



## Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction<sup>1</sup>

This standard is issued under the fixed designation C1320; 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.

### 1. Scope

1.1 This practice covers procedures for the installation of mineral fiber batt and blanket thermal insulation in ceilings, attics, floors, and walls of new or existing housing and other light frame construction.

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

1.3 This practice is not intended to replace installation instructions by manufacturers, but it shall be used in conjunction with such instructions. This practice is not intended to supersede local, state, or federal codes.

1.4 This practice assumes that the installer possesses a working knowledge of 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 construction that affect the installation of insulation.

1.5 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.

1.6 *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:<sup>2</sup>

**C168 Terminology Relating to Thermal Insulation**

<sup>1</sup> 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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<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.

**C665 Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing**

**C755 Practice for Selection of Water Vapor Retarders for Thermal Insulation**

**D3833/D3833M Test Method for Water Vapor Transmission of Pressure-Sensitive Tapes**

**E84 Test Method for Surface Burning Characteristics of Building Materials**

#### 2.2 Other Standards:

**NFPA-31 Standard for the Installation of Oil Burning Equipment<sup>3</sup>**

**NFPA-54 National Fuel Gas Code<sup>3</sup>**

**NFPA-70 National Electric Code<sup>3</sup>**

**NFPA-211 Standard for Chimneys, Fireplaces, Vents and Solid-Fuel Burning Appliances<sup>3</sup>**

**ICC International Residential Code<sup>4</sup>**

**CPSC Product Safety Fact Sheet No. 518 "The Home Electrical System"<sup>5</sup>**

### 3. Terminology

3.1 *Definitions*—Definitions relating to thermal insulation in Terminology C168 apply to terms used in this practice.

3.2 *Description of Terms Specific to This Standard:*

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

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

3.2.3 *mineral fiber batt and blanket thermal insulating materials*—those materials that meet the minimum requirements set forth in Specification C665.

3.2.4 *owner*—the person, partnership, corporation, agency, or other entity who owns the building to be insulated whether such ownership is by virtue of deed, contract, or any other

<sup>3</sup> Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, <http://www.nfpa.org>.

<sup>4</sup> Available from International Code Council (ICC), 500 New Jersey Ave., NW, 6th Floor, Washington, DC 20001-2070, <http://www.iccsafe.org>.

<sup>5</sup> Available from U.S. Consumer Product Safety Commission (CPSC), 4330 East West Hwy., Bethesda, MD 20814, <http://www.cpsc.gov>.

instrument for acquiring legal title under the laws of the State in which the building is located.

3.2.5 *vapor retarder*—membrane or tape that has a water vapor permeance (perm) rating of 1 perm ( $5.7 \times 10^{-11}$  kg·Pa<sup>-1</sup>·s<sup>-1</sup>·m<sup>-2</sup>) or less as defined in Practice **C755** or Test Method **D3833/D3833M** respectively.

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

#### 5. Safety Precautions

5.1 The installer shall wear proper clothing and equipment as recommended by the insulation manufacturer.

5.2 In areas where insulation is to be installed, components of the electrical system shall be in good condition. If there is reason to believe the electrical system is faulty, do not install insulation in such areas until the owner has been informed and repair has been accomplished.

NOTE 1—The CPSC Product Safety Fact Sheet No. 518 has identified the following signs of electrical deficiencies: lights dimming, fuses blowing, circuit breakers tripping frequently, electrical sparks and “glowing” from receptacles, light flickering, and coverplates on switches and outlets that are warm or hot to the touch.

#### 6. Pre-installation Inspection and Preparation

6.1 Inspect the roof, walls, ceilings, and attic floors to identify areas where previous or existing moisture problems have caused paint peeling, warpage, staining, visible fungus growth, rotting, or other structural damage. Do not install insulation in such areas until the owner has been informed and has certified that these conditions have been corrected and their source(s) of moisture eliminated.

6.2 Provide proper attic ventilation in accordance with local building requirements or practices, such as the ICC International Residential Code.

6.3 When the attic has soffit vents at the eaves, make provisions to prevent insulation from blocking the vents and restricting attic ventilation.

6.4 Where insulation is to be installed beneath floors over crawl spaces or on crawl space walls, cover the ground surface with a vapor retarder.

6.5 Provide proper crawl space ventilation in accordance with local building requirements or practices, such as the ICC International Residential Code.

6.6 Inspect attic floors for openings that might permit entrance of air from conditioned spaces below. Do not install insulation in such areas until the owner has been informed and has certified that these conditions have been corrected.

#### 7. Installation Procedures

##### 7.1 General:

7.1.1 Handle the insulation material in accordance with the manufacturer's instructions and keep free of extraneous materials. Keep materials dry, off the ground, and protected from water.

7.1.2 It is difficult to describe every situation that will be encountered by the insulation installer. In general, however, the installer shall be guided by the need to reduce heat flow around or through obstructions and to protect mechanical systems. Wherever insulation is installed in a building, it is very important that it fit snugly on all sides. If the insulation is too long for a space, cut it to the correct size. If it is too short, cut a piece to fill the void.

7.1.3 Install the insulation in such a way that the thickness specified by the manufacturer is met or exceeded. Avoid compression of the insulation where ever possible. Failure to achieve the manufacturer's labeled thickness will reduce the R-value.

7.1.4 When a vapor retarder facing is provided with the insulation, it can be pressure fit with no stapling or face stapled or inset stapled. Both inset and face staple methods are widely used and are acceptable procedures. Inset stapling is usually preferred by the wall finish trades because it allows adhesive application of the wall board. Some areas require face stapling. Always check the local code requirements.

7.1.4.1 Position the vapor retarder toward the winter-warm side, except in a hot, humid climate where local requirements or practices differ regarding the placement of vapor retarders.

7.1.4.2 Friction fit batts such as R13, R15, R21, R22, R30C, or R38C as well as kraft faced batts without attached stapling flanges do not have to be stapled in place. The higher density or increased glass batt width of these products helps hold them in place without a measurable loss in the moisture protection of the vapor retarder. Make sure the insulation facing is flush with the face of the stud. The insulation shall fit snugly at the sides and ends.

7.1.4.3 When inset stapling, gently press the insulation at the sides of the framing cavity, usually about  $\frac{3}{4}$  in. (19 mm), until the outside of the flange is flush with the face of the framing. When inset stapling between inclined or vertical framing members, as in cathedral ceilings or walls, start stapling at the top and work down. Use enough staples to hold the insulation firmly in place and avoid gaps or fishmouths between flanges and framing.

7.1.4.4 When face stapling, place the insulation between framing members and check to be sure it fits the cavity at both ends. With facing material flush with the face of the framing, the flanges will overlap the framing. Staple the flanges to the face of the framing, using enough staples to hold the insulation firmly in place and avoid gaps and fishmouths. The flange of the faced insulation placed in the next cavity will overlap the previously stapled flange. When more than one batt is used, pieces shall be snugly butted.

7.1.5 Building insulations faced with kraft or standard foil having a flame spread index greater than 25 shall never be left exposed as stated on the facing of the product. The facing shall be covered and in substantial contact with an approved ceiling,

wall, or floor construction material as required by the building codes. When supplied with stapling flanges inset and face stapling of these products are acceptable procedures. Alternatively a separate vapor retarder installed over the unfaced batts or blanket attached directly to the framing member in the location described in 7.1.4.1 is acceptable.

7.1.5.1 Install the vapor retarder either parallel or perpendicular to framing members.

7.1.5.2 In installations where there is a light stress on the vapor retarder, attach to wood framing with staples or adhesive, and to steel framing with adhesive or double sided tape.

7.1.5.3 In installations where there is a significant load on the vapor retarder due to application conditions, support with furring strips and screws or strapping. Consult the vapor retarder supplier for further instructions in such cases.

7.1.5.4 Overlap the adjacent runs by at least one inch (25mm).

7.1.5.5 When required by building codes or architectural specifications tape over overlap seams.

7.1.6 Maintain a 3-in. (75-mm) minimum air space around motors, fans, blowers, heaters, other heat-producing devices, flues and chimneys, as specified by NFPA-31, NFPA-54, and NFPA-211.

7.1.7 Maintain a 3-in. (75-mm) minimum air space around all sides of recessed lighting fixtures, unless such fixtures are approved for installation in direct contact with insulation, IC rated, as specified in NFPA-70. This includes fixture wiring compartments and ballasts, and other heat-producing devices. Do not cover open areas above these devices; allow free air circulation, unless they are specifically approved for operation when covered with thermal insulation. Allow devices that have the potential to require periodic servicing to remain accessible after the insulation is installed.

## 7.2 Walls:

7.2.1 Carefully fill any small spaces remaining around windows, doors, or wall cavity obstructions with insulation. Patch the vapor retarder with vapor retarder tape where it has been interrupted in these areas, including any remaining fish mouths or gaps between flanges and framing.

7.2.2 Caulk, gasket, or otherwise seal around all other penetrations of the interior wall, including plumbing, electrical, heat registers, and grills.

7.2.3 Insulate junction boxes for wall switches and convenience outlets at outside walls between the rear of the box and the sheathing. Place insulation behind the junction box, and if necessary, cut insulation to fit snugly around it. Where electrical wiring passes through a stud cavity and is located close to the inside wall surface, insulation shall be pressed behind the wiring. When the wiring is in the center of the cavity, either make a shallow cut in the insulation to allow the wiring to pass through the insulation or split the insulation lengthwise and sandwiched the wiring within.

7.2.4 Place insulation between the piping in exterior walls and the exterior wall sheathing. Sidewalls where plumbing fixtures are to be placed shall be insulated before the fixtures are installed. To guard against pipes freezing, insulation shall never be placed between piping and the warm side of the wall.

## 7.3 Attics, Ceilings, and Floors:

7.3.1 When installing insulation around trusses or cross bracing of ceiling or floor joists, care shall be taken to ensure that the insulation material is of the proper width, fits tightly around these obstructions, and that there are no gaps in the insulation.

7.3.2 Use only full width (typically 16 or 24 in. wide) batts or blankets when insulating between attic trusses and ceiling joists below open attic spaces. When insulating with two layers, the first layer of insulation shall be at least the same height as the bottom structural member. Apply the second layer crosswise to the joists. For single layer applications, use insulation thicker than the bottom structural member and make sure the tops of adjacent batts or blankets meet and cover the structural members where unobstructed.

7.3.3 Install floor insulation between floor joists to fit snugly in the joist areas in contact with the floor and support with such things as wire fasteners, screening, or nylon mesh held in place by stapling or nailing.

7.3.4 Install insulation around air vents in a manner that will ensure free movement of air through the vents into the attic or crawl space.

7.3.5 Fit the attic side of access doors or panels with an insulation batt (or equivalent material) except where there is a retractable ladder or other equipment attached. Anchor the insulation to the door or panel with staples or adhesive.

## 8. Post-installation Inspection

8.1 Ensure that no gaps or areas exist where insulation is unnecessarily compressed. Examples are behind piping and electrical wiring. When inset stapling, minimal compression shall be used to fasten the facing flanges.

8.2 Ensure that insulation does not restrict vents so that minimum attic ventilation requirements specified in 6.2, or crawl space ventilation requirements specified in 6.5 of this practice are met.

8.3 Ensure that insulation material is not in the air spaces, specified in 7.1.6 and 7.1.7 of this practice, around and above motors, fans, blowers, heaters, recessed lighting fixtures, ballasts, wiring compartments, and other heat-producing devices. Turn off electric power while performing this inspection.

8.4 Ensure that all cavities that act as air ducts for heating, cooling, or ventilation requirements are not restricted by insulation materials.

8.5 Ensure that no vapor retarder faced insulation with a flame spread index greater than 25, per Test Method E84, is left exposed to either the habitable space or to the attic, crawl, or other spaces. Unfaced insulation typically has a flame spread index no greater than 25, but verify with the manufacturer in case of uncertainty.

8.6 The installer shall provide a contract, receipt, or attic card showing the coverage area, thickness, and R-value of the insulation installed for each part of the building. The contract, receipt, or attic card shall be dated and signed by the installer. An acceptable practice is to attach an attic card adjacent to the entrance.

## **9. Keywords**

9.1 batt and blanket; installation; light frame construction;  
mineral fiber

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