

HH-B-100B
 September 28, 1973
 SUPERSEDING
 Fed. Spec. HH-B-100A
 November 1, 1967

FEDERAL SPECIFICATION

BARRIER MATERIAL VAPOR
 (FOR PIPE, DUCT AND EQUIPMENT THERMAL, INSULATION)

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

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers vapor barriers (jackets and facings) applied over thermal insulation for pipes, ducts, and equipment.

1.2 Classification. Vapor barriers covered by this specification shall be of the following types as specified (see 6.2):

Type I - Low vapor transmission, high puncture resistance (for use on insulation for piping, ducts and equipment).

Type II - Medium vapor transmission, moderate puncture resistance (for use on insulation for ducts and equipment).

1.2.1 Vapor barrier materials covered by this specification shall be of the nominal sizes listed in table I.

TABLE I. Size of rolls

Type	Width	Length
I	3, 4, 24, 35-1/4, 40 and 52 inches 7.6, 10.6, 89.3, 102, 60.96 and 132 cm.	300 and 600 feet 91.4 and 183 m.
II	38, 40, 50 and 52 inches 96.5, 102, 127 and 132 cm.	120, 600 and 800 ft. 36.6, 183 and 244 m.

2. APPLICABLE DOCUMENTS

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

Federal Specifications:

- UU-P-268 - Paper, Kraft, Untreated, Wrapping.
- PPP-B-585 - Boxes, Wood, Wirebound.
- PPP-B-591 - Boxes, Fiberboard, Wood-Cleated.
- PPP-B-601 - Boxes, Wood, Cleated-Plywood.
- PPP-B-621 - Boxes, Wood, Nailed and Lock Corner.
- PPP-B-640 - Boxes, Fiberboard, Corrugated, Triple-Wall.
- PPP-B-1055 - Barrier Material, Waterproofed, Flexible.
- PPP-T-60 - Tape; Pressure Sensitive Adhesive, Waterproof for Packaging and Sealing.

PPP-T-76 - Tape; Pressure Sensitive Adhesive Paper (For Carton Sealing).

Federal Standard:

Fed. Std. No. 123 - Marking for Domestic Shipment (Civil Agencies).

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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 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, DC, Atlanta, Chicago, Kansas City, MO, Forth 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.
- MIL-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 from a part of this specification to the extent specified herein. unless otherwise indicated, 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 777 - Test for Flammability of Treated Paper and Paperboard.
- D 781 - Test for Puncture and Stiffness of Paperboard, Corrugated and Solid Fiberboard.
- D 828 - Test for Tensile Breaking Strength of Paper and Paperboard.
- D 2020 - Test for Mildew Resistance of Paper and Paperboard.
- E 84 - Test for Surface Burning Characteristics of Building Materials.
- E 96 - Test for Water Vapor Transmissions of Materials in Sheet Form.

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

National Motor Traffic Association, Inc., Agent:

National Motor Freight Classification.

(Application for copies should be addressed to the American Trucking Association, Inc., Tariff Order Section, 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.)

(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. Unless otherwise specified, vapor barriers (jackets and facings) shall be constructed of a combination of one or more fills, plastic films, plastic coatings, fabric scrims, cloths or papers, selected to obtain the required performance characteristics specified in table II. The material shall be in the form of rolls or sheets in sizes specified in table I. The jackets or facing may be applied in the field or may be a factory composite of the insulations as specified, (see 6.2).

3.2 Physical properties. Unless otherwise specified, (see 6.2) physical properties, for vapor barriers (jackets and facings), shall conform to the requirements specified in table II, and shall be tested in accordance with 4.4.

TABLE II. Physical properties

Properties	Type I	Type II
Moisture Vapor Transmission		
Perms, Max. Grain/Hr.-Ft.2 In. Hg.	.02	.02
Puncture Resistance		
Beach Units, Min.	50.	25.
Tensile Strength		
Lb./In. Width, Min.	35	20
Flame Spread, Max.	25	25
Smoke developed, Max.	50	50
Fire Resistance Permanence		
Percent Increase in Char Length, Max.	20	20
Mold and Mildew Resistance		
Mold Growth Sustenance.	None	None
Humidity Resistance		
Corrosion or Delamination.	None	None
Dimensional Stability		
Percent length Change, Max.	.25	.25
Low Temperature Resistance	Remains Flexible	No Delamination
High Temperature Resistance	Remains Flexible	No Delamination

3.3 Dimensional tolerance. Tolerances on width shall be plus or minus 1/4 inch and plus or minus 5 percent on length.

3.4 Workmanship. Laminations shall be free from separation, holes, tears, cuts, and creases and shall show no visual defects that will affect serviceability.

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.

4.2 Sampling.

4.2.1 Lot. Unless otherwise specified (see 6.2), a lot shall consist of all rolls of each type, and size of vapor barrier submitted for inspection at the same time.

4.2.3 Sampling for tests. Samples for tests shall be in accordance with level S-2. The acceptable quality level (AQL) shall be 2.5 percent defective for specimens used in each test.

4.3 Visual examination.

4.3.1 End item. Vapor barrier shall be examined for defects listed in table III. The acceptable quality levels (AQL's) in MIL-STD-105 shall be 2.5 percent defective for major defects and 4.0 percent defective for minor defects.

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TABLE III. Classification of defects, end item

Defects	Major	Minor
Type, and size not as specified-----	X	
Width and length not within tolerance-----	X	
Delamination present-----	X	
Holes, tears or cuts in laminations-----	X	
Creases in laminations-----	X	
End of rolls deformed-----		X
Damage or defects affecting function or serviceability-----	X	
Damage or defects not affecting function or serviceability--		X

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 in section 5. Defects shall be scored in accordance with table IV. The sample unit shall be one shipping container fully prepared for delivery. Sampling shall be in accordance with MIL-STD-105. 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 IV. Classification of preparation for delivery defects

Examine	Defects
Markings	Omitted; incorrect; illegible; improper size, location, sequence, or method of application.
Materials	Any component missing or damaged.

4.4 Test methods.

4.4.1 Moisture vapor transmission. Moisture vapor transmission for jackets and facings shall be as specified in table II, when tested in accordance with ASTM E 96, Procedure A.

4.4.2 Puncture resistance. Puncture resistance for jackets and facings shall be as specified in table II, when tested in accordance with ASTM D 781.

4.4.3 Tensile strength. Tensile strength for jackets and facings shall be as specified in table II, when tested in accordance with ASTM D 828.

4.4.4 Fire hazard classification. Fire hazard classification for jackets and facings shall be as specified in table II for flame spread rating and smoke developed rating, when tested in accordance with ASTM E 84.

4.4.5 Fire resistance permanence. Fire resistance permanence percent increase in char length shall be as specified in table II, when tested in accordance with the following testing method:

4.4.5.1 Apparatus.

- (a) 1,000 ml. beakers, de-ionized water, paper towels.
- (b) Char test equipment as detailed in ASTM D 777.
- (c) Measuring rule graduated in 1/10 inches.

Sample preparation. Cut 10 samples 2-3/4 x 8-1/4 inches (7 by 21 cm) from the test sheet in pairs, a pair being two samples cut from adjacent positions. Immerse five of the samples, one from each pair fully in 700 mls. of de-ionized water at 75 deg. F (22.5 deg. C) room temperature for 15 minutes. Remove the samples from the water and blot up excess water with paper towel. Dry the samples for 15 minutes at 200 deg. F +/- 5 deg. F. (93 deg. +/- 2 deg. C.). Condition the leached specimen together with the corresponding unleached specimens for 24 hours at 73 deg. F +/- 2 deg. F, (22.5 deg. +/- 1 deg. C.) and 50 +/- 2 percent relative humidity.

Test procedure. Conduct the char test on all ten specimens in accordance with ASTM D 777. For results of test, compute the char length increase of each pair of samples by the following formula:

$$C = 100 \frac{(X_{r2} - X_{r1})}{X_{r1}}$$

Where C = Percent increase of char length.

X₂ = Char length of leached specimen.

X₁ = Char length of unleached specimen.

The five values shall then be averaged to conform to requirements of 4.4.5.

4.4.6 Mold and mildew resistance. Mold and mildew resistance for jackets and facings shall be as specified in table II, when tested in accordance with ASTM D 2020, Method A.

4.4.7 Humidity resistance. Humidity resistance for jackets and facings shall be as specified in table II, when tested as follows: Expose three square foot specimens for 20 days to 120 deg. F (49 deg. C.) and 95 percent humidity and then examine for corrosion and delamination.

4.4.8 Dimensional stability. Dimensional stability for jackets and facings shall be as specified in table II when tested as follows: Condition three square foot specimens at 75 deg. F (22.5 deg. C) and 50 percent humidity for 24 hours, measured in length to 1/64 inch in both directions before and after oven drying for 15 minutes at 200 deg. F (93 deg. C.) with the resulting length change calculated.

4.4.9 Low temperature resistance. Low temperature resistance for jackets and facings shall be as specified in table II when tested as follows: Expose three square foot specimens for four hours at 30 deg. F, (-1.11 deg. C.) and examine for flexibility and delamination.

4.4.10 High temperature resistance. High temperature resistance for jackets and facings shall be as specified in table II when tested as follows: Expose three square foot specimens for four hours at 150 deg. F, (65 deg. C.) and examine for flexibility and delamination.

5. PREPARATION FOR DELIVERY

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

5.1.1 Level A. Each roll of material shall be wrapped with paper conforming to PPP-B-1055, class E-1. All joints, seams and laps of the wrap shall be sealed with tape conforming to PPP-T-60, class 3.

5.1.2 Level B (civil agencies see 6.2). Each roll of material shall be wrapped with paper conforming to UU-P-268, grade B. All joints, seams and laps of the wrap shall be sealed with tape conforming to PPP-T-76.

5.1.3 Level C. The material shall be packaged in accordance with the supplier's commercial practice.

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

5.2.1 Level A. Rolls of like description shall be packed in a close-fitting box conforming to PPP-B-585, class 3, PPP-B-591, class 2, grade A, PPP-B-601, overseas type, PPP-B-621, class 2, style 2 or PPP-B-640, class 2, style B, end type 3. The box shall be closed and strapped in accordance with the applicable specification or appendix thereto. Steel strapping shall be flat and zinc-coated.

5.2.2 Level B. The rolls shall be packed as specified in 5.2.1, except that the boxes shall be the domestic type. Steel strapping need not be zinc-coated.

5.2.3 Level C. The material shall be packed in a manner which will insure arrival at destination in satisfactory condition and be acceptable to the carrier at lowest rates. Containers and packing shall comply with Uniform Freight Classification Rules or National Motor Freight Classification Rules.

5.3 Marking.

5.3.1 Civil agencies. In addition to any special marking required by the contract or order, packages and shipping containers shall be marked in accordance with Fed. Std. No. 123.

5.3.2 Military agencies. In addition to any special marking required by the contract or order, packages and shipping containers shall be marked in accordance with MIL-STD-129.

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6. NOTES

6.1 Intended use. Vapor barriers (jackets and facings) covered by this specification are intended primarily for indoor service. For outdoor service, additional mechanical and weather protection should be considered.

6.1.1 Type I. Intended for insulation jackets on piping in exposed and concealed areas and for insulation facings on ducts and equipment in exposed areas.

6.1.2 Type II. Intended for insulation facings on ducts and equipment in concealed areas. At the manufacturer's option, Type I jackets and facings may be substituted for Type II.

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) Type and size, width and length (see 1.2 and 1.2.1).
- (c) Material, specify whether field applied or factory composites (see 3.1).
- (d) Size of lot, if different from 4.2.1.
- (e) Selection of applicable level of packaging and packing required (see 5.1 and 5.2).
- (f) Special marking when required (see 5.3).

6.3 Level B packaging (see 5.1.2) has been developed for use by civil agencies to provide economical but limited protection and should be specified only when it is determined that domestic type packages will be stored in covered warehouses. For military procurements, details of level B packaging, when required, should be developed at time of procurement when all conditions are known.

MILITARY CUSTODIANS:

Army - ME
Navy - YD

Review activity:

Army - <UT>, CE
Navy - YD

User activity:

Army - CE, AV
Navy - <UT>

Military coordinating Activity:

Navy - YD

Preparing activity:

GSA - FSS

Civil Agency Coordinating Activities:

COMMERCE - <UT>
DOT - FIS
GSA - FSS-PCD, TCS
INTERIOR - <UT>

Orders for this publication are to be placed with the General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein. Price 10 cents each.