

HH-I-561e

May 24, 1967

SUPERSEDING

Int. Fed. Spec. HH-I-00561d(GSA-FSS)

April 15, 1963, and

Fed. Spec. HH-I-561c

June 19, 1950

## FEDERAL SPECIFICATION

INSULATION BLOCK AND SLEEVING, THERMAL  
(ASBESTOS-FOR TEMPERATURES UP TO 1200°F.)

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 asbestos block and pipe covering insulation for use on surfaces operating at temperatures up to 1200°F.

## 1.2 Classification

1.2.1 Types and classes. Asbestos thermal insulation shall be of the following types and classes, as specified (see 6.2):

Type I - Corrugated or indented asbestos paper insulation (300°F.)

Class a - 4 plies per inch of thickness.

Class b - 6 plies per inch of thickness.

Class c - 8 plies per inch of thickness.

Type II - Indented asbestos paper insulation (700°F.)

Type III - Fibrous, solid type asbestos insulation (1200°F.)

1.2.2 Form. Asbestos thermal insulation shall be of the following forms, as specified (see 6.2):

Form 1 - Blocks.

Form 2 - Sleeving.

1.2.3 Size. Asbestos thermal insulation shall be of the sizes listed in table I, as specified (see 6.2 and 6.3):

TABLE I. Sizes

Form	Type	Class	Length inches	Width inches	Thickness inches	Internal diameter	Thickness increments inch
1	I	a, b, and c	36	6	1 to 3	NA <sup>1/</sup>	1/2
	II	-	36	6	1 to 3	NA	1/2
	III	-	36	6	1 to 3	NA	1/2
2	I	a	36	NA	1/2 to 2	Sizes to fit standard pipe and tube diameters	1/4
		b	36	NA	1/2 to 2		1/6
		c	36	NA	1/4 to 2		1/8
	II	-	36	NA	1 to 3	1/2	
	III	-	36	NA	1 to 5	Sizes to fit 1/2 to 36 inch pipe	1/2

<sup>1/</sup> Not applicable.

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## 2. APPLICABLE DOCUMENTS

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-B-601 - Boxes, Wood, Cleated-Plywood.  
 PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner.  
 PPP-B-636 - Box, Fiberboard,

### Federal Standard:

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

(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, D. C., 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, D. C., Atlanta, Chicago, Kansas City, Mo., Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, Wash.

(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 contractors 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 issues in effect on date of invitation for bids shall apply.

### American Society for Testing and Materials (ASTM) Publications:

C 177 - Test for Thermal Conductivity of Materials by Means of the Guarded Hot Plate.  
 C 298 - Specification for Cellular Asbestos Paper Thermal Insulation for Pipes.  
 C 299 - Specification for Laminated Asbestos Thermal Insulation for Pipes.  
 C 303 - Test for Density of Preformed Block-Type Thermal Insulation.  
 C 390 - Standard Method of Sampling Preformed Thermal Insulation.  
 C 391 - Specification for Amosite Asbestos Thermal Insulation.

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

## 3. REQUIREMENTS

3.1 Certification. Unless otherwise specified (see 6.2), insulation block and sleeving offered under this specification shall be certified by the contractor to have successfully completed the test for thermal conductivity.

3.2 Type I. Type I insulation block shall conform with the requirements for material, and thermal conductivity of ASTM C 298. Type I sleeving, pipe and tube covering, shall conform with the requirements of ASTM C 298, except for sampling, marking, packaging, inspection, and rejection (see 4.4.1 and 4.4.2).

3.3 Type II. Type II insulation block shall conform with the requirements for material, density, and thermal conductivity of ASTM C 299. Type II sleeving, pipe and tube covering shall conform with the requirements of ASTM C 299, except for sampling, marking, packaging, inspection, and rejection (see 4.4.1 and 4.4.2).

3.4 Type III. Type III insulation block shall conform with the requirements for material, density, and thermal conductivity of ASTM C 391. Type III sleeving, pipe covering, shall conform with the requirements of ASTM C 391, except for packaging, marking, inspection, and rejection (see 4.4.1 and 4.4.2).

3.5 Shapes. Insulation blocks shall be rectangular in shape. Insulation sleeving shall be hollow cylindrical shapes, and unless otherwise specified (see 6.2), split lengthwise in half sections.

3.6 Jackets. Unless otherwise specified (see 6.2), the jackets for sleeving shall consist of cotton sheeting, weighing not less than 2.2 ounces per linear yard 37-1/2 inches wide. For indoor applications, type III sleeving may be procured with a commercial finish in lieu of jacketing.

3.7 Bands. Metal bands shall be furnished when specified, and as specified (see 6.2). Unless otherwise specified (see 6.2), the bands shall be at least 1/2 inch wide and not less than 0.005 inch thick. Bands shall be furnished at the rate of five for every two sections of pipe covering.

3.8 Workmanship. Insulation blocks and sleeving shall be free of visible defects such as holes, dents, and crushed or deformed corners or edges.

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. 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 thermal insulation of the same type, class, and form submitted for delivery at one time.

4.2.2 Dimensional and visual examination of end item. Sampling for these characteristics shall be in accordance with level S-2 in MIL-STD-105. The acceptable quality levels (AQL's) shall be 2.5 percent defective for major defects and 4.0 percent defective for minor defects.

4.2.3 Samples for tests. Samples for thermal conductivity tests, unless previously tested and acceptable for certification, shall be selected in accordance with ASTM C 390. Samples for density tests shall be selected in accordance with Plan B of ASTM C 390. The AQL shall be in accordance with ASTM C 390.

4.3 Examination.

4.3.1 End item. Insulation blocks and sleeving selected in accordance with 4.2.2 shall be examined for defects listed in table II. Dimensional measurements of sleeving shall be made with a flexible steel rule, graduated in 1/64 or 0.01 inch intervals.

TABLE II. Classification of defects, end item

Defect	Major	Minor
Type, class, and form not as specified-----	X	
Dimensions not as specified or not within tolerance-----	X	
Sleeving not split longitudinally as specified-----		X
Holes in insulation-----	X	
Dents in insulation-----		X
Corners or edges crushed or deformed-----	X	
Jackets not as specified-----	X	
Bands not as specified-----		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. An inspection shall be made to determine that the packaging, packing and marking requirements comply with section 5. Defects shall be scored in accordance with table III. 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.

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TABLE III. Classification of preparation for delivery defects

Examine	Defects
Markings (exterior and interior)	Omitted; incorrect; illegible; 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.

## 4.4 Test methods.

4.4.1 Form 1, blocks. Insulation blocks selected in accordance with 4.2.3 shall be tested in accordance with ASTM C 303 for density and ASTM C 177 for thermal conductivity (see 3.2, 3.3 and 3.4).

4.4.2 Form 2, sleeving. Insulation sleeving selected in accordance with 4.2.3 shall be tested in accordance with the applicable ASTM designation listed in table IV.

TABLE IV. Tests, form 2 sleeving

Type	ASTM designation	Requirement paragraph
I	C 298	3.2
II	C 299	3.3
III	C 391	3.4

## 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. The insulation of the same type or form and accessory materials shall be packaged in a close-fitting box conforming to PPP-B-636, class weather-resistant. The box shall be closed and waterproofed in accordance with the appendix to the box specification.

5.1.2 Level B. The insulation of the same type or form and accessory materials shall be packaged in a close-fitting box conforming to PPP-B-636, class domestic. The box shall be closed in accordance with method I of the appendix to the box specification.

5.1.3 Level C. The insulation shall be packaged to afford protection against damage from the supplier to the initial destination.

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

5.2.1 Level A. The unit packages of insulation of the same type or form shall be packed in a close-fitting box conforming to PPP-B-601, overseas type, or PPP-B-621, class 2. The box shall be closed and strapped in accordance with the appendix to the box specification. The gross weight shall not exceed 200 pounds.

5.2.2 Level B. No packing required.

5.2.3 Level C. The insulation shall be packed to insure carrier acceptance and safe delivery at destination in containers complying with the rules and regulations applicable to the mode of transportation.

5.3 Marking. Marking shall be as specified (see 6.2) in 5.3.1 or 5.3.2.

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

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

#### 6. NOTES

6.1 Intended use. Asbestos insulation block and sleeving covered by this specification is intended for use on heated surfaces, as follows:

Type I insulation is intended for applications where the temperature does not exceed 300°F.

Type II insulation is intended for applications where the temperature does not exceed 700°F.

Type III insulation is intended for applications where the temperature does not exceed 1200°F.

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, class, form, and maximum operating surface temperature (see 1.2.1 and 1.2.2).
- (c) Size of insulation (see 1.2.3, table I, and 6.3).
- (d) When tests for thermal conductivity are required in lieu of certification (see 3.1).
- (e) When sleeving shall be supplied in other than split half sections (see 3.5).
- (f) Requirements for jackets other than specified (see 3.6).
- (g) Requirements for bands (see 3.7).
- (h) Size of lot, if different from 4.2.1.
- (i) Selection of applicable level of packaging and packing required (see 5.1 and 5.2).
- (j) Markings required (see 5.3).

6.3 Thickness of insulation.

6.3.1 Military and civil agencies. The thickness requirements for insulation may be determined using the following:

(a) Federal Construction Council Technical Report No. 45, Thermal Insulation Thickness Charts and Material Characteristics for Piping (National Academy of Sciences - National Research Council Publication 1084).

Available from:

Printing and Publishing Office  
National Academy of Sciences  
National Research Council  
Washington, D. C., 20037

(b) Military Standard MIL-STD-769 - Thermal Insulation Requirements for Machinery and Piping, and Military Specification MIL-I-2781 referenced in MIL-STD-769.

6.3.2 Other than Government use. The thickness requirements for insulation may be determined using the following:

How to Determine Economic Thickness of Insulation. (A manual for specifying insulation for flat surfaces and pipes at elevated temperatures.)

Available from:

National Insulation Manufacturers Association  
441 Lexington Avenue  
New York, New York, 10017

#### Military Interests:

Review:

Army - ME  
Navy - YD  
Air Force - 85

U. S. Government Printing Office: 1967

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