



# Standard Specification for Flexible Fibrous Glass Insulation for Metal Buildings<sup>1</sup>

This standard is issued under the fixed designation C 991; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

<sup>ε1</sup> NOTE—6.1.2 was editorially updated in June 2008.

## 1. Scope

1.1 This specification covers the classification, composition, and physical properties of flexible fibrous glass insulation for use in metal building roofs and walls.

1.2 The basic insulation blanket is designed to be post-processed by a laminating process that applies an adhesive bonded facing.

1.3 The thermal values measured in accordance with this specification for both pre-processed and post-processed insulation are for the insulation only and do not include the effects of air-film surface resistance, changes in mean temperature, or compression of insulation at the framing members of the building, through metal conductance of fasteners and other parallel heat-transfer paths due to design or installation techniques.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *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 requirements prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

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

C 653 Guide for Determination of the Thermal Resistance of Low-Density Blanket-Type Mineral Fiber Insulation

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

C 755 Practice for Selection of Water Vapor Retarders for Thermal Insulation

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 1258 Test Method for Elevated Temperature and Humidity Resistance of Vapor Retarders for Insulation

C 1304 Test Method for Assessing the Odor Emission of Thermal Insulation Materials

C 1338 Test Method for Determining Fungi Resistance of Insulation Materials and Facings

E 84 Test Method for Surface Burning Characteristics of Building Materials

E 136 Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C

### 2.2 Other Referenced Document:

CAN/ULC-S102 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies<sup>3</sup>

## 3. Terminology

3.1 *Definitions*—For definitions of terms relating to insulation, refer to Terminology C 168.

## 4. Classification

4.1 The flexible fibrous glass insulation is furnished in two types, as follows:

4.1.1 *Type I*—Glass processed from the molten state into fibrous form, bonded with a thermosetting resin, and formed into a blanket or batt.

<sup>3</sup> Available from Underwriters Laboratories (UL), 333 Pfingsten Rd., Northbrook, IL 60062-2096, <http://www.ul.com>.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.23 on Blanket and Loose Fill Insulation.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

4.1.2 *Type II*—Type I material supplied with a suitable facing adhered to one surface.

NOTE 1—Facing properties are not part of this specification. The designer is referred to Practice C 755 and Specification C 1136 for guidance in selecting water vapor permeance and other physical property requirements.

## 5. Ordering Information

5.1 Type I material shall be ordered by specifying thermal resistance value, length, and width.

5.2 Type II material shall be ordered by specifying thermal resistance value, type of facing, facing permeance, length, width, number of tabs, and tab width.

5.3 Certification, when required, shall be in accordance with Section 11.

## 6. Physical Properties

### 6.1 *Type I Material*:

6.1.1 *Thermal Resistance*—The thermal resistance of the pre-processed insulation shall be determined in accordance with Guide C 653. The average *R*-value from nine randomly selected specimens, three specimens from each of three rolls, shall not be less than 103 % of the *R*-value agreed upon by the purchaser and the supplier. Use Test Method C 177 or C 518 at 75°F (23.9°C) with a minimum temperature difference of 40°F (20°C) for determining apparent thermal conductivity. Use the full roll method from Test Method C 167 to determine the average thickness for each roll and evaluate at the lesser of measured or label thickness.

NOTE 2—See Guide C 653. The thermal resistance is a function of temperature. As an option, the thermal resistance may be determined at additional temperatures as agreed upon by the purchaser and the manufacturer.

6.1.2 *Surface Burning Characteristics*—The surface burning characteristics shall be determined in accordance with Test Method E 84. 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. Results shall be no greater than:

Flame spread 25  
Smoke developed 50

6.1.3 *Combustion Characteristics*—The material shall pass the requirements of Test Method E 136.

6.1.4 *Water Vapor Sorption*—The water vapor sorption from exposure to water vapor shall not be greater than 0.2 % by volume when determined in accordance with the procedure set forth in Test Method C 1104/C 1104M.

6.1.5 *Fungi Resistance*—When tested in accordance with the procedure set forth in Test Method C 1338, the insulation shall exhibit no growth.

6.1.6 *Corrosiveness*—When tested in accordance with the procedure in Specification C 665, the metal plates in contact with the insulation shall show no greater corrosion than that observed on the comparative plates in contact with sterile cotton.

6.1.7 *Odor Emission*—When tested in accordance with Test Method C 1304, the insulation shall not emit a detectable odor objectionable to more than two of the five panel members.

6.1.8 *Dimensional Tolerances*—The average measured length and width shall not differ from the manufacturer's standard dimensions, when determined in accordance with Test Methods C 167, (Note 3) by more than the following:

Length, – 0 in. (–0 mm)  
Width, – 1/8 in. (–3 mm)

NOTE 3—Normally, a slight excess in all dimensions will be permitted. However, the purchaser may elect to specify a maximum tolerance to meet further processing requirements.

### 6.2 *Type II Material*:

6.2.1 Type II shall be faced on one side with a suitable facing and exhibit the following.

6.2.2 *Thermal Resistance*—The thermal resistance of the post-processed insulation shall be determined in accordance with Guide C 653. The average *R*-value from nine randomly selected specimens, three specimens from each of three rolls, shall not be less than 95 % of the *R*-value agreed upon by the purchaser and the supplier. Use Test Method C 177 or C 518 at 75°F (23.9°C) with a minimum temperature difference of 40°F (20°C) for determining apparent thermal conductivity. Use Test Methods C 167 to determine the average thickness for each roll.

6.2.3 *Surface Burning Characteristics*—Determine the surface burning characteristics on the facing side of the composite material. in accordance with Test Method E 84. For Canada, test in accordance with CAN/ULC-S102. Results shall be no greater than:

Flame spread 25  
Smoke developed 50

6.2.4 *Combustion Characteristics*—The base insulation material shall pass the requirements of Test Method E 136.

6.2.5 *Water Vapor Sorption*—The water vapor sorption of the base material shall not be greater than 0.2 % by volume when determined in accordance with the procedure set forth in Test Method C 1104/C 1104M.

6.2.6 *Fungi Resistance*—When tested in accordance with the procedure set forth in Test Method C 1338, the insulation and the facing shall exhibit no growth.

6.2.7 *Corrosiveness*—When the base insulation is tested in accordance with the procedure in Specification C 665, the metal plates in contact with the insulation shall show no greater corrosion than that observed on the comparative plates in contact with sterile cotton

6.2.8 *Odor Emission*—When tested in accordance with Test Method C 1304, the insulation shall not emit a detectable odor objectionable to more than two of the five panel members.

6.2.9 *Dimensional Tolerances*—The average measured length and width shall not differ from the manufacturer's standard dimensions, when determined in accordance with Test Methods C 167, (Note 3) by more than the following:

Length, – 0 in. (–0 mm)  
Width, – 1/8 in. (–3 mm)

6.2.10 *Humid Aging*—The faced material, when tested in accordance with the procedures in Test Method C 1258, shall not exhibit (a) corrosion of the facing, (b) delamination of the facing, or (c) lack of adhesion of facing to insulation.

## 7. Workmanship

7.1 Both Type I and Type II material shall exhibit good workmanship and shall not have visible defects that adversely affect its serviceability.

## 8. Sampling

8.1 Quality control records, maintained by the manufacturer, will usually suffice in the relationship between the purchaser and the manufacturer. If they mutually agree to accept lots on the basis of quality control records, no further sampling is required.

8.2 If the above procedure is not acceptable, sampling shall be in conformance with Practice C 390.

## 9. Inspection

9.1 Inspection of the material shall be agreed upon between the purchaser and the supplier as part of the purchase contract.

## 10. Rejection and Rehearing

10.1 Material that fails to conform to the requirements of this specification shall constitute cause for rejection. Rejection shall be reported to the producer or supplier promptly and in writing.

10.2 The producer or supplier shall have the option to reinspect rejected shipments and resubmit the entire lot for inspection and resampling after the removal and replacement of nonconforming portions.

## 11. Certification

11.1 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 the test results shall be furnished.

## 12. Health and Safety Hazards

12.1 The manufacturer shall provide the users with information regarding any hazards and recommended protective measures to be employed for safe installation and use of the material.

## 13. Product Marking

13.1 Unless otherwise specified, the product package shall be marked with the seller's name and designation, length, width, thickness, *R*-value, total number of square feet, manufacturing date code, surface burning characteristics and, if applicable, type of facing.

## 14. Packaging

14.1 Unless otherwise agreed or specified between the purchaser and the manufacturer or seller, the insulation shall be packed in the manufacturer's standard commercial container.

14.2 If there is residual moisture in the product at the time of packaging, the package shall be suitably vented to allow for the dissipation of the moisture.

## 15. Storage

15.1 The material shall be stored in accordance with the manufacturer's recommendations unless otherwise agreed upon between the purchaser and manufacturer.

15.2 If there are no manufacturers' recommended storage requirements, the material shall be stored in a dry location that protects the package from direct sunlight, weather and temperature extremes.

## 16. Keywords

16.1 faced insulation; metal building; thermal insulation

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