

CertainTeed

# Fiber Glass Insulation Installation Basics

Master Craftsman Education & Development Program



**CertainTeed**  
SAINT-GOBAIN



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# 1 Introduction

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*Fiber Glass Installation Basics* is one of two key pieces in the Insulation portion of CertainTeed's Building Solutions education program. (The other piece is *Fiber Glass Product Knowledge Workbook and Manual*). First, use it to master the information critical to a thorough understanding of the proper installation techniques for CertainTeed Insulation products. Then, keep it as a ready reference to verify installation techniques on site or to learn new techniques when you are faced with a particularly demanding installation.

The more you know about installation techniques, the better you'll be able to discuss insulation with your customers. And this means more options, more differentiation from your competitors, more services to sell, better estimates, and, in general, more profits for you.

As you finish reading each section in this manual, take a few minutes to check your product knowledge by completing the self-tests. These will prepare you for the Installation Basics Exam, which can earn you valuable rewards. These rewards — and more importantly, the leg up you'll have on the competition — are not available to everyone, just to those who have successfully passed the Insulation Installation Basics Exam.

If you fail to pass the test the first time you take it, you can keep trying until you pass.

## **If you complete two or more Building Solutions education programs, you'll receive:**

- Higher recognition as a "Specialist," including a top-spot listing on [www.certainteed.com](http://www.certainteed.com).
- Specialist Certificate of Completion.
- 24" Bucket Boss Tool Organizer — For keeping tools organized and accessible on the job. Fits any five-gallon bucket and holds more than most toolboxes.

## 2 Insulation Basics

### WHAT DOES INSULATION DO?

#### Heat Control

Insulation resists the flow of heat. Heat is a form of energy. By reducing heat flow in a properly insulated building, less energy is used for winter heating and summer cooling. Energy costs are high today and will be even higher in the future. Insulating today can help save both dollars and energy. Savings vary. Find out why in the seller's fact sheet on R-Values. The higher the R-Value, the greater the insulating power.

#### Sound Control

Insulating reduces sound transmission. An insulated floor, wall or ceiling will have an improved Sound Transmission Class (STC) compared with a similar building section with no insulation. As an example, 3.5 in. of fiber glass insulation in a wall can improve the STC from 4 to 11 points, depending upon construction details.

#### Moisture Control

A vapor-resistant membrane (commonly called a vapor retarder) attached to batt or foil insulation, or installed separately, decreases the possibility of moisture vapor condensing to water within the structure, which can cause mildew and rot.

### WHAT IS FIBER GLASS INSULATION?

The basic materials, sand and recycled glass, are melted and then spun into wool-like fibers. These are processed into batt or roll insulation, with or without facings, and in loose form for pneumatic installation.

### WHERE IS INSULATION INSTALLED?

Batts and rolls are designed for use in framing members of residential and other light-frame constructions. Standard widths are 15 in. and 23 in. for 16- and 24-in. on-center spacing; special widths are available for steel studs. A batt is a pre-cut piece of insulation, usually 47 to 96 in. in length. Rolls are available in lengths up to 70 ft.

### AREAS TO INSULATE

1. Exterior walls. Sections sometimes overlooked are walls between living spaces and unheated garages or storage rooms, dormer walls, and the portions of walls above ceilings of adjacent lower sections of split-level homes.

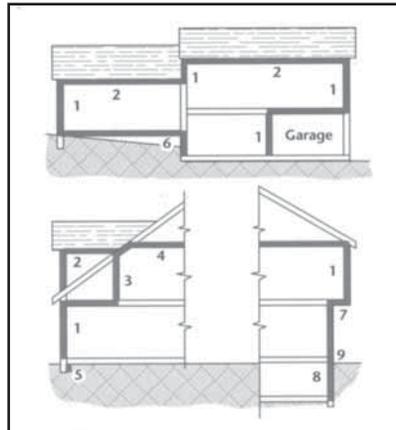


Figure 1

2. Ceilings with cold spaces above, including dormer ceilings.
3. Knee walls of attic spaces finished as living quarters.
4. Sloped walls and ceilings of attic spaces finished as living quarters.
5. Perimeters of slabs on grade.
6. Floors above crawlspaces. Insulation may also be placed on crawlspace walls.
7. Floors over unheated or open spaces such as over garages or porches. Floors over unheated basements. The cantilevered portions of floors.
8. Basement walls.
9. Band or header joists, the wall sections at floor levels.
10. Interior walls, ceilings and floors where sound control is desired. (Not shown on Figure 1.)

Although they are not shown, common walls and floors between separately heated apartment or townhouse units should be insulated. In addition to its thermal benefit, the insulation improves sound attenuation and fire resistance.

### HOW IS INSULATION LABELED?

Fiber glass building insulation is identified and labeled by R-Value. "R" stands for resistance to heat flow. (Higher R-Value means greater insulating power. Ask your seller for the fact sheet on R-Values.) In most cases, R-Values are printed on the facings of batts and rolls. Unfaced (no vapor retarder attached) insulation is ink-jet printed to identify the R-Value. All packages of CertainTeed fiber glass

insulation are clearly marked with the R-Value, thickness, width, length, and square footage. Most common R-Values of batts and rolls are 11, 13, 15, 19, 21, 22, 25, 30 and 38. R-Values can be added if, for example, a ceiling requires R-38 insulation, two layers of R-19 batts or rolls can be used. When batts or rolls are compressed to less-than-normal thickness during installation, the rated resistance value will be reduced. For example, a 6.25-in.-thick R-19 batt installed in a 3.5-in. cavity yields an R-14.

### CONSUMER INFORMATION

#### FTC Home Insulation Rule

The United States Federal Trade Commission's Labeling and Advertising of Home Insulation Rule requires installers to provide each customer (builder or consumer) with a signed and dated contract or receipt for the insulation installed. The receipt must show the type of insulation, coverage area, thickness and R-Value installed. The manufacturer must also provide a manufacturer's fact sheet. Installers must have this information and show it to customers before they agree to buy the insulation.

A new home seller must put the following information in every sales contract: the type, thickness, and R-Value of the insulation that will be installed in each part of the house.

### TYPES OF FIBER GLASS BUILDING INSULATION

#### Faced Insulation

Batts and rolls are available with facings already attached. The facing material is usually a vapor retarder. Vapor retarding facings usually consist of asphalt-coated kraft paper, aluminum foil or plastic film. A vapor retarder's purpose is to resist the movement of moisture vapor to cold surfaces where it could condense to liquid water.

The facings extend over the sides of the insulation to provide strengthened flanges that can be stapled to wood framing to hold the insulation in place when recommended by the manufacturer (Figure 2). Some faced products may be pressure fit between framing without stapling.

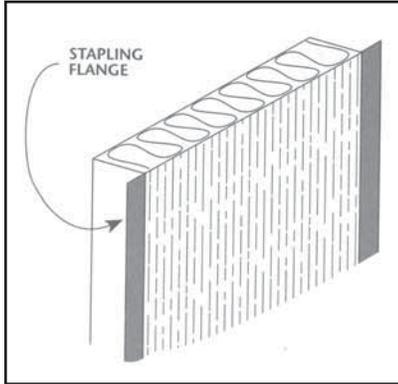


Figure 2

### Unfaced Insulation

Unfaced wall insulation is usually made wider to permit installation by pressure fitting between either wood or metal framing. No fastening is required. A separate vapor retarder is usually required when unfaced insulation is used. Unfaced insulation is often used in attics when adding to existing insulation.

### Insulation Sizes

Insulation is available in a variety of sizes. The table below represents common material sizes.

Nominal Dimensions Available		
	Batts	Rolls
Lengths	47 in. (1194 mm)	25 ft. (7.62 m)
	48 in. (1219 mm)	40 ft. (12.19 m)
	90 in. (2286 mm)	70 ft. 6 in. (21.49 m)
	93 in. (2362 mm)	
	94 in. (2388 mm)	
Widths	96 in. (2438 mm)	
	11 in. (279 mm)	11 in. (279 mm)
	15 in. (381 mm)	15 in. (381 mm)
	15.25 in. (387 mm)	23 in. (584 mm)
	16 in. (406 mm)	
	23 in. (584 mm)	
	23.25 in. (590 mm)	
24 in. (610 mm)		

## SELF-TEST #1: INSULATION BASICS

### 1. Insulation can

- a. resist the flow of heat
- b. reduce sound transmission
- c. decrease the possibility of moisture vapor condensing to water within a structure
- d. all of the above
- e. none of the above

### 2. Insulating power is rated according to

- a. U-Value
- b. heating degree day
- c. R-Value
- d. BTU

### 3. Vapor retarders are always attached to batt or roll insulation.

- a. true
- b. false

### 4. Fiber glass insulation is manufactured from

- a. sand and recycled glass
- b. slag
- c. fiber optic cable
- d. cellulose fibers

### 5. For remodeling and light construction, fiber glass insulation is supplied as

- a. batts only
- b. batts and rolls only
- c. batts, rolls, and loose fill

### 6. A batt is a precut piece of insulation

- a. 16 to 24 in. long
- b. without facing
- c. 47 to 96 in. long
- d. 70 ft. long

### 7. Rolls of insulation are

- a. 16 to 24 in. long
- b. up to 70 ft. long
- c. available in special lengths for steel studs
- d. all of the above
- e. none of the above

### 8. Common walls and floors between separately heated apartment or townhouse units should be insulated.

- a. true
- b. false

### 9. The knee walls of attic spaces finished as living spaces

- a. should never be insulated
- b. should be insulated
- c. must be ventilated

### 10. Slabs on grade

- a. should be insulated only in the Northeastern states
- b. are insulated only in areas of high humidity
- c. can't be insulated
- d. are insulated along the perimeter

### 11. It's a good idea to insulate

- a. the walls of basements
- b. the floors above crawlspaces
- c. around slabs on grade
- d. all of the above
- e. none of the above

### 12. In addition to its thermal benefit, insulation improves

- a. moisture retention
- b. sound attenuation and fire resistance
- c. the appearance of a home
- d. insured value

### 13. The "R" in R-Value stands for

- a. rating
- b. resistance to vermin
- c. resistance to heat flow
- d. resistance to moisture

### 14. Installers can identify the R-Value of faced insulation by looking

- a. on the customer's RFQ
- b. on the architect's spec sheet
- c. on the facing of the batt or roll

15. The R-Value of unfaced CertainTeed insulation will be

- a. printed on the batt or roll
- b. on packaging
- c. on a hang tag
- d. both a and b

16. When you install insulation, you should be prepared to leave the homeowner

- a. a warranty
- b. a signed and dated contract or receipt
- c. a manufacturer's fact sheet
- d. all of the above
- e. none of the above

17. Insulation is often faced with

- a. PVC
- b. polystyrene
- c. a vapor retarder
- d. insulation with a lower R-Value

18. The stapling flange on insulation is composed of

- a. the facing
- b. shims
- c. a single 3-mil Mylar strip
- d. a double 3-mil Mylar strip

19. Vapor retarders

- a. usually consist of asphalt-coated kraft paper, aluminum foil or plastic film
- b. resist the movement of moisture to cold surfaces
- c. prevent condensation on insulation
- d. all of the above
- e. none of the above

20. Unfaced batt insulation is sometimes

- a. made narrower than faced insulation for easy installation
- b. made wider than faced insulation for pressure fitting between framing
- c. not identified according to R-Value
- d. blown into walls

# 3 Installation Techniques

## FACED INSULATION

There are three commonly accepted methods of installing faced insulation in wood framing members.

### Inset Stapling

When insulating walls, begin by fitting the insulation snugly into the top of the cavity. Check to be sure it completely fills the cavity, top to bottom. If you have to fill in, do so at the bottom of the cavity. Start at the top and staple every 8 in. or so.

When insulating ceilings, be sure that each batt is butted closely to the next one before fastening. Gently press the insulation at the sides into the framing cavity, usually about .75 in., until the outside edge of the flange is flush with the face of the framing. When inset stapling insulation 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. Avoid gaps and “fishmouths” between flanges and framing (Figure 3A).

We recommend using a single batt in walls. However, when insulating with 47-in. or 48-in. batts, make sure the two pieces are butted snugly together. Use R-11, R-13 or R-15 with 2 x 4 stud construction and R-19, R-21 or R-22 with 2 x 6 studs. Remember, compressing insulation to fit a cavity will result in some loss of R-Value.

### 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 every 8 in. or so. Avoid gaps and fishmouths. The flange of the faced insulation placed in the next cavity will overlap the previously stapled flange (Figure 3B). When more than one batt is used, pieces must be snugly butted.

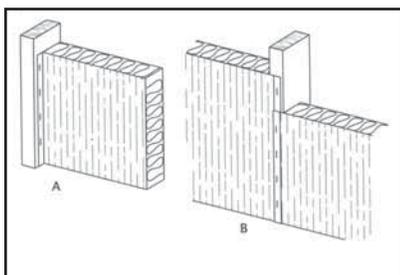


Figure 3

### Inset or Face Stapling?

Both methods are widely used and can provide acceptable performance. Inset stapling is usually preferred by the wall finish trades because it allows adhesive application of wall board. Most commonly used attached vapor retarders are flammable and should not be left exposed. During construction they should be covered with the interior finish material as soon as possible.

### Pressure Fit – No Stapling

To install faced products by pressure fit, gently place the insulation into the cavity space between framing. Make sure the insulation facing is flush with the face of the stud. The insulation must fit snugly at the sides and ends. Faced high-performance batts do not need to be stapled in place. Although staples can be used, the higher density of these products helps hold them in place without requiring staples.

## UNFACED INSULATION

To install unfaced insulation, gently place the insulation into the cavity space between framing members. It is important that insulation be correctly sized for the cavity and fit snugly at the sides and ends.

**Note:** *Wherever batts or rolls of any type are too short to fill a stud cavity, a piece should be cut to size to fill the gap. When insulation is too long, it should be cut to fit properly, not doubled over or compressed.*

### Lay In

After the ceiling finishing material has been applied, faced or unfaced batts or rolls can be laid between framing members and gently pressed into place. Ceiling insulation is held in place by gravity. Vapor retarder facings should face down in ceilings in most climate areas.

### Floors

There are four techniques for holding insulation in place between floor joists. These are described in the Installation Instructions section which starts on page 10.

## NON-STANDARD CAVITIES

Insulate non-standard-width framed spaces by cutting the insulation and facing about an inch wider than the space to be filled. As an example, to staple a batt or roll into a 9-in. stud cavity, cut the insulation 10 in. wide. Staple the uncut flange as usual. Pull the

facing on the cut side to the other stud and staple through the vapor retarder to the stud (Figure 4).

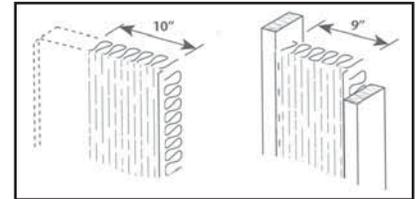


Figure 4

Special cutting of insulation may be required for less-than-standard width or length cavities or for insulating around window and door framing, stud corners, band joists, and between chimneys and framing.

If a faced material is used, and the space (such as at window framing) is narrow, the insulation may be pulled away from the facing in small pieces and stuffed into the narrow space (Figure 5). Small spaces between studs at the corners of buildings and at intersections of partitions and sidewalls should be treated in the same manner before the sheathing is applied. Where a vapor retarder is required, cover the interior side of the narrow space with excess vapor retarder facing, duct tape, or polyethylene film.

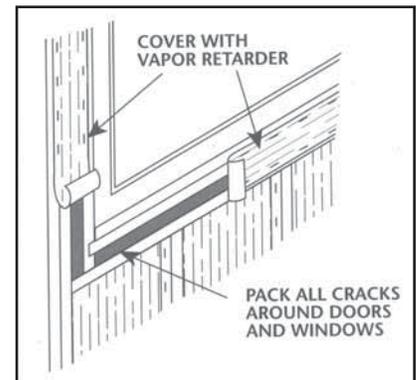


Figure 5

## FIREPLACES AND FURNACES

Clearances around fossil-fuel appliances should meet the requirements of the National Fire Protection Association (NFPA) or the appliance manufacturer's recommendations. Use only unfaced fiber glass insulation between wood framing and masonry chimneys. Do not place insulation in air spaces surrounding metal chimneys or fireplaces.

## CANTILEVERED OVERHANGS

These areas must not be overlooked. If the underside of the cantilever has been closed, insulation must be installed by sliding batts into place from the room below (Figure 6).

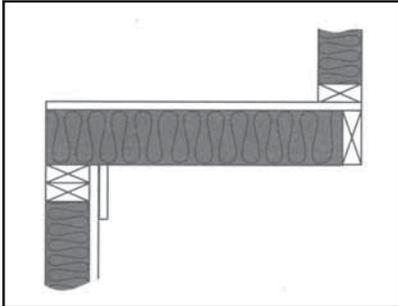


Figure 6

## INTERIOR SOFFITS AND DROPS

Interior soffits and drops, usually located over cabinets and bathrooms, should be constructed in a manner to allow proper insulation. Gypsum board or other suitable material can be applied to the underside of ceiling joists to enable the installation of batt or roll insulation.

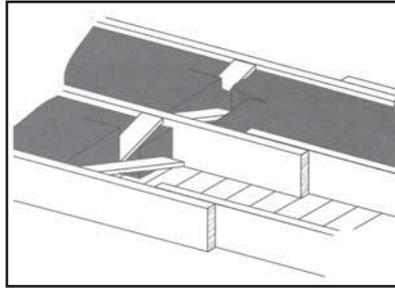


Figure 7

## BRIDGING

Bridging or cross bracing of ceiling or floor joists is insulated by splitting a batt vertically at the center and packing one half into the lower opening and the other half into the upper opening (Figure 7). Another method is to butt the insulation to the bridging, then fill the bridging space with scrap or loose insulation.

Band joists and headers between floors should be insulated. At the band joist, the insulation should be allowed to overlap the sill plate to reduce air infiltration between the sill plate and the foundation.

## DOUBLE WALL

The super-insulated wall is a double-frame providing a double-depth cavity. The studs are staggered to eliminate thermal and sound paths. Unfaced fiber glass wool batts are used in the outer wall. A vapor retarder is applied to the inner stud wall either separately or by using faced batts (Figure 8).

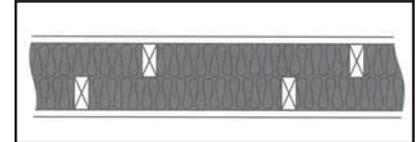


Figure 8

## SELF-TEST #2: INSTALLATION TECHNIQUES

21. When installing faced insulation in wood framing members
- you should not use CertainTeed approved methods
  - use one of the three commonly accepted methods
  - the installation method will be specified by the homeowner
  - all of the above
  - none of the above
22. When inset stapling batts, the outside edge of the flange should be
- .75 in. into the framing cavity
  - flush with the face of the framing
  - .75 in. above the face of the framing
  - tucked under the insulation in the framing cavity
23. When installing insulation in walls
- start from the top and work down
  - start from the bottom and work up
  - start in the middle and work toward the sides
  - don't butt the batts against each other
24. CertainTeed manufactures the following insulation for 2 x 4 stud construction:
- R-11 insulation
  - R-13 insulation
  - R-15 insulation
  - all of the above
  - none of the above
25. R-19, R-21, or R-22 insulation is recommended for
- 2 x 4 stud construction
  - 2 x 6 stud construction
  - steel stud construction
  - all of the above
  - none of the above
26. Compressing insulation to fit a cavity increases its R-Value.
- true
  - false
27. Insulation that has been inset stapled is preferred by drywall installers because
- it allows adhesive to be used to install drywall
  - it yields a smoother wall
  - it is easier to paint
  - all of the above
  - none of the above
28. When insulation is face stapled
- the flanges are tucked under the insulation
  - the flanges overlap the framing and are stapled to it
  - the flanges are removed and the insulation stapled through the batt
  - the flanges invariably get in the way
29. High-performance batts
- don't need to be stapled if they fit snugly
  - need to be stapled every 6 in.
  - will compress after a year
  - shouldn't be pressure fit
30. Unfaced insulation
- should fit loosely in the cavity
  - should fit snugly in the cavity
  - is inset stapled
  - can be compressed to fit
31. When insulating narrow-framed cavities, cut the faced insulation
- .5 in. narrower than the cavity
  - .5 in. wider than the cavity
  - 1 in. narrower than the cavity
  - 1 in. wider than the cavity
32. Small spaces around windows, doors, band joists, etc., may be insulated with
- faced insulation cut to fit the space
  - small pieces of insulation pulled away from its facing
  - both of the above
  - neither of the above
33. If a cantilever has been closed, insulation should be installed from the room below.
- true
  - false

## 4 Installation Instructions

### GENERAL

Wherever insulation is installed in a building, it is very important to fill the cavity completely. 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.

### CEILINGS

When ceiling insulation is installed at the same time as wall insulation, it is usually installed from underneath. Batts, faced or unfaced, are installed between ceiling joists and firmly butted together. Faced batts should be stapled to joists and should cover the outer edge of the exterior wall's top plate.

No stapling is required if insulation is laid in over finished ceilings. The facing should be toward the living space.

In attics where pre-engineered trusses are used and where more than one layer of insulation is to be applied, the best job is achieved by installing all of the insulation between the bottom chords. In attics with conventional joists and rafters, the first layer of insulation is installed between the joists and should be at least the same height as the joists (Figure 9). The second layer, which should always be unfaced, is applied crosswise to the joists. This method provides the most efficient thermal protection.

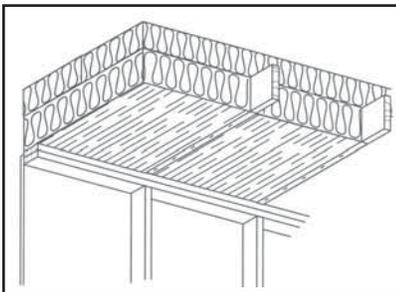


Figure 9

It is particularly important that clearance for air movement from vent openings be maintained. If there are soffit vents, there should be about 1 in. of unblocked free air space between the roof sheathing and the insulation. It is important also for the insulation to cover the top plate. Use baffles if necessary to keep the insulation from blocking the passage of air (Figure 10).

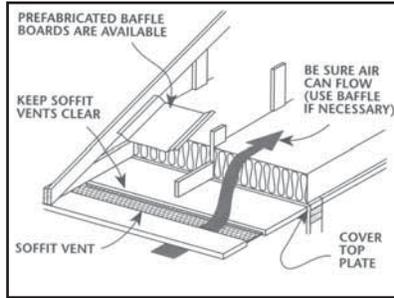


Figure 10

Insulation near recessed fixtures should be kept at least 3 in. from the fixtures in accordance with recommendations of the current National Electrical Code. (This warning does not apply to Type IC fixtures or fluorescent fixtures with thermally protected ballasts.)

### CATHEDRAL CEILINGS

In cathedral ceilings the insulation should be stapled or held in place by pressure against the sides of the rafters. An air space between the insulation and roof sheathing, ventilated at ridge and soffit, is desirable in cathedral ceilings. If unfaced material is used, a separate vapor retarder should be applied facing the living area after the insulation has been installed.

### ATTIC ROOMS

Attics that are used as living spaces should be insulated as shown in Figure 11.

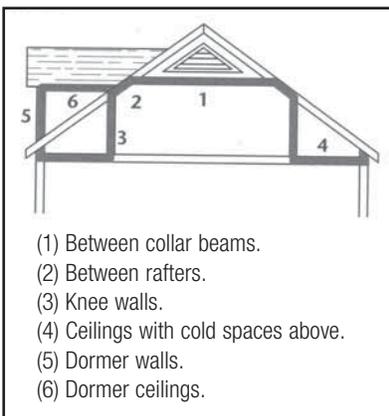


Figure 11

### WALLS

Insulation should fit snugly to the framing on all sides. Even the smallest openings between

framing members should be insulated. Recommendations applicable to insulating walls are discussed in Installation Techniques (page 8).

### FLOORS

Insulation is installed between floor joists and secured with either wire fasteners, mesh, screen, or wire lacing.

#### Wire Fasteners

The easiest and most effective method of holding insulation in place is to use insulation supports, which are straight, rigid pieces of wire (preferably galvanized) with pointed ends. The fasteners are made for joist spacings of 12, 16, 18, 20 and 24 in. and may be used against wood, metal, or concrete. The fasteners, which are slightly longer than the joist spacing, are placed by hand between the joists and bowed upwards into the insulation, causing the insulation to press gently against the subflooring. Spacing of fasteners is as required to prevent sagging of the insulation, normally 12 in. to 24 in. apart and not more than 6 in. from the ends of batts and rolls (Figure 12).

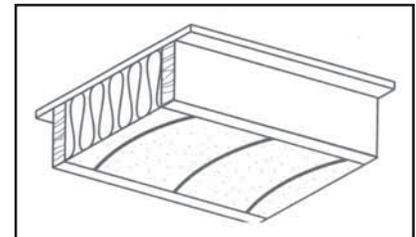


Figure 12

#### Mesh or Screen

Galvanized wire, nylon mesh or galvanized screen (chicken wire is also suitable) will hold the insulation in place. After the insulation has been pushed into place, the mesh or screen is stapled or nailed to the joist faces (Figure 13).

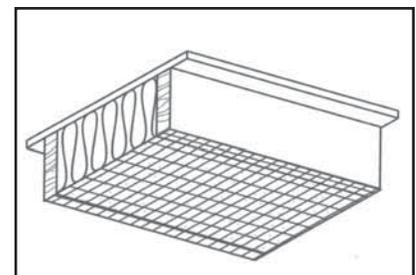


Figure 13

### Wire Lacing

Galvanized, malleable wire may be laced around nails protruding from the faces of the joists or the wire may be stapled to the joists. Wire and nail spacings are required to prevent sagging of the insulation (Figure 14).

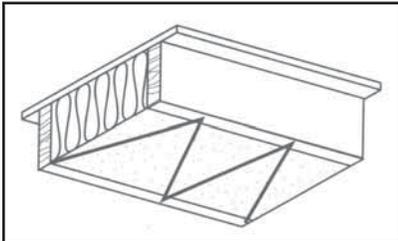


Figure 14

**Note:** For homes where the underside of the floor is exposed and readily accessible, such as those on pilings or with living spaces over garage areas, the insulation should be covered with a suitable exterior material to protect it from high winds and physical abuse. Header and band joists should also be insulated.

When insulating floors where the insulation is less than the thickness of the joists and the method of installation does not hold the insulation up against the subflooring, it will be necessary to insulate the headers or band joists at outside walls. This is because there will be an air space between the top of the insulation and the subfloor that will allow heat to be lost at outside walls. Therefore, it is recommended that the insulation be pushed up to the subfloor. If insulating over an unheated area, the vapor retarder should be in substantial contact with the subfloor. Where the header is parallel with the floor joists, it may be necessary to adhere insulation to the header or fill the joist area with insulation (Figure 15).

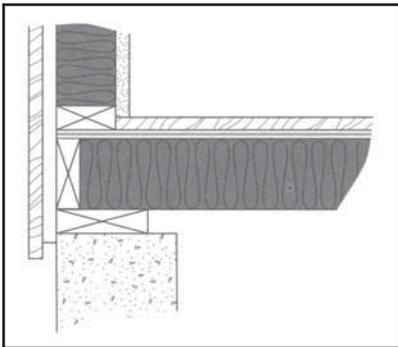


Figure 15

## BASEMENT WALLS

Prior to insulating basement walls with any of the following methods, insulate the band joists separately.

### Furring Strips on Masonry or Concrete

Masonry wall insulation ranges from R-3 to R-6 (.75 to 1.5 in. thick) and is unfaced. It is available for use with furring strips 16 and 24 in. on center. After the furring strips are mounted on the wall, the insulation is placed by pressure at its sides. Be sure the insulation fits tightly at the top and bottom.

If the vertical furring strips are aligned with the floor joists above and do not abut an upper horizontal furring strip, the insulation should extend into the space between the joists to insulate the sill and the header. Where the floor joists run parallel with the wall (no joists meet the header), secure the insulation to the sill and insulate the header separately. If a vapor retarder is desired, polyethylene film or foil-backed gypsum board may be installed.

### Masonry or Concrete with Framing

When insulation of higher R-Values (R-11, R-13, R-15, R-19 or R-21) is to be installed on a masonry wall, a separate frame wall may be built of 2 x 4 or 2 x 6 studs.

The top plate is nailed to the underside of the joists or to blocking between joists.

Attachment of the insulation to the framing is the same as for sidewall insulation. Here, too, faced or unfaced insulation may be used, with the vapor retarder applied the same way. Standard vapor retarder facings must be covered with the interior finish material (paneling, .5-in. gypsum board, or the equivalent). Only special low flame-spread vapor retarder facing (FSK) can be left exposed (Figure 16).

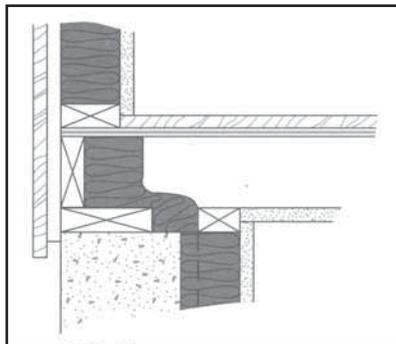


Figure 16

## CRAWLSPACE WALLS

If the crawlspace does not contain pipes or ducts, it is best to insulate the floor above. The proper method for insulating floors is described on pages 10-11.

If the crawlspace contains pipes and/or ducts, insulate the crawlspace walls to prevent freezing and heat loss. There are two ways to insulate crawlspace walls.

The first is to insulate the band joists separately. Then nail the insulation to the sill plate with .5 x 1.5 nailer strips (Figure 17). The insulation should be snug against the piece next to it. The insulation should hang down to the bottom of the wall and extend out onto the ground cover (usually polyethylene) about 2 ft. Where the insulation bends onto the ground cover, the insulation may be held in place by laying small rocks or bricks on the insulation.

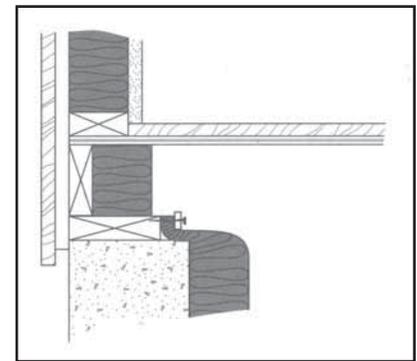


Figure 17

An alternate method of insulating masonry walls is to run the insulation up the wall, past the sill plate to the subfloor. Again, insulate the band joist separately (Figure 18).

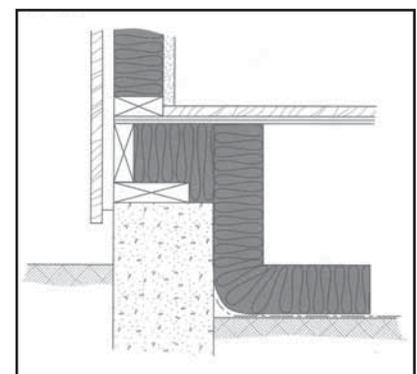


Figure 18

### SELF-TEST #3: INSTALLATION INSTRUCTIONS

#### 34. When insulating ceilings

- a. unfaced batts must always be used
- b. batts must always be stapled to the joists
- c. pressure fitting is always the preferred method
- d. the vapor retarder should usually be toward the living space

#### 35. Where soffit vents are used for attic ventilation

- a. there should be about 1 in. of unblocked air space between the sheathing and the insulation
- b. only loose fill insulation should be used
- c. never insulate
- d. avoid installing baffle boards

#### 36. In cathedral ceilings, insulation should be installed

- a. on the roof sheathing
- b. on the ceiling
- c. between the rafters
- d. cathedral ceilings are not insulated

#### 37. Attics that are used as living spaces should be insulated

- a. between collar beams and rafters
- b. at dormer walls and ceilings
- c. at knee walls and ceilings with cold spaces above
- d. all of the above
- e. none of the above

#### 38. Insulation between floor joists can be secured

- a. with staples
- b. with gypsum board
- c. with wire fasteners, lacing, mesh, or screen
- d. none of the above

#### 39. Unfaced insulation for masonry walls with furring strips should always be

- a. inset stapled
- b. face stapled
- c. pressure fit
- d. kept 6 in. away from the top and bottom of the wall

#### 40. When insulating masonry or concrete walls with framing

- a. faced or unfaced insulation may be used
- b. insulation can be face or inset stapled
- c. faced insulation must be covered
- d. all of the above
- e. none of the above

#### 41. When insulating crawlspaces

- a. never extend insulation onto the ground cover
- b. always use insulation faced with a vapor retarder
- c. keep insulation away from the sill plate
- d. insulate the band joists separately

## 5 Insulating Around Obstructions

### GENERAL

It is difficult to describe every situation that will be encountered by the insulation installer. In general, however, the installer should be guided by the need to reduce heat flow around or through obstructions to protect mechanical systems.

### ELECTRICAL

Junction boxes for wall switches and convenience outlets at outside walls should be insulated between the rear of the box and the sheathing. Place insulation behind the junction box and cut insulation to fit snugly around it (Figure 19).

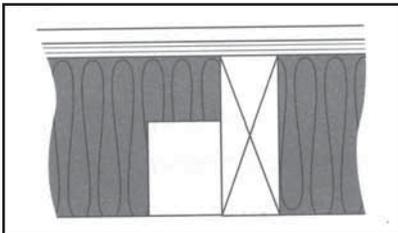


Figure 19

Where electrical wiring passes through a stud cavity and is located close to the inside wall surface, insulation should be pressed behind the wiring. When the wiring is in the center of the cavity, either a shallow cut in the insulation may be used to allow the wiring to pass through the insulation or it may be split lengthwise and the wiring sandwiched within (Figures 20 and 21).

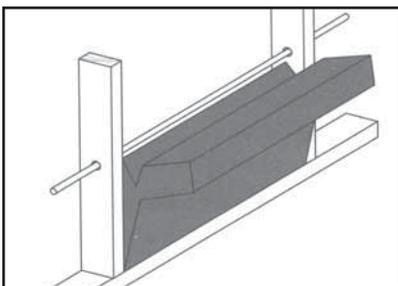


Figure 20

The National Electrical Code contains the following recessed lighting fixture requirements: "Thermal insulation shall not be installed within 3 in. of the recessed fixture enclosure, wiring compartment or ballast and shall not be so installed above the fixture as to entrap heat and prevent the free circulation of air unless the fixture is otherwise approved for the purpose." The recommendations of the NEC do not apply to IC light fixtures.

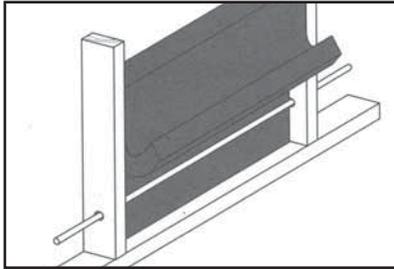


Figure 21

### PLUMBING

Insulation should be placed between the piping in exterior walls and the exterior wall sheathing (Figure 22). Sidewalls where plumbing fixtures are to be placed must be insulated after plumbing is installed but before the fixtures are installed. To guard against pipes freezing, insulation should never be placed between piping and the warm side of the wall.

### AIR DUCTS

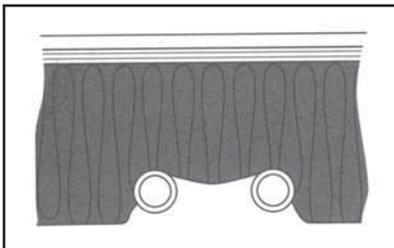


Figure 22

Any air duct in an unconditioned space must be insulated. Insulated air ducts contribute to the home's overall indoor environment by delivering heated and cooled air at designated temperatures and absorbing noise generated by central air conditioning equipment, air rush and cross-talk. In addition, insulated air ducts control the heat loss or gain through the air duct walls.

If an air duct runs through an unconditioned space such as an attic, crawlspace, or an exterior wall, either insulate it with duct wrap or apply batt insulation between the duct and the wall sheathing. In addition to duct wrap, CertainTeed manufactures fiber glass duct board for this application.

### OPENINGS THROUGH BUILDING SECTIONS

Where pipes, wiring, or ductwork penetrate a building section, insulation or a sealant (caulking) should be packed tightly into the openings to reduce air infiltration.

### SELF-TEST #4: INSULATING AROUND OBSTRUCTIONS

42. Junction boxes for outlets and switches
  - a. should be insulated between the rear of the box and the sheathing
  - b. should never be insulated
  - c. should be insulated before the boxes are installed
  - d. may be insulated only with unfaced insulation
43. Walls with wiring can be insulated
  - a. between the wiring and the outside wall
  - b. by sandwiching the wiring into cut insulation
  - c. with faced or unfaced insulation
  - d. all of the above
  - e. none of the above
44. The National Electrical Code stipulates that insulation
  - a. be no closer than 3 in. to a recessed lighting fixture
  - b. be no closer than 6 in. to a recessed lighting fixture
  - c. be no closer than 9 in. to a recessed lighting fixture
  - d. there is no recommendation for insulating around fixtures
45. Walls are insulated
  - a. after plumbing is installed
  - b. only with faced insulation
  - c. before plumbing is installed
  - d. walls with plumbing are not insulated
46. Insulated air ducts
  - a. deliver heated and cooled air at the proper temperatures
  - b. absorb noise generated by central air, air rush and cross talk
  - c. control heat loss or gain through duct walls
  - d. all of the above
  - e. none of the above

## 6 Vapor Retarders

### WHAT IS A VAPOR RETARDER?

A vapor retarder is a material that adequately retards the transmission of water vapor under specified conditions. The permeance of an adequate retarder for residential construction will not exceed 1 perm at 25% RH (The perm is a measure of the flow of water vapor through a material.)

### WHAT DOES A VAPOR RETARDER DO?

Occupants of buildings, certain appliances, and plumbing equipment generate moisture that is carried in the air as vapor. As moisture vapor moves from a warm interior through construction materials to a cooler surface, the moisture may condense as water, which could damage the building. It is for this reason that vapor retarders, which retard the flow of moisture through construction materials, are installed in buildings. By locating vapor retarders on the side of the insulation toward the warm living area, moisture vapor is kept away from cold surfaces on which it might condense to water.

### VAPOR RETARDER-FACED INSULATION

The vapor retarder facing should usually be installed facing the interior of the building. This means that in ceilings the vapor retarder faces down, in walls it faces the inside, and in floors over unheated spaces it faces up. In hot, humid (Gulf Coast) climates, vapor retarders can be installed facing the outside. Check local practices and/or building codes.

### WHEN IS A VAPOR RETARDER REQUIRED?

Good construction practice calls for installing a vapor retarder in walls of all new buildings in colder climates. Local building practice should be followed with regard to the need for vapor retarders in ceilings. In general, a well ventilated attic will not require a vapor retarder.

### CAUTIONS

Always follow these rules when working with vapor retarder-faced insulation:

- Standard vapor retarders are combustible and should not be left exposed. For this reason they must always be covered. (Only special low flame-spread vapor retarder facings can be left exposed.) Included are such spaces as garages, storage rooms,

utility rooms, and laundries. Covering standard vapor retarders is a requirement of the model codes issued by Building Officials and Code Administrators International, the International Conference of Building Officials, the Southern Building Code Congress International, and the International Code Council. To comply with the codes, interior finish materials must have flame spread ratings of 200 or less. Standard vapor retarders should also be covered in areas not ordinarily occupied but accessible for service work. Gypsum board is commonly used. CertainTeed prints on all combustible vapor retarders statements that the vapor retarder is flammable (will burn) and should not be left exposed. Special care must be taken to keep open flames and other sources of heat away from the facing.

- Batts and rolls may be installed one on top of the other in ceilings where there is adequate space. Only the bottom layer should have a vapor retarder, which should face down toward the living space. Additional layers normally should be unfaced. If unfaced insulation is not available, use the faced type but remove the facing completely or slash it before installing it.
- Repair damaged vapor retarders. Rips or tears in the vapor retarder facing may be repaired by covering the damaged area with scrap vapor retarder material and taping it in place or, in the case of small rips, by using duct tape or polyvinyl tape.

### OTHER VAPOR RETARDER MATERIALS

Separate vapor retarders are used in some constructions. When required, a separate vapor retarder should be installed on the interior side of the framing. (In hot, humid climates, vapor retarders are sometimes omitted or installed outside the insulation.) CertainTeed MemBrain™ Smart Vapor Retarder and Air Barrier Film or 4-mil or thicker polyethylene sheeting, available in foils, is placed horizontally and stapled to the face of the framing. If more than one sheet is required, overlap the sheets across two framing members. Foil-backed gypsum board is also an effective vapor retarder.

\* To learn more about MemBrain™ Smart Vapor Retarder and Air Barrier Film, visit [www.certainteed.com/membrain](http://www.certainteed.com/membrain)

### GROUND COVERS

Where the floor of a crawlspace is soil or gravel, a ground cover should be used to limit the evaporation of water moving from damp soil into a crawlspace. It is recommended that a ground cover be 4-mil or thicker polyethylene film or 55-lb. or heavier asphalt roll roofing, laid on the floor and up the walls approximately 6 in. The joints of the ground cover should lap at least 12 in. Overlaps and edges should be held in place by scrap brick, rocks or other suitable material.

### SELF-TEST #5: VAPOR RETARDERS

#### 47. Vapor retarders

- reduce the flow of noise
- are never installed in hot, humid climates
- are located on the cold-in-winter side of the wall
- keep moisture vapor away from cold surfaces

#### 48. Standard vapor retarders must be covered because they

- attract vermin
- are unsightly
- deteriorate over time
- will burn

#### 49. When batts and rolls are installed one on top of the other

- only the bottom layer (warm side) should have a vapor retarder
- only the top layer (cold side) should have a vapor retarder
- both layers should have vapor retarders

#### 50. When a separate vapor retarder is required, it should be installed

- usually on the cold-in-winter side of the framing
- usually on the warm-in-winter side of the framing
- on both sides of the insulation
- separate vapor retarders should never be used with insulation

#### 51. In crawlspaces, ground cover

- reduces the evaporation of water from damp soil into the crawlspace
- can be polyethylene or asphalt roll roofing
- should overlap at least 12 in.
- all of the above
- none of the above

# 7 On The Job

## SCHEDULING YOUR WORK

Construction debris must be removed from spaces to be insulated. Insulation should be installed just before the interior finish is applied. This means that the following work, as applicable, has been performed.

- Foundation walls are in place. Sidewalls, floors, roof and ceiling have been framed.
- Roofing is finished and doors, windows, sub-flooring and sheathing are in place.
- Plumbing, wiring (including telephone and other low-voltage wiring) and heating, ventilating and air conditioning work have been completely roughed in. If any part of this work is done following the installation of the insulation, the vapor retarder may be damaged and gaps may be made in the insulation. Openings in the insulation or vapor retarder will reduce the effectiveness of the material.

In some constructions, it will be necessary to install part of the insulation before the sheathing is applied or before the mechanical or electrical work is roughed-in. These are areas that will be impossible or difficult to insulate after, such as where plumbing fixtures are next to outside walls and at soffits or overhangs.

Where attics are accessible, ceiling insulation may be installed from the attic space after the ceiling finish is in place. Many roofs, however, are of shallow pitch, making it difficult to insulate the outer edges of the ceiling from above. The work, therefore, is best accomplished before the ceiling finish is installed.

Floors over unheated spaces that will not receive a bottom surface may be insulated at any time after the subflooring and mechanical and electrical work are complete.

## CLOTHING

When installing fiber glass insulation:

- Wear a long-sleeved shirt loose at the neck and wrists, long pants, gloves and cap.
- Wear eye protection (safety goggles, safety glasses or a face shield, or a combination of these, as appropriate).
- Use a NIOSH/MSHA-approved disposable dust respirator, such as a 3M model #8710 or #9900 or equivalent. An appropriate training and fit testing program must be incorporated into a respiratory protection program. For more detailed information on recommended work practices, contact CertainTeed at 800-233-8990.

## EQUIPMENT

The best knife for cutting insulation is one with a serrated blade. If you use a standard utility knife, replace the blade periodically as it tends to dull during use. You may prefer other equipment, but keep it sharp enough to cut cleanly.

## SELF-TEST #6: ON THE JOB

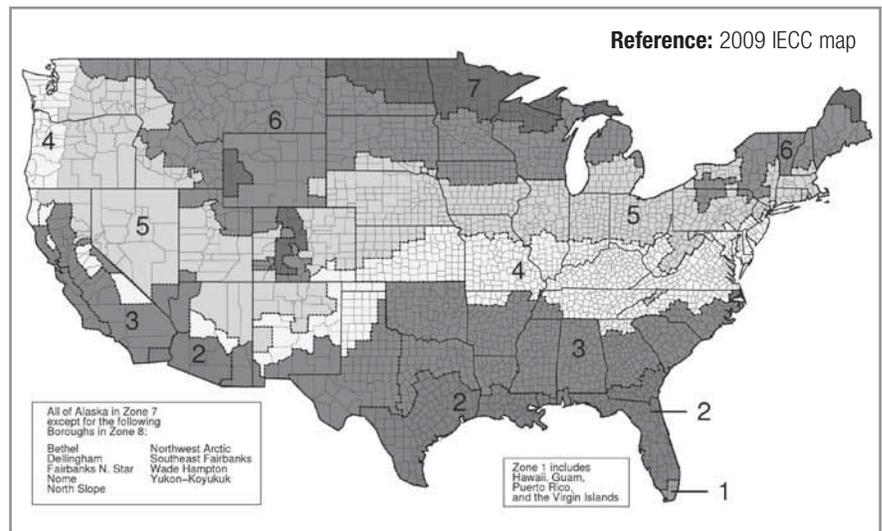
52. Insulation should be installed
  - a. before electrical wiring has been installed
  - b. before the framing is complete
  - c. before the interior finish is applied
  - d. after the interior finish is applied
53. Plumbing, wiring (including telephone) and HVAC work should be roughed in before insulation is installed.
  - a. true
  - b. false
54. Shallow pitch roofs are easiest to insulate
  - a. before the rafters are in place
  - b. after the ceiling finish is installed
  - c. before the ceiling finish is installed
55. When installing fiber glass insulation, wear a long-sleeved shirt tight at the wrist and neck.
  - a. true
  - b. false
56. When installing fiber glass insulation, appropriate eye protection includes
  - a. safety goggles
  - b. safety glasses
  - c. face shield
  - d. any of the above
  - e. none of the above
57. When selecting a dust respirator, look for one that is approved by
  - a. the NIH
  - b. the NFL
  - c. HUD
  - d. NIOSH

## 8 Material Specifications & Thermal Recommendations

Material quality is extremely important to the safety and effectiveness of installed insulation. CertainTeed fiber glass insulation meets the requirements of the current edition of ASTM C665 Standard Specification for Mineral Fiber Blanket Thermal Insulation, and our products are audited by the NAHB Research Center to verify R-Value.

When building a new home, consumers and builders alike should make sure their homes are insulated to save energy and to provide more comfortable living.

The R-Value table at right is our interpretation of the latest IECC requirements and should be used as a guide for evaluating the energy efficiency of new detached one- and two-family residential buildings. The zone map approximates the major climate zones in the United States.



### 2009 IECC R-VALUE BY ZONE

ZONE	Ceiling	Wood Wall	Mass Wall	Floor	Basement Wall	Slab	Crawlspace	Vapor Retarder
1	R-30	R-13	R-3/4	R-13	R-0	R-0	R-0	N/A
2	R-30	R-13	R-4/6	R-13	R-0	R-0	R-0	N/A
3	R-30	R-13	R-5/8	R-19	R-5/13	R-0	R-5/13	N/A
3 Warm-Humid	R-30	R-13	R-5/8	R-19	R-0	R-0	R-5/13	N/A
4	R-38	R-13	R-5/10	R-19	R-10/13	R-10, 2 ft	R-10/13	N/A
4 Marine	R-38	R-20 or 13+5	R-13/17	R-30 (or fill cavity, min. R-19)	R-10/13	R-10, 2 ft	R-10/13	N/A
5	R-38	R-20 or 13+5	R-13/17	R-30 (or fill cavity, min. R-19)	R-10/13	R-10, 2 ft	R-10/13	N/A
6	R-49	R-20 or 13+5	R-15/19	R-30 (or fill cavity, min. R-19)	R-15/19	R-10, 4 ft	R-10/13	N/A
7	R-49	R-21	R-19/21	R-38 (or fill cavity, min. R-19)	R-15/19	R-10, 4 ft	R-10/13	N/A
8	R-49	R-21	R-19/21	R-38 (or fill cavity, min. R-19)	R-15/19	R-10, 4 ft	R-10/13	N/A

## 9 Installation Basics Self-Test Answer Key

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- |       |       |       |
|-------|-------|-------|
| 1. d  | 20. b | 39. c |
| 2. c  | 21. b | 40. d |
| 3. b  | 22. b | 41. d |
| 4. a  | 23. a | 42. a |
| 5. c  | 24. d | 43. d |
| 6. c  | 25. b | 44. a |
| 7. b  | 26. b | 45. a |
| 8. a  | 27. a | 46. d |
| 9. b  | 28. b | 47. d |
| 10. d | 29. a | 48. d |
| 11. d | 30. b | 49. a |
| 12. b | 31. d | 50. b |
| 13. c | 32. c | 51. d |
| 14. c | 33. a | 52. c |
| 15. d | 34. d | 53. a |
| 16. d | 35. a | 54. c |
| 17. c | 36. c | 55. b |
| 18. a | 37. d | 56. d |
| 19. d | 38. c | 57. d |

## 10 Fiber Glass Insulation Installation Basics Exam

Now that you've reviewed the Insulation Installation Instructions chapters, watched "The Right Way to Insulate," and completed the Self-Tests at the end of each section, you are ready to take this exam.

Answer all questions with the best possible answer. Select one answer for each question. If you're unsure of the answer, review the material before proceeding. Indicate your answers on the perforated answer sheet by

shading in the appropriate circle. If you make a mistake or change your mind, please erase completely before shading another circle.

When you've answered all the questions, fill in your name and mailing information and return the exam to us. The perforated answer sheet is a postage-paid self mailer. Just tape it closed and drop it in the mail. Please allow four to six weeks for processing.

To pass, you must answer 36 of the 40 questions correctly. If you fail to pass the exam the first time you take it, you can keep trying until you pass.

When you answer 36 of the 40 questions correctly, you will receive a personalized Certificate of Completion, ready to be framed and used to promote your professional services.

1. The stapling flange on insulation is composed of
  - a. the facing
  - b. shims
  - c. a single 3-mil Mylar strip
  - d. a double 3-mil Mylar strip
2. CertainTeed manufactures the following for 2 x 4 stud construction
  - a. R-11 insulation
  - b. R-13 insulation
  - c. R-15 insulation
  - d. all of the above
  - e. none of the above
3. Insulation is often faced with
  - a. PVC
  - b. polystyrene
  - c. a vapor retarder
  - d. insulation with a low R-Value
4. When insulation is face stapled
  - a. the flanges are tucked under the insulation
  - b. the flanges overlap the framing and are stapled to it
  - c. the flanges are removed and the insulation stapled through the batt
  - d. the flanges invariably get in the way
5. The knee walls of attic spaces finished as living spaces
  - a. should never be insulated
  - b. should be insulated
  - c. must be ventilated
6. Cantilevers can be overlooked if they are closed.
  - a. true
  - b. false
7. In cathedral ceilings, insulation should be installed
  - a. on the roof sheathing
  - b. on the ceiling
  - c. between the rafters
  - d. cathedral ceilings are not insulated
8. Rolls of insulation are
  - a. 16 or 24 in. wide
  - b. up to 70 ft. long
  - c. available in special lengths for steel studs
  - d. all of the above
  - e. none of the above
9. The R-Value of CertainTeed unfaced insulation will be
  - a. printed on the batt or roll
  - b. printed on packaging
  - c. on a hang tag
  - d. both a and b
10. Insulation in floor joists can be secured
  - a. with staples
  - b. with tape
  - c. with wire fasteners, lacing, mesh, or screen
  - d. none of the above
11. For remodeling and light construction, fiber glass insulation is supplied as
  - a. batts only
  - b. batts and rolls only
  - c. batts, rolls, and loose fill
12. A batt is a precut piece of insulation
  - a. 16 to 24 in. long
  - b. without facing
  - c. 47 to 96 in. long
  - d. 70 ft. long
13. Unfaced insulation for masonry walls with furring strips should always be
  - a. inset stapled
  - b. face stapled
  - c. pressure fit
  - d. kept 6 in. away from the top and bottom of the wall
14. Insulation should be installed
  - a. before electrical wiring has been installed
  - b. before framing is complete
  - c. before the interior finish is applied
  - d. after the interior finish is applied
15. The "R" in R-Value stands for
  - a. rating
  - b. resistance to vermin
  - c. resistance to heat flow
  - d. resistance to moisture
16. Unfaced batt insulation is sometimes
  - a. made narrower than faced insulation for easy installation
  - b. made wider than faced insulation for pressure fitting between framing
  - c. not identified according to R-Value
  - d. blown into walls
17. Junction boxes for outlets and switches
  - a. should be insulated between the rear of the box and sheathing
  - b. should never be insulated
  - c. should be insulated before the boxes are installed
  - d. may be insulated only with unfaced insulation
18. Walls with wiring can be insulated
  - a. between the wiring and the outside wall
  - b. by sandwiching the wiring into cut insulation
  - c. with faced or unfaced insulation
  - d. all of the above
  - e. none of the above

19. Vapor retarders
- usually consist of asphalt-coated kraft paper, aluminum foil, or plastic film
  - resist the movement of moisture to cold surfaces
  - prevent condensation on insulation
  - all of the above
  - none of the above
20. The National Electrical Code stipulates that insulation
- be no closer than 3 in. to unrated recessed lighting fixtures
  - be no closer than 6 in. to unrated recessed lighting fixtures
  - be no closer than 9 in. to unrated recessed lighting fixtures
  - there is no recommendation for insulation around unrated fixtures
21. In addition to its thermal benefit, insulation improves
- moisture retention
  - sound attenuation and fire resistance
  - the appearance of a home
  - insured value
22. High-performance batts
- don't need to be stapled if they fit snugly
  - need to be stapled every 6 in.
  - will compress after a year
  - shouldn't be pressure fit
23. When insulating narrow-framed cavities, cut the faced insulation
- .5 in. narrower than the cavity
  - .5 in. wider than the cavity
  - 1 in. narrower than the cavity
  - 1 in. wider than the cavity
24. When installing insulation in walls
- start from the top and work down
  - start from the bottom and work up
  - start in the middle and work toward the sides
  - don't butt the batts against each other
25. Walls are insulated
- after plumbing is installed
  - only with faced insulation
  - before plumbing is installed
  - walls with plumbing are not insulated
26. Insulated air ducts
- deliver heated and cooled air at proper temperatures
  - absorb noise generated by central air, air rush, and cross talk
  - control heat loss or gain through duct walls
  - all of the above
  - none of the above
27. Vapor retarders
- reduce the flow of noise
  - are never installed in hot, humid climates
  - are located on the cold-in-winter side of the wall
  - keep moisture vapor away from cold surfaces
28. When inset stapling batts, the outside edge of the flange should be
- .75 in. into the framing cavity
  - flush with the face of the framing
  - .75 in. above the face of the framing
  - tucked under the insulation in the framing cavity
29. It's a good idea to insulate
- the walls of basements
  - the floors above crawlspaces
  - around slabs on grade
  - all of the above
  - none of the above
30. Compressing insulation to fit a cavity increases its stated R-Value.
- true
  - false
31. When batts and rolls are installed one on top of the other
- only the bottom layer (warm side) should have a vapor retarder
  - only the top layer (cold side) should have a vapor retarder
  - both layers should have vapor retarders
32. Insulating power is rated according to
- U-Value
  - heating degree day
  - R-Value
  - BTU
33. When installing CertainTeed faced insulation in wood framing members
- you should not use the CertainTeed-approved method
  - use one of the three commonly accepted methods
  - the installation method will be specified by the homeowner
  - all of the above
  - none of the above
34. R-19, R-21, or R-22 insulation is recommended for
- 2 x 4 stud construction
  - 2 x 6 stud construction
  - steel stud construction
  - all of the above
  - none of the above
35. In crawlspaces, ground cover
- reduces the evaporation of water from damp soil into the crawlspace
  - can be polyethylene or asphalt roll roofing
  - should overlap at least 12 in.
  - all of the above
  - none of the above
36. Plumbing, wiring (including telephone), and HVAC work should be roughed in before insulation is installed.
- true
  - false
37. When installing fiber glass insulation, wear a long-sleeved shirt tight at the wrists and neck.
- true
  - false
38. Attics that are used as living spaces should be insulated
- between collar beams and rafters
  - at dormer walls and ceilings
  - at knee walls and ceilings with cold spaces above
  - all of the above
  - none of the above
39. Shallow pitch roofs are easiest to insulate
- before the rafters are in place
  - after the ceiling finish is installed
  - before the ceiling finish is installed
40. Where soffit vents are used for attic ventilation
- there should be about 1 in. of unblocked air space between the sheathing and the insulation
  - only loose fill insulation should be used
  - never insulate
  - avoid installing baffle boards

# Answer Sheet For Installation Basics Exam

Indicate your answer by filling in the appropriate circle. Fill in each circle completely. If you make a mistake or change your mind, erase completely before shading in a second circle. Answers can be mailed to CertainTeed using this self-mailer or faxed to (610) 254-5436.

	<u>a</u>	<u>b</u>	<u>c</u>	<u>d</u>	<u>e</u>		<u>a</u>	<u>b</u>	<u>c</u>	<u>d</u>	<u>e</u>		<u>a</u>	<u>b</u>	<u>c</u>	<u>d</u>	<u>e</u>
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Name \_\_\_\_\_ Title \_\_\_\_\_

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Business Address \_\_\_\_\_

City/State/Zip \_\_\_\_\_

Business Telephone \_\_\_\_\_ E-mail \_\_\_\_\_

Website Address \_\_\_\_\_

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Remodeler/Business Owner

Builder

Architect

Distributor

Other \_\_\_\_\_

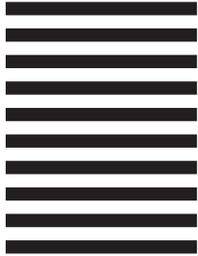
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