



CERTIFICATE OF INSTALLATION		CF2R-ENV-21-H
Quality Insulation Installation (QII) –Air Infiltration Sealing - Framing Stage for Batt, Loose Fill, and SPF (Page 1 of 3)		
Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City:	Zip Code:

A. AIR INFILTRATION AND INSULATION INSTALLATION (QII) - FRAMING STAGE

01	The requirements below cover the required air sealing and installation of insulation that must occur in the framing stage.
02	Spray Foam Insulation (SPF) can be considered an air barrier when SPF covers the possible leakage area to a thickness of 5.5 inches for open cell SPF (ocSPF) and 2.0 inches for closed cell SPF (ccSPF).
The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.	

B. RAISED FLOOR

01	All gaps in the raised floor are sealed.
02	All chases sealed at floor level using a hard cover and the hard covers are sealed.
03	All Plumbing and electrical wires that penetrate the floor are sealed.
04	Subfloor sheathing is glued or sealed at all exterior panel edges, to create a continuous air tight subfloor.
The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.	

C. WALLS/KNEE WALLS

01	All penetrations through the exterior wall air barrier are sealed to provide an air-tight envelope to unconditioned spaces such as the outdoors, attic, garage and crawl space.
02	Exterior wall air barrier is sealed to the top plate and bottom plate in each stud bay.
03	All electrical boxes including knockouts that penetrate the air barrier to unconditioned space are sealed.
04	All openings in top and bottom plate, including all interior and exterior walls, to unconditioned space are sealed. Such as holes drilled for electrical and plumbing.
05	Exterior bottom plates (all stories) are sealed to the floor using the appropriate sealing method under the entire exterior bottom plate of the home.
06	All gaps around windows and doors are sealed. Proper sealant used was specified by window manufacturer.
07	Rim Joists all gaps/openings fully sealed.
08	Fan exhaust ducts that run between conditioned floors to exterior walls have a damper at the exterior wall.
09	Metal tie downs are insulated between exterior framing and tie down.
10	Insulation is installed in hard to access wall stud cavities, such as corner channels, wall intersections are insulated to the proper R-value prior to exterior sheathing, or the exterior stucco lath.
11	Insulation is installed behind tub, shower, fireplace enclosures, and exterior stairwells to the R-value listed on the CF1R when located against exterior walls. Insulation is required to be installed <u>before</u> tub, shower, and fireplace are installed.
12	A solid air barrier is installed on the interior wall from floor to ceiling before tub, shower, and fireplace enclosures are installed in exterior walls. Insulation in contact on all six sides of air barrier on exterior walls.
13	All window and door headers shall be insulated to a minimum of R-2. Using continuous rigid insulation sheathing, or SIP headers, or Two-member headers with insulation in between, or Single-member headers with insulation to the exterior.
14	Knee walls have solid and sealed blocking at the bottom, top, left side and right side of the knee wall.
The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.	

D. CEILING/ATTIC

01	For vented attics much of the ceiling air barrier is verified <u>after</u> the ceiling drywall is installed using the ENV-22.
02	For non-vented attics ensure all penetrations through the roof deck and gable ends are sealed and air tight.
03	All eave vents are covered with a rigid ventilation baffle that maintains the Net free-ventilation area.
04	All dropped ceilings/soffits are covered with hard covers and sealed to framing.
05	All chases are covered with hard covers and sealed to framing.
06	HVAC ducts that travel down a chase the chase is sealed at the ceiling level.
07	Chimney's and Flue's require sheet metal flashing. The flashing shall be sealed to the chimney/flue with fire rated caulk. The flashing shall be sealed to the surrounding framing.
08	All Eave/soffit baffles are installed to stop air movement around the baffle and into insulation. Net free-ventilation of the eave/soffit shall be maintained.
09	Double walls that open to attic are covered with an air barrier and cover has an air tight seal to the framing.
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E. CONDITIONED SPACE ABOVE OR ADJACENT TO GARAGE AIR BARRIER

01	All penetrations in the subfloor above the garage into conditioned space must follow the raised floor air barrier requirements above.
02	Infiltration between the space above the garage and subfloor is prevented by one of the following methods: <ul style="list-style-type: none"> Seal all edges of garage ceiling (typically drywall) at the perimeter of the garage to create a continuous air tight surface between the garage and adjacent conditioned envelope. Seal all plumbing, electric and mechanical penetrations between the garage and the adjacent conditioned space. For an open-web truss, airtight blocking is added on four sides of the garage perimeter. Insulation can be placed on the garage ceiling. Seal band joist above the wall at the garage to conditioned space transition. Seal all subfloor seams and penetrations between the conditioned space and the garage. Insulation must be placed in contact of subfloor below conditioned space.
The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.	

F. WALLS FOR ATTACHED PORCH, ATTIC, DOUBLE WALL

01	All walls that separate conditioned and unconditioned space includes a continuous air barrier on the interior and exterior wall.
02	Exterior wall, air barrier required at the intersection of the porch and exterior wall when there is conditioned space on the other side. The exterior wall where the attic attaches to the conditioned space does includes an air barrier.
03	Truss framing blocking is used at the top and bottom of each wall/roof section.
The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.	

G. CANTILEVERED FLOOR AIR BARRIER

01	Airtight blocking is installed between joists where the wall rim joist would have been located in the absence of a cantilever.
02	Exterior sheathing is installed to the bottom of the cantilever so that there is a continuous air and weather barrier for the cantilever. The cantilevered joist must be insulated to the same R value as would be required for the subfloor prior to closing.
03	Any gaps, cracks or penetrations in the air barrier of the cantilever are sealed. Can lights in the cantilever are IC and AT rated and properly sealed to sheathing.
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H. MULTIFAMILY AIR BARRIER

01	Multifamily buildings must meet all air sealing requirements for single family buildings listed above.
02	Each dwelling unit must be air sealed to stop air movement from one unit to another.
03	Floor AND Ceiling of each Dwelling Unit: All penetrations through the floor and ceiling of each unit are sealed including, electric and gas utilities, water pipes, drain pipes, fire protection service pipes, communication wiring.
04	Elevator penthouse, mechanical penthouse, stairwell doors, roof access hatch, plumbing stacks sealed to reduce air transfer from attached spaces.
05	Common Walls: Bottom plate between units is sealed to the subfloor. All penetrations in the common walls are sealed including electrical boxes, wiring and plumbing penetrations. Perpendicular Interior walls that open into the common walls are sealed.
06	Vertical Chases for garbage chutes, elevator shafts, and HVAC ducting plumbing must be sealed to the floor and ceiling of each unit to stop air movement up and around the chase due to stack effect.
07	Vertical Chases such as garbage chutes, elevator shafts, and HVAC ducting plumbing, wiring etc. must be sealed to stop air movement through the chase to the surrounding spaces.
08	Common Hallways – Penetrations between dwelling unit and common hallways are sealed including doors to the dwelling unit are gasketed or made substantially airtight.
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DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

1. I certify that this Certificate of Installation documentation is accurate and complete.

Documentation Author Name:	Documentation Author Signature:
Documentation Author Company Name:	Date Signed:
Address:	CEA/HERS Certification Identification (If applicable):
City/State/Zip:	Phone:

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

- The information provided on this Certificate of Installation is true and correct.
- I am eligible under Division 3 of the Business and Professions Code in the applicable classification to accept responsibility for the system design, construction, or installation of features, materials, components, or manufactured devices for the scope of work identified on this Certificate of Installation and attest to the declarations in this statement (responsible builder/installer), otherwise I am an authorized representative of the responsible builder/installer.
- The constructed or installed features, materials, components or manufactured devices (the installation) identified on this Certificate of Installation conforms to all applicable codes and regulations, and the installation conforms to the requirements given on the plans and specifications approved by the enforcement agency.
- I understand that a HERS rater will check the installation to verify compliance, and that if such checking identifies defects; I am required to take corrective action at my expense. I understand that Energy Commission and HERS Provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.
- I reviewed a copy of the Certificate of Compliance approved by the enforcement agency that identifies the specific requirements for the scope of construction or installation identified on this Certificate of Installation, and I have ensured that the requirements that apply to the construction or installation have been met.
- I will ensure that a registered copy of this Certificate of Installation shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a registered copy of this Certificate of Installation is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Builder/Installer Name:	Responsible Builder/Installer Signature:	
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)	Position With Company (Title):	
Address:	CSLB License:	
City/State/Zip:	Phone	Date Signed:
Third Party Quality Control Program (TPQCP) Status:	Name of TPQCP (if applicable):	

APPROVED MATERIALS

In order to be considered an air barrier, individual materials must have an air permeance not exceeding 0.004 cfm/ft² @ 1.57 lb/ft² (0.02 L/(s•m²) @ 75 Pa) when tested in accordance with ASTM E2178. Products must be installed per manufacturer instructions. Products that meet these requirements are listed below.

All joints/seams for materials that make up the air barrier must be sealed with caulk, foam, tape, or a material specifically designed for building envelope sealing to prevent air infiltration. Products must be installed per manufacturer instructions.

It is the installer's responsibility to ensure the products are installed properly, and it is the HERS rater's responsibility to verify proper installation.

Examples of Approved Air Barrier Materials:

- Plywood – minimum 3/8 inch
- Oriented Strand Board (OSB) – minimum 3/8 inch
- Foil-back polyisocyanurate insulation board – minimum 1/2 inch
- Extruded polystyrene insulation board – minimum 1/2 inch
- Foil backed urethane foam insulation (1 inch)
- Closed cell spray polyurethane foam with a minimum density of 2.0 lb./cu.ft. and a minimum thickness of 2.0 inches
- Open cell spray polyurethane foam with a minimum density of 0.4 to 1.5 lb./cu.ft. and a minimum thickness of 5 1/2 inches
- Exterior or interior gypsum board - minimum 1/2 inch
- Cement board - minimum 1/2 inch
- Built-up roofing membrane
- Modified bituminous roof membrane
- Particleboard - minimum 1/2 inch
- Fully adhered single-ply roof membrane
- Portland cement/sand parge, or gypsum plaster - minimum 5/8 inch
- Cast-in-place and precast concrete
- Fully grouted uninsulated and insulated concrete block masonry
- Sheet steel or aluminum
- Structural Sheathing – Meeting ASTM E2178
- Dimensional lumber
- House Wrap – Meeting ASTM E2178

LINE ITEMS ADDRESSED:

- C 01:** All penetrations through the exterior wall air barrier are sealed to provide an air-tight envelope to unconditioned spaces such as the outdoors, attic, garage, and crawl space.
- C 02:** Exterior wall air barrier is sealed to the top plate and bottom plate in each stud bay.
- C 03:** All electrical boxes including knockouts that penetrate the air barrier to unconditioned space are sealed.
- C 05:** Exterior bottom plates (all stories) are sealed to the floor using the appropriate sealing method.
- C 08:** Fan exhaust ducts that run between conditioned floors to exterior walls including damper at the exterior wall.
- C 09:** Metal tie downs are insulated between exterior framing and tie down.
- C 10:** Hard to access wall stud cavities, such as corner channels or wall intersections, are insulated to the proper R-value prior to the installation of exterior sheathing or exterior stucco lath.
- C 11:** Insulation is installed behind tub, shower, or fireplace enclosures, and exterior stairwells to the R-value listed on the CF1R when located against exterior walls. Insulation is installed before tub, shower, and fireplace are installed.
- C 12:** A solid air barrier is installed, from floor to ceiling, on the inside of exterior walls directly adjacent to tub, shower, or fireplace enclosures. Insulation shall contact all six sides of the air barrier on exterior walls.
- C 13:** All window and door headers shall be insulated to a minimum of R-2. Using continuous rigid insulation sheathing, or SIP headers, or Two-member headers with insulation in between, or Single-member headers with insulation to the exterior.
- D 04:** All dropped ceilings are covered with hard covers and sealed to framing.
- D 05:** All chases are covered with hard covers and sealed to framing.
- D 09:** Double walls that open to the attic are covered with an air barrier and cover has an air tight seal to the framing.
- E 01:** All penetrations in the subfloor above the garage into conditioned space must follow the raised floor air barrier requirements above.
- E 02:** Infiltration between the space above the garage and subfloor is prevented by one of the following methods:
- F 02:** An exterior wall air barrier is required at the intersection of the porch and exterior wall when there is conditioned space on the other side. The exterior wall includes an air barrier where the attic attaches to the conditioned space.
- F 03:** Truss framing blocking is used at the top and bottom of each wall/roof section.
- G 01:** Airtight blocking is installed between joists where the wall rim joist would have been located in the absence of a cantilever.

All graphics are from ENERGY STAR® 10-12-14 U.S. Environmental Protection Agency and U.S. Department of Energy and can be found at www.energystar.gov.

LINE ITEM CLARIFICATIONS:

C 01: All penetrations through the exterior wall air barrier are sealed to provide an air-tight envelope to unconditioned spaces such as the outdoors, attic, garage, and crawl space.

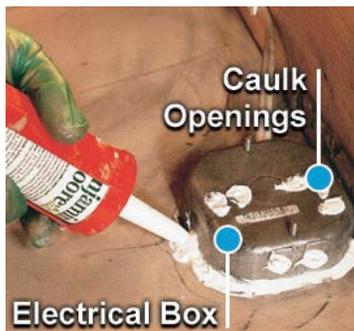
- If stucco or similar air tight products will be applied to the outside of the building, only penetrations in that air barrier need to be sealed. Example: Lineset, electrical boxes.
- If no additional outside air barrier will be installed, then all penetrations, joints/seams where individual materials meet must be sealed with caulk, foam, tape, or a material specifically designed for building envelope sealing to prevent air infiltration. If foam board is the air barrier then it must be taped at all seams. Edges of foam board must be sealed to the surrounding air barrier.
- House wrap can be used as an air barrier when it meets ASTM E2178. All seams, edges and penetrations in the house wrap must be sealed.
- If OSB, plywood, cement board, Thermo-ply, or dimensional lumber are the exterior air barrier, all of the seams and penetrations must be sealed.

C 02: Exterior wall air barrier is sealed to the top plate and bottom plate in each stud bay.

- For multi-story buildings that have a continuous air barrier on the exterior, only the bottom plate of the first floor and the top plate of the top floor need to be sealed to the exterior air barrier.
- It is possible to have a two-story house where the upstairs conditioned space has a smaller footprint than the first story. In such a floor plan, top plates of a first story wall exposed to an unconditioned attic would be sealed to the exterior air barrier.

C 03: All electrical boxes including knockouts that penetrate the air barrier to unconditioned space are sealed.

- Seal electrical boxes to the surrounding air barrier.
- Seal openings (knockouts) in the electrical box.
- Use tape, caulk or foam. Ensure sealing products do not enter into the electrical box.



C 05: Exterior bottom plates (all stories) are sealed to the floor using the appropriate sealing method.

If the exterior air barrier is continuous (from the bottom story to the top story), then the bottom plate of first floor only needs to be sealed.

In order to verify that the bottom plate is sealed, the following are allowed:

- Use a gasket material that is 3.5 inches wide on 2x4, 5.5 inches wide on 2x6; or
- Seal the bottom plate on the inside at junction of concrete and plate with caulk or foam; or
- Watch sealing of the bottom plate to foundation during framing.

C 08: Fan exhaust ducts that run between conditioned floors to exterior walls including damper at the exterior wall.

- Fan exhaust ducts that run between conditioned space, including the space between conditioned floors to exterior walls, shall include a damper at the exterior wall.

C 09: Metal tie downs are insulated between exterior framing and tie down.

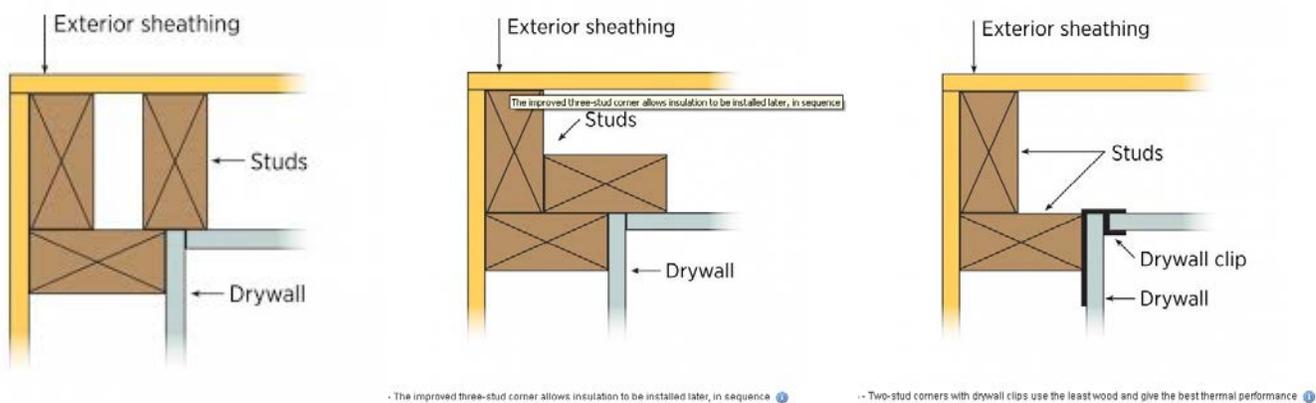
- Metal tie downs shall be fully insulated in a manner that resists thermal bridging through the structural framing assembly.
- If there is room behind the tie down and the exterior framing, ensure it is insulated. It is not required to move the tie down to add insulation.

C 10: Hard to access wall stud cavities, such as corner channels or wall intersections, are insulated to the proper R-value prior to the installation of exterior sheathing or exterior stucco lath.

- Cavities in corner channels or wall intersections that will become inaccessible shall be completely filled with insulation and verified before the exterior sheathing is installed.
- Alternative framing details shown below can be used to eliminate cavities that would become inaccessible after exterior sheathing is installed.

NOTE: When batt insulation is used, it must be cut to fit around framing.

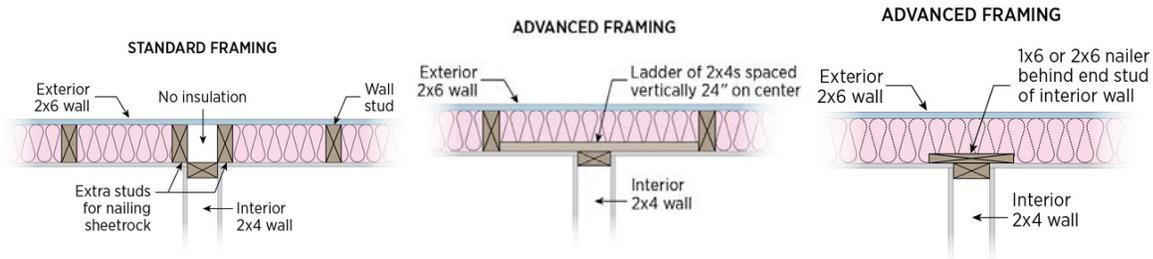
Corner Channels are typically framed in a U-channel. Insulation must be inserted in this space from the outside before the exterior wall sheathing is installed. It is recommended that the advanced framing methods shown below be used.



Typical Corner Framing

Advanced Framing Methods

Wall Intersections where interior walls intersect exterior walls, builders will typically use a conventional T-post detail. Insulation must be inserted in this space from the outside before the exterior wall sheathing is installed. It is recommended that the advanced framing methods shown below are used. In advanced framing, batt insulation must be cut to fit around the 2x4 ladders and the 1x6 or 2x6 nailers.



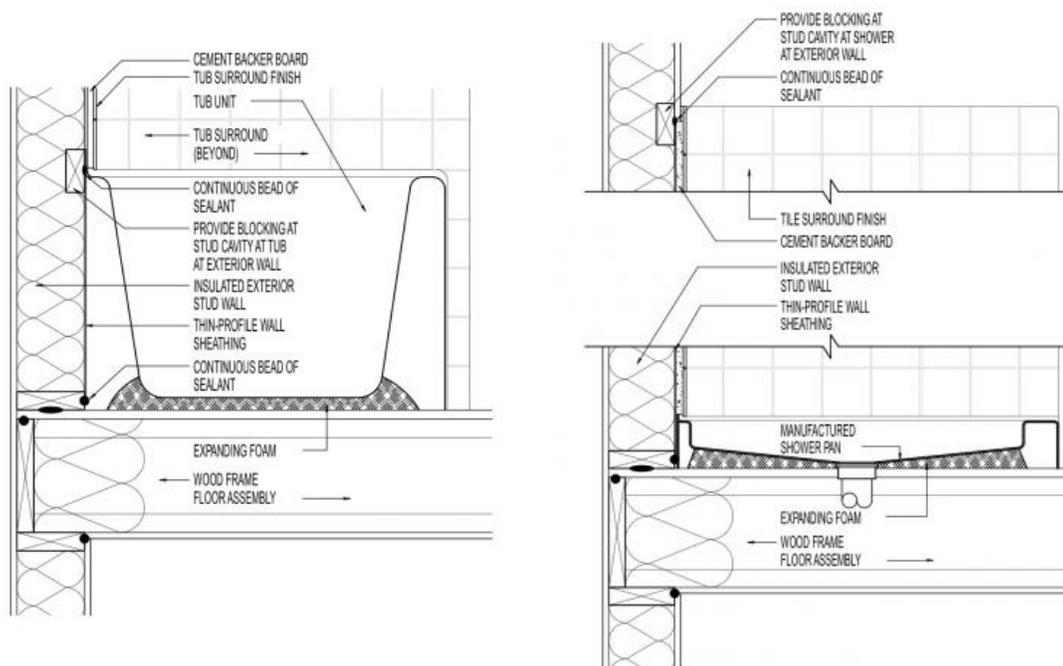
C 11: Insulation is installed behind tub, shower, or fireplace enclosures, and exterior stairwells to the R-value listed on the CF1R when located against exterior walls. Insulation is installed before tub, shower, and fireplace are installed; and

C 12: A solid air barrier is installed, from floor to ceiling, on the inside of exterior walls directly adjacent to tub, shower, or fireplace enclosures. Insulation shall contact all six sides of the air barrier on exterior walls.

- When tubs, showers, fireplace enclosures, or stairwells are installed on exterior walls, builders may forget to insulate and air seal the exterior wall behind those locations. For QII the HERS Rater must visually verify that these locations are properly air sealed and insulated before they become inaccessible.
- The insulation behind the tub or shower must be equivalent to the insulation in adjacent exterior walls and covered with an air barrier that is sealed at all edges and seams to provide a continuous air barrier. Any type of insulation may be installed as long as it completely fills the void and is in full contact on all six sides of the air barrier.

NOTE: The bath tub air barrier is not required to extend to the ceiling at framing stage. Drywall will be installed to the ceiling at a later stage.





C 13: All window and door headers shall be insulated to a minimum of R-2. Using continuous rigid insulation sheathing, or SIP headers, or Two-member headers with insulation in between, or Single-member headers with insulation to the exterior. The Building Energy Efficiency Standards provide Quality Insulation Installation (QII) compliance credit for R-2 insulated headers. Insulation or wood must fill the cavities, leaving no air gaps in or around the header.

Three options meet the R-2 insulated header requirement:

- A. Two-member header with insulation in between. The header and insulation must fill the wall cavity. Example: a 2x4 wall with two 2x nominal headers, or a 2x6 wall with a 4x nominal header and a 2x nominal header. Insulation is required to fill the wall cavity and must be installed between the headers.
- B. Single-member header, less than the wall width, with insulation on the interior face. The header and insulation must fill the wall cavity. Example: a 2x4 wall with a 3 1/8 inch wide header, or 2x6 wall with a 4x nominal header. Insulation is required to fill the wall cavity and must be installed to the interior face of the wall.
- C. Single-member header, same width as wall. The header must fill the wall cavity. Example: a 2x4 wall with a 4x nominal header or a 2x6 wall with a 6x nominal header. No additional insulation is required because the header fills the cavity.

D 04: All dropped ceilings are covered with hard covers and sealed to framing.

- The 2008 RA allowed the entire drop area to be filled with insulation level with the rest of the attic. This is no longer allowed under the 2013 Standards; hard covers are required.
- Framing of soffits or drop ceilings should be done inside the Air Barrier. This means the drywall has been installed and sealed as required before the soffit or drop ceiling is framed out.

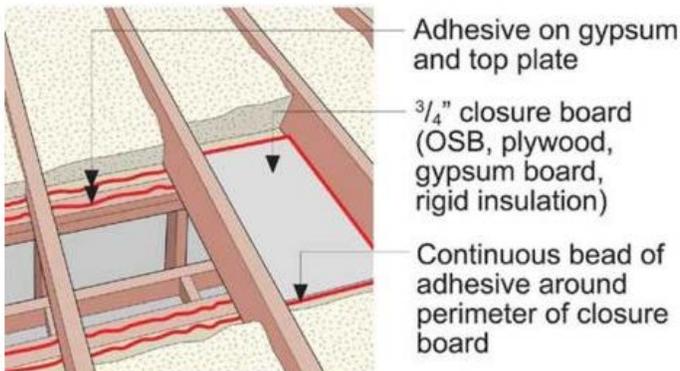


D 05: All chases are covered with hard covers and sealed to framing.

- All vertical chases shall have hard covers sealed to the framing at each plate level.
- See notes for D 04 above.

D 09: Double walls that open to the attic are covered with an air barrier and cover has an air tight seal to the framing.

- Double walls that open to the attic or subfloor must be covered. See notes for D 04 above.
- For double walls on the exterior. An air barrier must be installed covering the double wall if insulation is going to be installed on the exterior wall.



- Installing air barrier above a soffit

In this picture an air barrier is not required at the double wall because insulation will be installed on the interior wall.

E 01: All penetrations in the subfloor above the garage into conditioned space must follow the raised floor air barrier requirements above.

E 02: Infiltration between the space above the garage and subfloor is prevented by one of the following methods:

- All seams where components (including the rim joists, closures, top plates, and subfloor) come together must be sealed with caulk, spray foam, or foam gaskets/tape. Sole plates at the slab of the common wall are to be caulked, foamed, or gasketed to prevent air migration.
- When garage ceiling joists extend across both the living space and the garage, the joist bay cavities above any common walls must be closed off and sealed to prevent air movement within the frame assembly.



Incorrect – Joist bay cavities not sealed



Correct – Joist bays with blocking and sealed

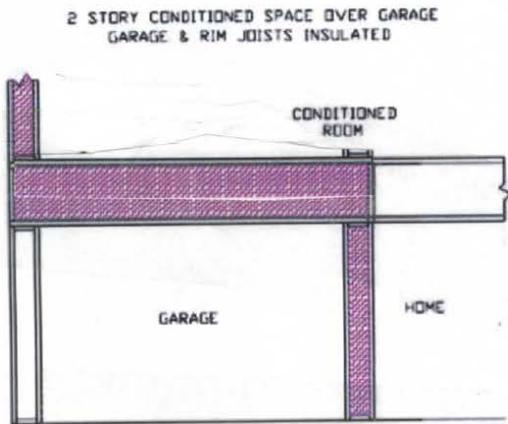
- Insulation can be placed on the ceiling of the garage or in contact with the conditioned subfloor above. Where the insulation will be installed effects the location of the air barrier and sealing.
- Option 2 below is the preferred method.

Option 1 – Insulation is placed in contact with the garage ceiling, with a void between the insulation and the conditioned subfloor above. When using this option, the air barrier for the conditioned space above the garage is the garage ceiling and the perimeter blocking.

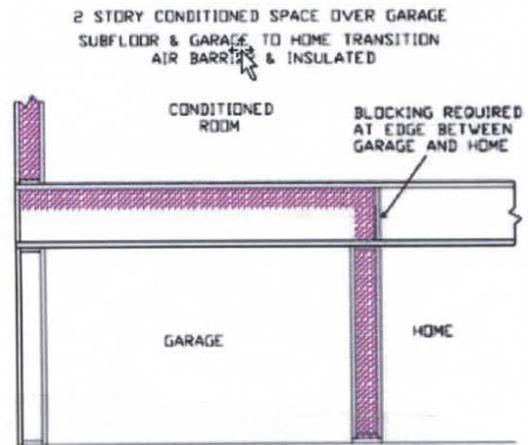
- Perimeter of insulation must be full depth. Filling space from ceiling to subfloor.
- Seal all edges of the garage ceiling (typically drywall) at the perimeter of the garage to create a continuous air tight surface between the garage and adjacent conditioned space.
- The blocking at the garage and the adjacent conditioned space (house) shall be insulated up to the subfloor.

Option 2 – Insulation is placed in contact with the conditioned subfloor (this is the preferred method). When using this option, the air barrier is the subfloor alone.

- Seal all subfloor seams and penetrations between the garage and adjacent conditioned space.
- The garage and the adjacent conditioned space (house) shall be insulated up to the subfloor.



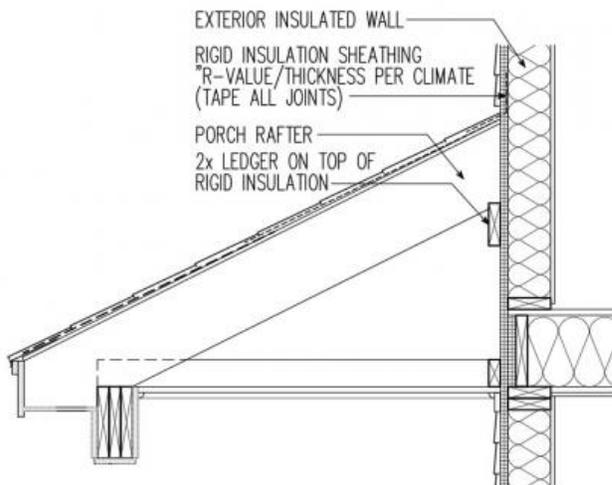
Option 1 – Insulation goes from ceiling to subfloor around perimeter.



Option 2 – Insulation goes from ceiling to subfloor at blocking to house.

F 02: An exterior wall air barrier is required at the intersection of the porch and exterior wall when there is conditioned space on the other side. The exterior wall includes an air barrier where the attic attaches to the conditioned space.

- Insure all wall insulation is in contact with the air barrier on all six sides. Exterior air barrier is often missed when an attic is attached to an exterior wall.
- Insulation values for these areas must be the same as the rest of the walls. If rigid insulation is installed on the walls it must also be installed in these areas.





F 03: Truss framing blocking is used at the top and bottom of each wall/roof section.

G 01: Airtight blocking is installed between joists where the wall rim joist would have been located in the absence of a cantilever.

- Blocking must be installed any time joists goes over an exterior wall or opens into an unconditioned space.

