



Building Industry Institute

BII-SOW

## Quality Installation of Insulation: Subcontractor Scope of Work

### Introduction

The purpose of envelope insulation is to provide a continuous thermal barrier to minimize heat flow through the walls, ceiling and floor. The home will not be as comfortable and energy costs will be increased if insufficient insulation is installed, or it is installed incorrectly, such as being compressed or installed with gaps. Insufficient and/or improperly installed insulation can lead to defect litigation. Furthermore, it is not difficult to install insulation correctly.

An air barrier is needed in all thermal envelope assemblies to prevent air movement. Insulation, other than foam, is not designed to stop air movement. For insulation installed horizontally, such as in an attic, the insulation must be in substantial contact with the assembly air barrier (usually the ceiling drywall) on one side for it to perform at its rated R-value. A wall or ceiling covering that has multiple leakage sites (such as 1 x 6 tongue and groove board ceilings) can not serve as an air barrier. Air-tight Thermal envelope assemblies (such as wall assemblies) shall be built to minimize air movement. Air movement can move unwanted heat and moisture through or into the assembly.

### California

When "High Quality Installation of Insulation" is included as a feature in energy calculations for California, the installer must complete a CF-6R for each home. Verification of installation quality is required by a HERS Rater with current certification by a California Energy Commission (CEC) approved Rater Provider. The HERS Rater must inspect using the CEC protocols and the HERS Rater must complete a CF-4R for each home.

### **Builder:**

Work with the architect and framer to minimize spaces that are difficult to insulate. This scope of work is meant to form the basis for both bidding and contracting. Include these materials in your bidding and contracting documents. Its use will help ensure consistent bids and quality installations. The Scope of Work is to be followed by the insulation contractors.

### **Contractor:**

Follow this Scope of Work

### **Field Superintendent:**

Check installation quality. If selected as a feature in the California energy calcs then verification is required by a certified HERS Rater.

### Criteria for a Quality Thermal Envelope

*Insulation shall:*

1. Provide a continuous barrier between the inside conditioned space and the outside;
2. Be installed to the proper R-value;
3. Be installed without gaps;
4. Be installed without excessive compression; and
5. Be properly labeled or be proper depth to indicate proper R-value.

### Insulation installation procedures to create a Quality Thermal Envelope

*The following steps should be followed in the installation of insulation to ensure efficiency and comfort*

1. Work with the architect and framer to minimize spaces that are difficult to insulate;
2. Use materials that meet California quality standards;
3. Install R-values that meet or exceed design specifications;
4. Install insulation to completely fill all cavities without gaps and with minimal compression;

Account for special characteristics of the materials used, such as settling, flammability, or water permeability;

## INSULATION INSTALLATION PROCEDURES

*Preparation note: when "High Quality Installation of Insulation" is selected as a feature in California energy calcs, wall stud cavities must be caulked or foamed to provide an air tight envelop.*

### BATT WALL INSULATION

Unfaced batt installation; batts shall be:

- correctly sized to fit snugly
- installed to completely fill the cavity side-to-side, top-to-bottom, and front-to-back.
- cut to fit properly – there should be no gaps, nor should the insulation be doubled-over or compressed
- non-standard-width cavities shall be filled by batt insulation cut approximately one inch (1") wider than the space to be filled.
- cut to butt-fit around wiring and plumbing, or be split (de-laminated) so that one layer can fit behind the wiring or plumbing and one layer fit in front

Faced batt installation, where used as a vapor barrier: additional instructions:

- facing should be placed toward living spaces

Inset stapling:

- Batts with flanges that are inset stapled to the side of the stud must be flush with the face of the cavity (or protrude beyond) except for the portion that is less than two inches from the edge of the stud. The void created by the flange inset shall not extend more than two inches from the stud on each side.

Stud face stapling:

- faced insulation must be properly stapled over the face of the studs; it must be continuous with no penetrations
- stapling: the batt flange should be stapled to the face of the framing; flanges from adjacent cavities should overlap per manufacturers specifications on facing
- each batt should be stapled approximately every eight (8) inches, or according to manufacturers specifications on facing
- all tears or breaks in the facing six (6) inches or longer shall be sealed with duct tape or other waterproof tape. Tears and breaks in the facing should be minimal.

Narrow-framed cavities and "chinking:"

- non-standard-width cavities shall be filled by batt insulation cut approximately one inch (1") wider than the space to be filled.
- narrow spaces (2" or less) at windows, between studs at the building's corners, and at the intersections of partitions and walls shall be filled with small pieces of insulation; care should be taken not to compress the insulation

Special situations:

Installations prior to exterior sheathing or lath

- all exterior channels (e.g., at wall junctions and corners) must be filled with insulation
- all exterior walls adjacent to tubs and showers must be filled with insulation

Obstructions

- insulation shall be cut to fit around wiring and plumbing without compression
- insulation shall be placed between the sheathing and the rear of electrical boxes
- insulation shall be cut to fit around junction boxes
- in cold climates water pipes shall have at least two thirds of the insulation between the water pipe and the outside. If the pipe is near the outside, as much insulation as possible shall be placed behind the pipe and no insulation shall be placed between the pipe and the inside.

Rim joists

- all rim joists shall be insulated to the same R-value as the walls
- as necessary, insulation shall be cut to fit into the rim joist
- an alternative to fitting insulation in a web truss located at the rim joist is to completely cover the truss with insulation, snug to the upper and lower floors

Knee walls and Skylight shafts with framing that will support insulation

- all knee walls and skylight shafts shall be insulated to a minimum of R-19.
- the insulation shall be installed without gaps and with minimal compression

- for steel-framed knee-walls and skylight shafts, external surfaces of steel studs must be covered with batts or rigid foam unless otherwise specified on the CF-1R using correct U-factors from the CEC Joint Appendix IV, Table IV-11

Knee walls and Skylight shafts without framing that will support insulation

- for steel-framed knee-walls and skylight shafts, external surfaces of steel studs must be covered with batts or rigid foam unless otherwise specified on the CF-1R using correct U-factors from the CEC Joint Appendix IV, Table IV-11
- the house side of the insulation shall be in contact with the drywall or other wall finish. The attic side shall be covered with, and supported by a facing rated for attic exposure to stop air intrusion into the insulation.

HVAC/Plumbing closet

- insulate all walls of interior closets for HVAC and/or water heating equipment the same R-value as the exterior walls

## **BATT CEILING INSULATION**

Unfaced batt installation:

- batts shall be correctly sized to fit snugly at the sides and ends
- batts should fill the cavity
- where necessary, batts shall be cut to fit properly – there should be no gaps, nor should the insulation be doubled-over or compressed. When batts are cut to fit a non-standard cavity, they should be cut to be one inch (1") wider than the cavity.
- batts should be cut to butt-fit around wiring and plumbing, or be split (de-laminated) so that one layer can fit behind the wiring or plumbing and one layer fit in front
- for batts that are taller than the trusses, full-width batts should be used so that they expand to touch each other over the trusses
- the insulation must cover the wall top plates
- hard covers or draft stops should be placed over all deep drops and interior wall cavities to keep insulation in place and sealed to stop air movement. If hard covers or draft stops are missing or incomplete, they should be completed before insulation is completed.
- required ventilation must be maintained: for eaves or soffit vents, one-inch (1") of unblocked free air space between the roof sheathing and the insulation is required.
- where necessary, use baffles to keep the insulation from blocking the passage of air
- insulation shall cover all IC rated lighting fixtures
- fixtures that are not IC rated (e.g., halogen lamps, heat lamps) need to be enclosed in an airtight box that meets fire codes, and the box covered with insulation. If fixtures are not IC rated and not enclosed in such a box, they should be replaced or boxed before insulation is completed.

*Note: when "High Quality Installation of Insulation" is selected as a feature in California energy calcs, all recessed light fixtures that penetrate the ceiling must be IC and air tight (AT) rated plus sealed with a gasket or caulk between the housing and ceiling.*

Faced batt installation, where used as a vapor barrier: additional instructions:

- facing should be placed toward living spaces
- stapling: the batt flange is stapled to the face of the framing; flanges from adjacent cavities should overlap
- each batt should be stapled approximately every eight inches (8") or per manufacturer's specifications on the facing
- all tears or breaks in the facing six inches (6") or longer shall be sealed with appropriate tape approved by the insulation manufacturer. Tears and breaks in the facing should be minimal.

Special situations:

Insulation at bridging (cross bracing)

- batts shall be split lengthwise at the center and packed half into the lower opening and half into the upper opening of bridging (cross bracing) of ceiling and/or floor joists
- alternatively, insulation is butted to the bridging and the space is filled with scrap insulation

Rafter ceilings

- an inch of air space should be maintained between the insulation and roof sheathing, if necessary to meet local codes
- facings and insulation should be kept three inches (3") away from heated flue pipes or chimneys; follow flue manufacturer's recommendations

#### HVAC platform

- verify that appropriate batt insulation is placed below any plywood platform or walks for HVAC equipment installation and access

#### Attic access

- permanently attach rigid foam or a batt of insulation to the access cover using adhesive or mechanical fastener

### **BLOWN-IN CEILING INSULATION**

- baffles must be placed at eaves or soffit vents to keep insulation from blocking attic ventilation; required ventilation must be maintained: for eaves or soffit vents, one-inch (1") of unblocked free air space between the roof sheathing and the insulation is required.
- hard covers or draft stops must be placed over all deep drops and interior wall cavities to keep insulation in place and sealed to stop air movement. If hard covers or draft stops are missing or incomplete, they should be completed before insulation is completed.
- small, inaccessible openings shall be hand packed with pieces of batt insulation
- attic rulers appropriate to the material installed must be placed around attic to verify depth: 1 ruler for every 250 square feet, evenly distributed around the attic and clearly readable from the attic access. The rulers shall be scaled to read inches of insulation and the R-value installed
- insulation shall be blown to a uniform thickness throughout the attic, with no high or low spots
- labels from the insulation bags should be cut out and stapled to a truss vertical near the attic opening
- insulation must go underneath and on both sides of obstructions such as cross-bracing and wiring
- insulation shall be applied all the way to the outer edge of the wall top plate
- insulation shall cover IC rated lighting fixtures
- fixtures that are not IC rated (e.g., heat lamps) need to be enclosed in a drywall box and the box covered with insulation. If fixtures are not IC rated and not enclosed in a drywall box, they should be replaced or boxed before insulation is completed.

*Note: when "High Quality Installation of Insulation" is selected as a feature in California energy calcs, all recessed light fixtures that penetrate the ceiling must be IC and air tight (AT) rated plus sealed with a gasket or caulk between the housing and ceiling.*

- there shall be no excessive compression of insulation material
- clearances around fossil-fuel appliances and heat-exhaust vents shall follow local fire protection codes
- no insulation or facing shall be placed in air spaces surrounding metal chimneys or fireplaces; follow manufacturer's recommendations
- batt or rigid foam insulation shall be installed in areas where blown-in insulation has not been applied, such as access panels and doors

#### Special situations:

##### HVAC platform

- pressure-fill the areas under any plywood platform or walks for HVAC equipment installation and access or verify that appropriate batt insulation has been installed

##### Attic access

- permanently attach rigid foam or a batt of insulation that is equal or exceeds the R-value of the insulation on the attic floor to the access cover using adhesive or mechanical fastener

### **RAISED FLOORS AND FLOORS OVER GARAGES**

- batts must be correctly sized to fit snugly at the sides and ends, but not be so large as to buckle – batts should be no more than one inch (1") wider than the cavity
- batts must be cut to fit properly – there should be no gaps, nor should the insulation be doubled-over or compressed
- batts should fill the cavity
- batts should be cut to butt-fit around wiring and plumbing, or be split (de-laminated) so that one layer can fit behind the wiring or plumbing and one layer fit in front
- insulation shall be in contact with an air barrier – usually the subfloor
- where there is an air space between the insulation and flooring, the headers and band-joists must be insulated
- if faced, facing should be placed toward living spaces and be in contact with the underside of the floor sheathing. Continuous support shall be provided to keep the facing in contact with the floor sheathing.

**MATERIALS Shall:**

- comply with Uniform Building Code (including but not limited to 1997 UBC Section 707) and installed to meet all applicable fire codes
- meet CA Quality Standards for Insulating Material, Title 24, Chapter 4, Article 3 listed in the California Department of Consumer Affairs Consumer Guide and Directory of Certified Insulating Materials
- comply with flame spread rating and smoke density requirements of Sections 2602 and 707 of the Title 24, Part 2: All exposed installations must use fire retardant facings which have been tested and certified not to exceed a flame spread of 25 and a smoke development rating of 450. Insulation facings that do not touch a ceiling, wall, or floor surface and faced batts on the undersides of roofs with an air space between the ceiling and facing are considered exposed applications.
- be installed according to manufacturer specifications and instructions

**R-VALUE AND U-VALUE SPECIFICATIONS:**

See CF-1R for minimum requirements using correct U-factors from the CEC Joint Appendix IV, Table IV-11

**CERTIFICATES:**

For California, an Installation Certificate (CF-6R, formerly IC-1) signed by the responsible party shall be provided that states that the installation is consistent with the plans and specifications for which the building permit was issued. The certificate shall also state the installing company name, insulation manufacturer's name and material identification, the installed R-value, and, in applications of blown-in insulation, the minimum installed weight-per-square-foot consistent with the manufacturer's labeled installed-design-density for the desired R-value.