



Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts¹

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^{e1} NOTE—Sections 2.2 and 13.3 were editorially updated in June 2008.

1. Scope

1.1 This specification covers the composition, size, dimensions, and physical properties of flexible fiber glass blanket, ductwrap, used to externally insulate HVAC ducts used for the distribution of condition air with a temperature up to 250°F (121°C).

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only and may be approximate.

1.3 When the installation and use of thermal insulation materials, accessories, and systems may pose safety and health problems, the manufacturer shall provide the user appropriate current information regarding any known problems associated with the recommended use of the company's products, and shall also recommend protective measures to be employed in their safe utilization. The user shall establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.

1.4 The following safety hazards caveat pertains only to the test methods, Section 13, in this specification. *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

C 167 Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations

C 168 Terminology Relating to Thermal Insulation

C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus

C 390 Practice for Sampling and Acceptance of Thermal Insulation Lots

C 411 Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation

C 518 Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

C 665 Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing

C 1104/C 1104M Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation

C 1136 Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation

C 1045 Practice for Calculating Thermal Transmission Properties Under Steady-State Conditions

E 84 Test Method for Surface Burning Characteristics of Building Materials

E 96/E 96M Test Methods for Water Vapor Transmission of Materials

E 2231 Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess Surface Burning Characteristics

2.2 Other Documents:

CAN/ULC-S102 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies³

3. Terminology

3.1 *Definitions*—For definitions of terms defined in this specification, see Terminology **C 168**.

4. Classification

4.1 Fibrous glass flexible blanket HVAC duct external insulation consists of the following three types:

³ Available from Underwriters Laboratories of Canada, 7 Crouse Road, Scarborough, Ontario, Canada M1R 3A9.

¹ This specification is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is under the direct responsibility of Subcommittee C16.23.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

4.1.1 *Type I*—Blankets without membrane facing.

4.1.2 *Type II*—Blankets faced with a vapor-retarder membrane having a water vapor permeance no higher than 1.30 Perm.

4.1.3 *Type III*—Flexible blankets faced with a vapor-retarder membrane with a water vapor permeance no higher than 0.02 Perm that meet all physical property requirements of Specification C 1136.

5. Ordering Information

5.1 Specific installation, insulation type, thermal resistance, thickness, length, and width suited for the intended use shall be specified by the purchaser.

6. Materials and Manufacture

6.1 *Basic Material*—The basic material shall be fibers made from glass processed from the molten state into fibrous form.

6.2 *Manufacture*—Insulation shall consist of bonded fibers formed into flexible blanket rolls with or without various adhered facings.

7. Physical Properties

7.1 *Thermal Resistance*—The material shall be tested at the out of package thickness and at the installed thickness for the thermal resistance at 75°F (24°C) mean temperature in accordance with 13.2. The installed thermal resistance shall be tested with the material compressed to 75 % of the labeled out of package thickness. For each case the tested thermal resistance, R, for the average of any four randomly selected samples, shall not be more than 5% below the label R-Values, when tested in accordance with 13.2 nor shall any single specimen be more than 10 % below the label R-Values⁴.

NOTE 1—Consult the local or state building codes for the minimum installed thermal resistance, R-value, required to be installed.

NOTE 2—To obtain the measured installed R-value during installation, the duct wrap insulation shall be cut to a stretch-out as indicated in Table X1.1 in Appendix X1.

7.2 *Surface Burning Characteristics*—Types I, II, and III, when tested in accordance with 13.3, shall have a flame spread index not greater than 25, and smoke developed index not greater than 50.

7.3 *Hot Surface Performance*—Insulation shall not flame, glow, or smolder when tested in accordance with 13.4 at 250°F (121°C).

7.4 *Water Vapor Permeance*—When tested in accordance with 13.5, the vapor-resistant membrane of a Type III product shall have a vapor permeance of no more than 0.02 Perm before laminating to fiber glass. A Type II product shall have a vapor permeance of no more than 1.30 Perm before laminating to fiber glass.

7.5 *Water Vapor Sorption*—The water vapor sorption of the insulation blanket shall be not more than 5 % by weight, when tested in accordance with 13.6.

7.6 *Odor Emission*—A detectable odor of objectionable nature recorded by more than two of the five panel members shall constitute rejection of the product when tested in accordance with 13.7.

7.7 *Corrosiveness*—When tested in accordance with 13.8, the steel plates in contact with the insulation shall show no corrosion greater than that observed for comparative plates in contact with sterile cotton.

7.8 *Fungi Resistance*—When tested in accordance with 13.9, the test specimens that have growth greater than that on the comparative items shall be considered to have failed. Test specimens on which the growth is not greater than that on the comparative items shall be considered to have passed.

8. Dimensional Tolerances

8.1 After conditioning for a minimum of 24 h at 70 ± 3°F (21 ± 1.6°C) and 50 ± 5 % relative humidity, the insulation shall conform to the dimensional tolerances listed in Table 1. All measurements shall be made in accordance with 12.1.

9. Sampling

9.1 Sampling of the insulation shall be in accordance with Criteria C 390. Specific provisions for sampling shall be agreed upon between the purchaser and the supplier.

10. Inspection

10.1 Inspection of the insulation shall be as agreed upon by the purchaser and the manufacturer as part of the purchase agreement.

11. Qualification and Inspection Requirements

11.1 *Qualification Requirements*—The following requirements are generally used for purposes of initial material or product qualification:

- 11.1.1 Thermal resistance,
- 11.1.2 Surface burning characteristics,
- 11.1.3 Water vapor permeance, except for Type I material,
- 11.1.4 Water vapor sorption,
- 11.1.5 Odor emission,
- 11.1.6 Corrosiveness, and
- 11.1.7 Fungi resistance.

11.2 *Inspection*—The following requirements are generally used for purposes of acceptance sampling of lots or shipments of qualified thermal insulation:

- 11.2.1 Dimensional tolerances, and
- 11.2.2 Workmanship.

12. Workmanship and Finish

12.1 Although all requirements for physical properties of materials such as blankets are not easily defined or stated

TABLE 1 Dimensional Tolerance, in. (mm)

Dimension	Tolerance
Width	-1/8 (3.2)
Length	-none, excess permitted
Thickness	-1/8 (3.2), excess permitted

⁴ The ranges of thermal resistance, R, listed in this section are allowed by the Federal Trade Commission's 16 CFR part 460 Trade Regulation Rule: Labeling and Advertising of Home Insulation.

numerically, it is understood that the insulation will be essentially free of defects that adversely affect thermal performance, such as local compressed areas, low density areas, tears, and holes.

12.2 Although general properties of membranes and means for attachment are not included in this specification, they may be presumed to be free of excessive tears, rips, holes, and other defects that will adversely affect performance.

13. Test Methods

13.1 *Dimensions*—Test in accordance with Test Method **C 167**.

13.2 *Thermal Resistance*:

13.2.1 Test in accordance with Test Method **C 177** or Test Method **C 518** at 75°F (24°C) mean temperature (see also Practice **C 1045**). If the test is conducted using Test Method **C 518**, the manufacturer shall certify that recent calibrations have been made.

13.2.2 If the blanket is furnished with an adhered membrane, carefully remove the membrane to provide a surface equivalent to the original surface that the blanket had before the application of the membrane.

13.3 *Surface Burning Characteristics*—Determine the surface burning characteristic for the composite material in accordance with Test Method **E 84**, and Practice **E 2231**. For Canada, test in accordance with Test Method **CAN/ULC-S102**. When the referenced Canadian document in this specification is referred to in applicable Canadian building codes, the editions, referenced by those building codes, shall govern.

13.4 *Hot Surface Performance*—The hot surface performance of the material shall be tested in accordance with Test Method **C 411**. Type II and III materials should be tested with the insulation blanket in contact with the hot plate.

13.5 *Water Vapor Permeance*—Test the permeance of the facing material in accordance with the Desiccant Method of Test Method **E 96**.

13.6 *Water Vapor Sorption*—Determine the amount of water vapor sorption of the blanket test specimen in accordance with Test Method **C 1104/C 1104M**.

13.7 *Odor Emission*— Determine the odor emission in accordance with the Odor Emission test method in Specification **C 665**.

13.8 *Corrosiveness*— The corrosiveness of the material shall be determined in accordance with the steel portion of the Corrosiveness test method in Specification **C 665**.

13.9 *Fungi Resistance*— The fungi resistance of the material shall be determined in accordance with the Fungi Resistance test method in Specification **C 665**.

14. Rejection and Rehearing

14.1 Materials that fail to conform to the requirements agreed upon in the purchasing agreement may be rejected. Rejection should be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the inspection, the producer or supplier may make claim for a rehearing.

15. Certification

15.1 When specified in the purchase order or contract, a producer's, supplier's, or independent third party's certification shall be furnished to the purchaser indicating that the material was manufactured, sampled, tested, and inspected in accordance with this specification and has been found to meet the requirements. When specified in the purchase order or contract, a report of test results shall be furnished.

16. Product Marking

16.1 Type II and III material shall be marked continuously, at intervals not greater than 36 in. (914 mm) apart, with the following information: manufacturer, product name, surface burning characteristics, nominal thickness, nominal R-value, and installed R-value.

17. Packaging and Package Marking

17.1 *Packaging*—Unless otherwise specified, the insulation shall be packaged in the manufacturer's standard containers.

17.2 *Package Marking*— The markings shall be clear and legible. Unless otherwise specified, each container shall be marked with the manufacturer's name, address, and telephone number; product name; material width; length; thickness; nominal R-value; installed R-value; and facing type, if a facing is employed.

18. Keywords

18.1 blanket; ducts; fibrous glass; insulation; thermal resistance

APPENDIX
(Nonmandatory Information)
X1. INSULATION INSTALLATION STRETCH-OUT SCHEDULE

X1.1 This appendix has been included to show the insulation stretch-out schedule to be followed during installation of duct wrap material in order to prevent excessive compression of the material during installation.

X1.2 By following the schedule in **Table X1.1**, the reduction in material nominal thickness due to compression during installation will be limited to an average 25 %.

TABLE X1.1 Duct Wrap Stretch-Outs^A in. (mm)

Labeled Thickness	Minimum Installed Thickness	Round ^B	Square ^B	Rectangular ^B
1.0 (25)	.75 (19)	P + 7.0 (178)	P + 6.0 (152)	P + 5.0 (127)
1.5 (38)	1.125 (29)	P + 9.5 (241)	P + 8.0 (203)	P + 7.0 (178)
2.0 (51)	1.5 (38)	P + 12.0 (305)	P + 10.0 (254)	P + 8.0 (203)
2.5 (64)	1.875 (48)	P + 14.5 (368)	P + 12.5 (318)	P + 9.5 (241)
3.0 (76)	2.25 (57)	P + 17.0 (432)	P + 14.5 (368)	P + 11.5 (292)
3.5 (89)	2.625 (67)	P + 19.5 (495)	P + 16.5 (419)	P + 13.0 (330)
4.0 (102)	3.0 (76)	P + 22.0 (559)	P + 18.5 (470)	P + 14.5 (368)

^A Stretch-out is the length of insulation, duct wrap, that is added due to the outside perimeter of the installed insulation being larger than the outside perimeter of the duct and to achieve the above minimum installed thicknesses.

^B P = Perimeter of duct, in. (mm).

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