



Standard Practice for Installation of Cellulosic and Mineral Fiber Loose-Fill Thermal Insulation¹

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

1. Scope

1.1 This practice covers procedures for the installation of cellulosic and mineral fiber loose-fill insulation in ceilings, attics, and floor and wall cavities of new or existing housing and other framed buildings.

1.2 This practice applies only to the installation of dry loose-fill thermal insulation consisting of cellulosic materials or mineral fiber by pneumatic or pouring application.

1.3 This practice covers the installation process from pre-installation inspection through post-installation procedure. It does not cover the production of the insulation materials.

1.4 This practice is not intended to replace the manufacturer's installation instructions, but shall be used in conjunction with such instructions. This practice is not intended to supersede local, state, or federal codes.

1.5 This practice assumes that the installer possesses a good working knowledge of the applicable codes and regulations, safety practices, tools, equipment, and methods necessary for the installation of thermal insulation materials. It also assumes that the installer understands the fundamentals of residential construction that affect the installation of insulation.

1.6 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.

1.7 *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. For specific precautionary statements, see Section 5.*

¹ This practice 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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2. Referenced Documents

2.1 ASTM Standards:²

C 168 Terminology Relating to Thermal Insulation

C 739 Specification for Cellulosic Fiber Loose-Fill Thermal Insulation

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

C 764 Specification for Mineral Fiber Loose-Fill Thermal Insulation

2.2 NFPA Standards:³

NFPA 31 Standard for the Installation of Oil Burning Equipment

NFPA 54 National Fuel Gas Code

NFPA 70 National Electrical Code

NFPA 211 Standard for Chimneys, Fireplaces, Vents and Solid-Fuel Burning Appliances

2.3 ICC Document:⁴

International Residential Code 2003

2.4 Federal Standard:⁵

FTC Trade Regulation Rule 16 CRF 460, Labeling and Advertising of Home Insulation

3. Terminology

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

3.2 *Definitions of Terms Specific to This Standard:*

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.

³ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02269-9101.

⁴ Available from International Code Council (ICC), 5203 Leesburg Pike, Suite 600, Falls Church, VA 22041.

⁵ Federal Register Vol 70, No 103, May 31, 2005. Available from National Archives and Records Administration, 8601 Adelphi Road, College Park Maryland, 20740-6001.

3.2.1 *installer*—the person or persons who apply thermal insulation materials in residential buildings whether or not such person or persons have contracted with the owner to perform the work.

3.2.2 *cellulosic loose-fill thermal insulating materials*—those materials that meet the minimum requirements specified in Specification **C 739**.

3.2.3 *conditioned space*—a space in a residential building that is served by a heating or cooling system.

3.2.4 *mineral fiber loose-fill thermal insulating materials*—those materials that meet the minimum requirements specified in Specification **C 764**.

3.2.5 *owner*—the person, partnership, corporation, agency, or other entity who owns the residential building to be insulated whether such ownership is by virtue of deed, contract, or any other instrument for acquiring legal title under the laws of the state in which the building is located.

3.2.6 *residential building*—a building used for residential occupancy and that has a mechanical or electrical system for heating or for cooling, or for both.

3.2.7 *vapor retarder*—a material (membrane or paint) that has a water vapor permeance rating of 1 perm (5.7×10^{-8} / Pa·s·m²) or less. See Practice **C 755** for more information on vapor retarders.

4. Significance and Use

4.1 This practice recognizes that effectiveness, safety, and durability of insulation depend not only on the quality of the insulating materials, but also on their proper installation.

4.2 Improper installation of insulation can reduce its thermal effectiveness, cause fire risks and other unsafe conditions, and promote deterioration for the structure in which it is installed. Specific hazards that can result from improper installation include fires caused by (1) heat build-up in recessed lighting fixtures; (2) deterioration or failure of electrical wiring components; (3) heat build-up resulting from overcurrent protection devices incorrectly matched to wiring; or (4) deterioration in wood structures and paint failure due to moisture accumulation.

4.3 This practice provides general procedures that will help ensure the installation of insulation in a safe and effective manner. It must be noted that actual conditions in existing buildings vary greatly, and in some cases substantial additional care and precaution must be taken to ensure effective and safe installation.

5. Safety Precautions

5.1 All pneumatic equipment shall be operated in accordance with the recommended operating and safety procedures of the equipment manufacturer and the insulation manufacturer.

5.2 The installer shall wear proper clothing and equipment as recommended by the insulation manufacturer. If in doubt of the effects of the insulation, wear protective clothing, gloves, eye and breathing protection.

NOTE 1—For breathing protection use a NIOSH approved N95 or higher disposable or reusable particulate respirator such as a 3M model

#8210 or #8511 or equivalent.⁶

5.3 In areas where insulation will be installed, components of the electrical system shall be in good condition. If the electrical system is faulty, proper inspection and repair must be none.

NOTE 2—The Consumer Product Safety Commission⁷ has identified the following signs of potential electrical deficiencies: Lights dimming, fuses blowing, circuit breakers tripping frequently, electrical sparks and glowing from receptacles, lights flickering, and coverplates on switches and outlets that are warm or hot to the touch.

6. Pre-Installation Preparation

6.1 In the areas where insulation will be installed, the installer shall locate and plan for subsequent blocking around recessed lighting fixtures, motors, fans, blowers, heaters, flues, chimneys, and other heat-producing electrical or mechanical devices.

6.1.1 Install blocking, such as wood, metal, or unfaced mineral wool batts, securely fastened in place around all heat-producing devices to exclude loose fill insulation and permanently maintain the clearances specified in **6.1.2** and **6.1.3**, or the exception in **6.1.4**. Install all required blocking at least as high as the height of the finished insulation and in a manner that ensures that all devices that require maintenance or servicing remain accessible after the insulation is installed.

6.1.2 Install blocking to provide a 3-in. (75-mm) minimum clearance around all sides of recessed lighting fixtures, unless such fixtures are approved for installation in direct contact with insulation (IC rated), including fixture wiring compartments and ballasts, and other heat-producing devices not covered in **6.1.3**. The open area above these devices must not be covered, in order to allow free air circulation unless they are specifically approved devices for operation when covered with thermal insulation (see 410-66, **NFPA 70**, National Electric Code).

6.1.3 Do not place insulation in air spaces surrounding metal flues, chimneys or fireplaces. Provide the minimum clearances specified in NFPA 31, NFPA 54 or NFPA 211 or as required by local building codes.

6.1.4 Inspect the roof, walls, ceilings, and attic floors to identify areas where previous or existing moisture problem has caused paint peeling, warpage, stain, visible fungus growth, rotting, or other structural damage. Notify the owner to correct these conditions before installing insulation.

6.1.5 The installer shall block all openings in ceilings, floors, and sidewalls through which it is possible for the insulating material to escape. Block all wall cavities that open into a basement or crawl space before wall insulation is installed.

⁶ The sole source of supply of the apparatus known to the committee at this time is 3M model #8210 or #8511. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

⁷ CPSC Product Safety Fact Sheet No. 518, "Guide to Home Electric Wiring," available from the Consumer Product Safety Commission, 4330 East West Highway Bethesda, MD 20814.

6.1.6 Proper attic ventilation and the use of vapor retarders shall be provided before installation in accordance with building requirements or practices, local building codes and the **International Residence Code**.

NOTE 3—The **International Residence Code**, Section R806.2 states the following attic ventilation requirements: The total net free ventilating area shall not be less than 1 to 150 of the area of the space ventilated except that the total area is permitted to be reduced to 1 300, provided at least 50 % and not more than 80% of the required ventilating area is provided by ventilators located in the upper portion of the space to be ventilated at least 3 ft. (914 mm) above the eave or cornice vents with the balance of the required ventilation provided by eave or cornice vents. As an alternative, the net free cross-ventilation area may be reduced to 1 to 300 when a vapor barrier having a transmission rate not exceeding 1 perm (57.4 mg/s m²Pa) is installed on the warm side of the ceiling.

When the attic has soffit vents at the eaves, install rigid blocking to restrain loose-fill insulation from clogging the vents, thus restricting attic ventilation. Blocking shall be installed to ensure free movement of air through soffit vents into the attic.

7. Procedure

7.1 Installation:

7.1.1 The insulation material shall be handled in accordance with manufacturer's instructions and should be kept free of extraneous materials. Keep the materials dry and do not place in contact with the ground or other sources of water.

7.1.2 Apply the insulation uniformly covering all areas. To attain the required *R*-value, install at least the minimum

thickness and minimum square-foot weight in accordance with the coverage chart supplied by the manufacturer.

7.1.3 Fill enclosed cavities to rejection of the material to ensure that cavity is free of voids and that the proper amount is installed in accordance with the manufacturer's coverage chart.

7.1.4 For pneumatic installation, use only equipment compatible with the insulation material, and operate the equipment in accordance with the manufacturer's instructions.

7.1.5 In pouring applications, install insulation in accordance with the manufacturer's recommended coverage.

7.2 Post-Installation:

7.2.1 Inspect the coverage and depth of the insulation. Fill all pockets and voids in the insulation. Level insulation in a manner that will not damage wiring or any other items. Turn off the electric power and clear all electric wall outlet boxes and switch boxes of any insulation material. Check all baffles and vents for insulation accumulation. Remove all temporary blockings that were installed over vent openings in attics.

7.2.2 The installer must provide a signed and dated statement describing the insulation installed, stating thickness, coverage area, *R*-value, and number of bags used or pounds installed per **FTC Rule 16 CFR 460**.

8. Keywords

8.1 cellulose; installation; light frame construction; loose fill; mineral fiber

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