Standard Practice for Simulated Aging of Cellulosic Loose-Fill Insulation[1]

This standard is issued under the fixed designation C 1488; 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 (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This practice covers a procedure to simulate the aging process of cellulosic loose-fill insulation by subjecting it to controlled laboratory conditions of temperature and humidity so that the insulation will be further evaluated, particularly for critical radiant flux characteristics.

1.2 It is not the intent of this practice to establish aging conditions that represent all possible exposures.

1.3 The values stated in SI units are to be regarded as the standard. The values in parentheses are provided for information only.

1.4 *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:* [2]

C 168 Terminology Relating to Thermal Insulation

C 687 Practice for Determination of Thermal Resistance of Loose-Fill Building Insulation

C 739 Specification for Cellulosic Fiber (Wood-Based) Loose-Fill Thermal Insulation

C 870 Practice for Conditioning of Thermal Insulating Materials

C 1485 Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using an Electric Radiant Heat Energy Source

E 970 Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source

2.2 *Other Document:*

NBSIR 84-2917 Environmental Cycling of Cellulosic Thermal Insulation and Its Influence on Fire Performance

3. Terminology

3.1 *Definitions*—Terminology C 168 shall be considered as applicable to the terms used in this practice.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *simulated aging*, *n*—condition resulting from exposing a specimen to a controlled cycle of temperature and humidity conditions.

4. Significance and Use

4.1 The purpose of this practice is to simulate the aging process of cellulosic loose-fill insulation. By identifying any changes in flame retardant permanency due to the aging process, producers can design loose-fill insulation to meet or exceed material specifications throughout the product life cycle.

5. Procedure

5.1 *Apparatus*:

5.1.1 Air oven, humidity cabinet or appropriate conditioning chamber capable of temperature and humidity conditions allowing for successfully completing the prescribed procedure as defined in 5.2.

5.1.2 Material specimens to be tested after simulated aging shall be prepared and placed in the appropriate test container in accordance with the applicable material specification or Practice C 687. For specimen to be tested using Test Method E 970 or Test Method C 1485, prepare three specimen trays to allow for repeat testing if necessary.

5.2 *Conditioning*—Condition the specimen in the selected chamber under the following conditions and chronological sequence:

- 23.4 ± 1.7°C (75 ± 3°F) and 50 ± 3 % RH until constant weight is achieved (constant weight is achieved when weight changes less than 1 % in 24 h)
- 24 h at 82.2 ± 1.7°C (180 ± 3°F) and 90 ± 3 % Relative Humidity (RH)
- 24 h at 23.4 ± 1.7°C (75 ± 3°F) and 50 ± 3 % RH
- 24 h at 82.2 ± 1.7°C (180 ± 3°F) and 90 ± 3 % RH
- 24 h at 23.4 ± 1.7°C (75 ± 3°F) and 50 ± 3 % RH
- 96 h at 60.0 ± 1.7°C (140 ± 3°F) Air Oven
- 21 ± 2°C (69.8 ± 3.6°F) and 50 ± 3 % RH until constant weight is achieved

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[1] This practice is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.31 on Chemical and Physical Properties.

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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.

6. Report

6.1 Report the following information:

6.1.1 Conditioning treatment followed,

6.1.2 Conditioned sample use; that is, tested in accordance with Test Method E 970, Specification C 739 or Test Method C 1485 as applicable, and

6.1.3 Any visible changes in the specimen after the conditioning treatment, such as a separation of components or a change in color or fluffiness, particularly when changes are not uniform.

7. Keywords

7.1 aging; cellulosic fiber loose-fill; conditioning; humidity/temperature cycling; thermal insulation

APPENDIXES

(Nonmandatory Information)

X1. NBSIR 84-2917, ENVIRONMENTAL CYCLING OF CELLULOSIC THERMAL INSULATION

X1.1 NBSIR 84-2917, Environmental Cycling of Cellulosic Thermal Insulation and Its Influence on Fire Performance, is a study conducted on climate data for eleven cities located throughout the United States. Findings from this environmental study were used to develop conditioning cycles for research on the influence of environment on the fire performance of loose-fill cellulosic thermal insulation. Cellulosic thermal insulation was exposed to various simulated environmental cycles and tested for changes in fire performance. Results from this research showed that environmental exposure could effect fire performance.

X2. PROCEDURE TO DETERMINE CHANGE IN WEIGHT

X2.1 A change in weight due to conditioning can be useful information to the user of this standard in evaluating changes, if any, in performance characteristics. A change in weight can be calculated using the following procedure:

$$C = [(W_1 - W_3 / (W_1 - W_2)) \times 100] \quad (X2.1)$$

where:

C = percentage change in weight after conditioning treatment,
W_1 = weight of specimen and specimen holder before the conditioning treatment, grams,
W_2 = weight of empty specimen holder/tray, grams, and
W_3 = weight of specimen and specimen holder after the conditioning treatment, grams.