditioned for 2 hours at the conditions specified in 4.3. The flexibility test shall then be conducted with the coated specimen using a 3.6 cm (1.4 in) diameter mandrel in accordance with method 6221 of Fed. Test Method Std. No. 141 except that the magnification and special illumination specified therein for the examination of the coated specimen will not be required. The adhesive film shall be examined for cracks deep enough to expose the substrate to determine compliance with the requirement of 3.9.

4.4.10 Scrub resistance (class 1). The material to be used for the scrub resistance test for class 1 adhesives shall be as follows:

- (a) A washability machine with counter and brush as specified in method 6142 of Fed. Test Method Std. No. 141.
- (b) A glass panel 15.2 cm (6 in) by 45.7 cm (18 in), as specified in method 2021 of Fed. Test Method Std. No. 141.
- (c) A film applicator with a 0.5 mm (0.020 in) clearance as specified in method 2162 of Fed. Test Method Std. No. 141.
- (d) A bar of "Bon-Ami" abrasive soap.

The glass panel shall be prepared as specified in method 2021 of Fed. Test Method Std. No. 141. A film of class 1 adhesive shall be drawn down using the film applicator. The film shall be drawn down the entire length of the glass panel on the ground side. The draw-down shall be at least 9 cm (3.5 in) in width. The panel shall be allowed to dry for 6 days at the conditions specified in 4.3. The glass panel shall be placed on the table of the washability machine. The brush shall be soaked in water for 30 minutes. The brush shall be rubbed over the bar of soap until the bristles are thoroughly saturated with soap. The brush shall be placed into the machine receptacle and shall be aligned on the coated glass panel so that the brush stroke is entirely within the coated area. During the test, water shall be permitted to drop into the path of the brush at the rate of 12 drops per minute. The machine shall be started and run for 1000 double strokes. The brush shall then be washed, and the film shall be inspected within the middle 15 cm (6 in) of brush travel for definite breaks or detachment of the film down to the glass to determine compliance with the requirement of 3.10. Small pin point areas shall be disregarded.

4.4.11 Paintability (class 1). The class 1 adhesive shall be applied to the fibrous glass cloth facing of a 30.5 cm (12 in) square specimen of fibrous glass insulation board conforming to MIL-I-742 and allowed to set for 10 minutes. A strip of fibrous glass tape conforming to type II, class 1 of MIL-C-20079, shall then be applied to the adhesive-coated specimen. A coat of adhesive shall be applied over the tape. The specimen shall be allowed to dry for 24 hours. A coat of enamel conforming to the MIL-E-17970 shall be applied to the face of the specimen and allowed to dry for 24 hours, after which a second coat of enamel shall be applied. The specimen shall then be inspected after 24 and 48 hours to determine compliance with the requirement of 3.11.

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#### 4.4.12 Fire resistance.

4.4.12.1 Vertical specimen test. Three strips of fibrous glass tape, 15.2 cm (6 in) long and 5 cm (2 in) wide, conforming to type II, class 1 of MIL-C-20079 shall be coated with the adhesive, so that the tape with coatings on both sides when dried shall have an overall thickness of  $0.33 \pm 0.08$  mm ( $0.013 \pm .003$  in). The coated strips shall be dried for 24 hours and then placed in a forced-draft oven for 20 hours at 100 to 105°C (212 to 221°F). These specimens shall then be removed from the oven and, after not less than 1/4 hour, nor more than 1/2 hour, each in turn shall be suspended vertically from a clamp that covers the upper 1/2 inch of the strip, in a draft-free location. A Meker burner, having a 30 mm (1.2 in) diameter grid, and supplied with natural gas of 1100 + 100 BTU per cubic foot, shall have its flame adjusted so that its outer zone is 3.8 cm (1.5 in) high and its light blue inner zone is 1.6 mm (1/16 in) high. The burner shall then be placed directly below the specimen in a position such that its grid is 2.5 cm (1 in) below the middle of the lower edge of the specimen. After 5 seconds, the burner shall be extinguished and the length of time that the coating continues to burn after the extinction shall be noted to determine compliance with the requirement of 3.12.1.

#### 4.4.12.2 Horizontal panel test.

4.4.12.2.1 Preparation of specimen (class 1). The adhesive shall be applied to the facing of a 76 by 76 by 2.5 cm (30 by 30 by 1 in) specimen of type I fibrous glass insulation board and to one side of a 76 by 76 by 2.5 cm (30 by 30 by 1 in) specimen of type II fibrous glass insulation board conforming to MIL-I-742. A 76 by 76 cm (30 by 30 in) piece of cotton brattice cloth conforming to MIL-C-788 shall be superimposed on the primed surface of each of the specimens and hand-troweled smooth, eliminating and removing air pockets, until the adhesive extrudes through the interstices of the cloth. A finish coat of adhesive shall then be brushed over the cloth. A 91 by 91 by 0.16 cm (36 by 36 by 1/16 in) steel plate, stiffened against sagging, shall be bonded to the opposite side of each specimen. Then each specimen shall be dried to constant weight at  $80 \pm 1^\circ\text{C}$  ( $176 \pm 2^\circ\text{F}$ ).

4.4.12.2.2 Preparation of specimen (classes 2 and 3). The adhesive shall be applied to the unfaced sides and to the edges of two fibrous glass insulation boards conforming to type I of MIL-I-742 and measuring 38 by 76 by 2.5 cm (15 by 30 by 1 in) each. The two boards shall then be secured by the adhesive to a 91 by 91 by 0.16 cm (36 by 36 by 1/16 in) steel plate, stiffened against sagging, so that the boards are butted together to form a 76 cm (30 in) square specimen, centered on the steel plate. Then a piece of glass tape, 76 cm (30 in) long and 5 cm (2 in) wide, conforming to type II, class 1 of MIL-C-20079, shall be applied over the seam where the two boards are joined and shall be bonded to the board facings with class 1 adhesive. The specimen shall be allowed to dry for 24 hours. Two coats of enamel conforming to MIL-E-17970 shall be brushed over the glass cloth facing of the specimen, each coat being allowed to dry for 24 hours.

4.4.12.2.3 Test procedure. The specimen shall be placed in a horizontal position with the insulation downward and with the steel plate supported on the flat surface by a 51 by 51 by 3.2 mm (2 by 2 by 1/8 in) steel angle frame having a 76 by 76 cm (30 by 30 in) clear opening. A gas-air burner of 19 to 22 (3/4 to 2/8 in) diameter shall be placed vertically with its top 57 mm (2-1/4 in) below the center of the lower surface of the specimen. A temperature measuring device capable of measuring temperatures accurately between 0 and 1000°C shall be placed 2.5 cm (1 in) below the center of the lower surface of the specimen. The test shall be conducted by directing a flame from the burner against the center of the lower surface of the specimen for a period of 40 minutes. During the test, the temperature of the temperature measuring device shall be read and recorded at intervals not exceeding 2 minutes. The flame shall be regulated to give temperature indications conforming to the time-temperature curve shown on figure 1. The flame shall contact the specimen during the entire test period except for the first 5 minutes, if required for proper temperature regulation. At no time during the test shall the flame from the burner contact the specimen at any point which is more than 6 inches from the center of the specimen. The area under the time-temperature curve obtained from the thermocouple readings shall be



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within 5 percent of the area under the curve of figure 1. During the 40-minute test period, the extent and duration of flaming shall be noted. At the end of the test period, the flame shall be extinguished. The specimen shall then be examined to determine the further extent and duration of flaming to determine compliance with the requirements of 3.12.2.1 and 3.12.2.2. After the test of either the class 2 or the class 3 adhesive, the insulation board shall be pulled off the steel plate, and the steel plate shall be examined to determine compliance with the requirement of 3.12.2.2.

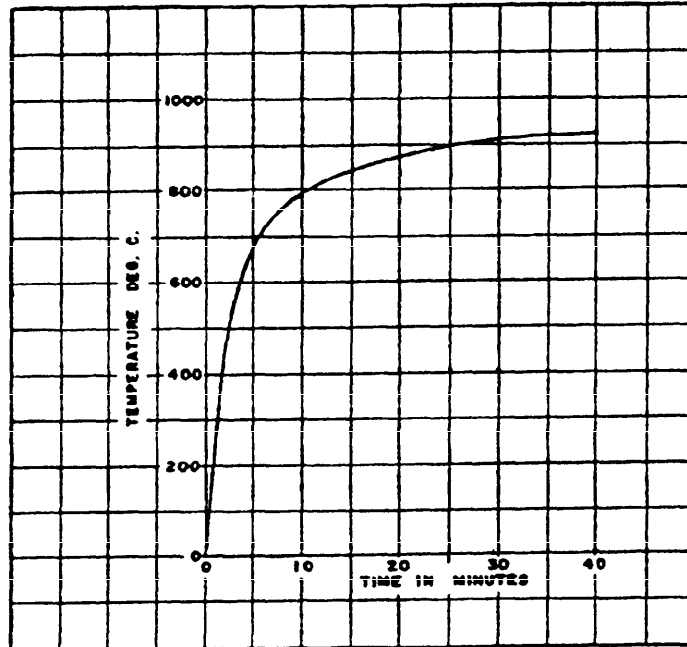


FIGURE 1. Time-temperature curve.

4.4.13 Puncture resistance (class 1). The puncture resistance of the class 1 adhesive shall be determined in accordance with the method specified in ASTM D 781, except the test specimen shall be placed, with the finished covering surface down, between the clamping plates. Before each test is made, the loose sleeve shall be placed against the base of the puncture point and the pointer set 2.5 cm (1 in) above the expected reading. The pendulum shall be raised to the horizontal position and released by pushing the latch handle to the left. The reading shall be noted on the proper scale after the pendulum has completed its swing to determine compliance with the requirement of 3.14. The scales are graduated in inch-ounces per inch of tear.

## 5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A or Commercial, as specified (see 6.2).

5.1.1 Level A. The adhesive shall be furnished in 1-gallon metal cans or 5-gallon metal pails, as specified (see 6.2). The metal cans and pails shall meet or exceed the requirements of DOT Specifications under 49 CFR 178.

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5.1.2 Commercial. The adhesive shall be packaged in cans or pails, as applicable, in accordance with normal commercial practice. The complete package shall be designed to protect the item against damage during shipment, handling and storage.

5.2 Packing. Packing shall be level A or Commercial, as specified (see 6.2).

5.2.1 Level A. Four 1-gallon cans of adhesive, packaged as specified in 5.1, shall be packed in close-fitting boxes conforming to PPP-B-636, grades V3c, V3s, or V2s. The boxes shall be closed, waterproofed, and reinforced in accordance with the appendix to PPP-B-636. Alternatively, wirebound, cleated plywood, or nailed wood boxes shall be acceptable shipping containers when lined with a waterproof barrier material. The barrier material shall be sealed at the edges with waterproof tape or adhesive. Five gallon metal pails need no further packing.

5.2.2 Commercial. The one gallon adhesive, packaged as specified in 5.1, shall be packed in fiberboard boxes that will assure acceptance by common carrier and provide product protection against loss and damage during multiple shipments, handling and storage. The shipping container shall be in compliance with the National Motor Freight Classification or Uniform Freight Classification. Five gallon pails need no further packing.

5.3 Palletization. When shipments to Government depots are full car or truckload, the shipping containers shall be palletized on expendable wooded pallets, 2 or 4 way design, to facilitate handling, in accordance with normal commercial practice. The palletized load shall not exceed 2,500 pounds in weight, 63 inches in height, 56 inches in length, and 45 inches in width.

5.4 Marking. Marking shall be as specified in the contract or order (see 6.2).

## 6. NOTES

6.1 Intended use. The adhesive covered by this specification is used to secure cloth and tape to certain thermal insulations and to secure certain thermal insulations to metal surfaces (see 1.2).

6.2 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) Class of adhesive required (see 1.2).
- (c) Level of packaging and packing required (see 5.1 and 5.2).
- (d) Size of container required (see 5.1).
- (e) Marking required (see 5.4).

6.3 The facing of certain batches of fibrous glass insulation board may require additional treatment prior to the application of the adhesive in order to achieve a satisfactory test of adhesive strength; this treatment may be accomplished by priming with a thin brushed-on coat of a small portion of the adhesive which has been thinned sufficiently for this purpose. This coat shall be dried for 72 hours.

Preparing activity:

GSA-FSS