

[INCH-POUND]
HH-I-558C
January 7, 1992
(TO SUPERSEDE)
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November 22, 1971

FEDERAL SPECIFICATION

INSULATION,, BLANKETS, THERMAL
(MINERAL FIBER, INDUSTRIAL TYPE)

This specification is 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 industrial mineral fiber insulation.

1.2 Classification.

1.2.1 Form, type, classes. The flexible blanket mineral fiber insulation shall be of the following form, type and classes, as specified (see 6-1), for other forms, types and classes see 6-2:

Form B - Blankets and felts, flexible.

Type I - Blankets flexible.

Class 7 - For use at temperatures up to and including 450 deg. F.

Class 8 - For use at temperatures from 451 deg. F. up to and including 1000 deg. F.

1.2.2. Sizes. Mineral fiber insulation shall be of the sizes listed in table I, as specified (see 6.1).

2. APPLICABLE DOCUMENTS

2.1 The documents referenced In this Federal specification shall be the issues in effect on the date of issuance of the invitation for bids or request for proposal unless otherwise specified.

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data which may improve this document should be sent to: General Service Administration, Engineering Group (7FXEE), 819 Taylor St., Fort Worth, TX 76102

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

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These documents form a part of this Federal specification to the extent specified. In the event of a conflict between this specification and a document referenced herein, this specification shall take precedence.

Federal Standards:

- FED-STD-123 - Marking for Shipment (Civil Agencies).
- FED-STD-376 - Preferred Metric Units for General use by the Federal government.

Copies of Federal specifications and standards are available from the General Services Administration Business Service Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.

Military Standards:

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-129 - Marking for Shipment and Storage.

Copies of military standards may be obtained from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

ASTM Standards:

- C 167 - Standard Test Methods for Thickness and Density of Blanket or Batt Thermal Insulation.
- C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of The Guarded-Hot-Plate Apparatus.
- C 411 - Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
- C 518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- C 553 - Standard Specification for Mineral Fiber Blanket and Felt Insulation (Industrial Type).
- E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103.

3. REQUIREMENTS

3.1 Material. The basic material shall be fibers made from mineral substances such as rock, slag, or glass processed from molten state, with or without binder. The use of asbestos is prohibited.

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3.1.1 Flexible blankets. When tested in accordance with 4.5.7, blankets shall show no visible rupture on outer surfaces when bent and upon release, shall spring back to its original form and dimensions.

3.1.2 Fire hazard classification. When tested in accordance with 4.5.2, insulation shall have a flame spread rating not greater than 25. The smoke developed rating shall not be greater than 50.

3.1.3 Corrosiveness. When tested in accordance with 4.5.3, the steel test plate in contact with the insulation shall show no greater corrosion than sterile cotton in contact with a steel plate for comparison.

3.1.4 Temperature rating. When tested in accordance with 4.5.4, at the temperature rating specified in the contract or purchase order (see 6-1), insulation shall show no physical changes that adversely affect its service qualities.

3.1.5 Moisture absorption. When tested in accordance with 4.5.5, insulation for use below ambient shall gain no more than 1.0 percent by volume.

3.1.6 Dimensions. Dimensions of insulation shall be determined in accordance with 4.5.6.

3.2 Classes 7 and 8 blankets, flexible.

3.2.1 Construction. Blankets shall be flexible (see 3.1.1 and 4.5.7) thermal insulation composed principally of mineral fiber and binder, shall be plain or faced as specified, and furnished in rolls, flat sheets, or cut pieces (see 6.1).

3.2.2 Density. Density shall be as specified (see 6.1). When tested in accordance with 4.5.8, the density tolerance shall be plus or minus 1 pcf or 20 percent whichever is smaller of the manufacturer's specified density.

3.2.3 Dimensional tolerances. Dimensional tolerances of classes 7 and 8 material shall be as follows:

An excess in all dimensions is permissible.

| | | |
|-----------|---|----------------|
| Length | = | minus 0 inches |
| Width | = | minus 1/8 inch |
| Thickness | = | minus 1/8 inch |

3.2.4 Thermal conductivity. Thermal conductivity of classes 7 and 8 blankets shall conform to table II (see 4.5.9).

3.3 Workmanship. Insulation shall not have visual defects that adversely affects its serviceability.

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3.4 Regulatory requirements. The offerer/contractor is encouraged to use recovered materials in accordance with Public Law 94-580, an amended, to the maximum extent practicable.

3.5 Metric Products. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch/pound units, provided they fail within the tolerances specified using conversion tables contained in the latest revision of FED-STD-376, and all other requirements of this specification are met.

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 purchase 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. 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 Classification of inspection. The inspection requirements specified herein are classified as follows:

- (a) Quality conformance inspection (see 4.2.1).
- (b) Preparation for delivery inspection (see 4.6).

4.2.1 Quality conformance inspection. Quality conformance inspection shall be performed on the samples selected in accordance with 4.4 and 4.5.

4.2.2 Inspection lot. All units at the same form, type and class, manufactured by the same manufacturer, and offered to the Government at one time, shall be considered a lot for purpose of inspection. The sample unit shall be one complete insulation blankets

4.3 Sampling. A random sample of insulation blankets shall be selected from each lot in accordance with MIL-STD-105.

4.3.1 Sampling for examination. Examination of the insulation blankets shall be based on inspection level I, and an acceptable quality level (AQL), of 2.5 percent defective for major defects and 6.5 percent defective for minor defects.

4.3.2 Sampling for tests. Tests shall be based on inspection level S-2 and an AQL of 2.5 percent defective.

4.4 Examination. Each sample selected in accordance with 4.3.1 shall be examined for defects listed in table III.

Table I. Sizes*

| Class | Width | Length inches | Thickness inches | Thickness increments inches |
|-------|-------|------------------|---------------------|--------------------------------|
| 7 | 24,30 | 30 | 1 to 4 | 1/2 |
| | 24,30 | 48 | 1 to 4 | 1/2 |
| | 24,30 | 60 | 1 to 4 | 1/2 |
| 8 | 24 | 48 | 1 to 3 | 1/2 |
| | 24 | 96 | 1 to 3 | 1/2 |

* All sizes listed are not available from all manufacturers. For other sizes, consult manufacturers.

TABLE II. THERMAL CONDUCTIVITY AND DENSITY

| Mean Temperature deg. F. | Thermal conductivity, BTU-IN/HR. Sq. Ft. deg. F | |
|-----------------------------|---|-----------|
| | Class - 7 | Class - 8 |
| | Up to 4-1/2 PCF | 3 PCF |
| 25 | 0.25 | - |
| 50 | .28 | - |
| 75 | .30 | 0.28 |
| 100 | .28 | .31 |
| 200 | .43 | - |
| 300 | - | 0.58 |

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Table III. Classification for preparation for delivery defects.

| Defects | Major | Minor |
|---|-------|-------|
| Class of insulation not as specified. | X | |
| Dimensions not as specified or not within tolerances. | X | |
| Corners and edges not square. | X | |
| Holes puncturing insulation. | X | |
| Facing material missing or not as specified. | X | |
| Damage or defects affecting function or serviceability. | X | |
| Damage or defects not affecting function or serviceability. | | X |

4.5 Tests.

4.5.1 Specimens. When necessary, facing material shall be removed from specimens.

4.5.2 Fire rating. Flame spread and smoke developed ratings shall be determined in accordance with ASTM E 84 (see 3.1.2).

4.5.3 Corrosiveness. Specimens: - Two pieces of thermal insulation and two pieces of sterile cotton shall be used, each measuring 1 inch by 4 inches by approximately 1/2 inch thick. Apparatus: - Two polished-steel plates, 1 inch wide, 4 inches long and 0.02 inch thick. Steel plates shall be low-carbon, commercial quality, cold-rolled, less than 0.30% carbon, shim steel, with No. 2 surface finish, and a humidity chamber. Procedure: - The steel plates shall be rinsed with chemically pure benzol until their surfaces are free from oil and grease and allowed to dry. One piece of steel shall be placed between two specimens of insulation and secured with tape or twine. The test specimen and the sterile cotton covered steel plate shall be suspended vertically in an atmosphere having a relative humidity of 95 percent +/- 3 percent, and a temperature of 120 deg. +/- 3 deg. F, for 96 hours, and then examined for corrosion (see 3.1.3).

4.5.4 Temperature rating. Determination of temperature rating shall be in accordance with ASTM C 411 (see 3.1.4).

4.5.5 Moisture absorption. Amount of moisture absorption shall be determined in accordance with paragraph 14 of ASTM C 553 (see 3.1.5).

4.5.6 Dimensions. Dimensions of blankets shall be determined in accordance with ASTM C 167 (see 3.1.6 and 3.2.3).

4.5.7 Flexibility. A piece of insulation, 12 inches square, and 1 inch thick, shall be bent over a 1/2 inch pipe through an angle of 90 deg., then released (see 3.1.1).

4.5.8 Density. Determination of density shall be in accordance with ASTM C 167 (see 3.2.2).

4.5.9 Thermal conductivity. Determination of thermal conductivity shall be in accordance with ASTM C 177 or ASTM C 518 (see 3.2.4).

4.5.10 Certification. Unless otherwise specified in the contract or purchase order (see 6-1), a certificate of conformance may be furnished in lieu of actual testing on a lot by lot basis providing the requirements of paragraphs 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.2.2, and 3.2.4 have been met, with the contractor furnishing actual test results, acceptable to be Government, indicating that tests have been performed to substantiate the certification. The certification shall state that the tests described in paragraphs 4.5.2, 4.5.3, 4.5.4, 4.5.5, 4.5.8 and 4.5.9 have been performed on products manufactured from the same material and by the same manufacturing process as the items being offered and that any proposed changes in material or process will be promptly reported to the Government. The Government reserves the right to require additional testing and certification by the contractor when such changes are made or when otherwise deemed necessary.

4.6 Examination for preparation for delivery. A random sample of shipping containers shall be selected from each lot for examination of unit, Intermediate and shipping containers (as applicable) for conformance with the preservation, packaging, packing, labeling and marking required in the contract or order. Samples shall be selected in accordance with inspection level S-2, AQL 6.5, expressed in terms of defects per hundred units. The sample unit shall be one shipping container.

5. PREPARATION FOR DELIVERY

5.1 Packaging, packing, and marking. The packaging, packing, and marking shall be as specified in the contract or order.

6. NOTES

6.1 Ordering data. Purchasers should select the preferred options offered herein and include the following data in procurement documents:

- (a) Title, number, and date of this specification.
- (b) Class required (see 1.2.1).
- (c) Size required (see 1.2.2).
- (d) Density required (see 3.2.2).
- (e) Whether blankets shall be plain or faced (see 3.2.1)
- (f) Whether certificate is not acceptable.
- (g) Form: Roll, flat sheets, cut pieces (see 3.2.1)

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6.2 Cross reference table.

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|--|-----------------------------------|
| Form A Classes 1, 2, 3, 4, and 5 | Cancel use ASTM C 612. |
| Form B Type I Class 6 | Cancel use ASTM C 553. |
| Type II Class 9 | Cancelled without replacement. |
| Form C and D Type IV Classes 10, 11, 14, and 15 | Cancel use ASTM C 592. |
| Form D and E Type III Classes 12, 13, 16, and 17 | Cancel use ASTM C 547. |

MILITARY INTEREST:

NONE: DoD has determined that no military activity has an official interest in this Federal specification.

CIVIL AGENCY INTEREST:

GSA - PBS - PMP

USER ACTIVITY

Army - GL

PREPARING ACTIVITY:

GSA - FSS