



CERTIFICATE OF INSTALLATION		CF2R-ENV-02-E
Envelope Air Sealing - ENV-02		(Page 1 of 3)
Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City	Zip Code

Note: The Energy Efficiency Standards Section 110.7 requires that "all joints, penetrations and other openings in the building envelope that are potential sources of air leakage shall be caulked, gasketed, weather stripped, or otherwise sealed to limit infiltration and exfiltration." ASHRAE 62.2 Addendum j section 8.4 "measures shall be taken to minimize air movement across envelope components separating dwelling units, including sealing penetrations in the common walls, ceilings, and floors of each unit and by sealing vertical chases adjacent to the units." The requirements below are for newly constructed spaces, additions and alterations to existing assemblies. In areas where Spray Foam (SPF) insulation is used, the SPF can be considered the air barrier. Rigid board insulation is also an air barrier as long as infiltration cannot bypass the product. All other forms of insulation are not considered an air barrier and cannot be used as such.

A. Raised Floor Air Barrier	
01	All gaps in the raised floor are sealed.
02	All chases sealed at floor level using a hard cover and the hard cover is sealed.
03	All plumbing and electrical wires that penetrate the floor are sealed.
The responsible person's signature on this compliance document affirms that all applicable requirements have been met.	

B. Wall/Knee Wall Air Barrier	
01	All penetrations through the exterior wall are sealed to provide an airtight envelope to unconditioned spaces such as the outdoors, attic, garage, and crawl space.
02	Exterior wall air barrier is sealed at the top plate and bottom plate.
03	All penetrations through the exterior sheathing to unconditioned space such as electrical boxes including knockouts, plumbing, and lineset are sealed.
04	All openings in the top and bottom plate, including all interior and exterior walls, to unconditioned space are sealed.
05	Exterior bottom plates (all stories) are sealed to the floor
06	All gaps around windows and doors are sealed. The sealant used must be per window manufacturer specifications.
07	Rim joist gaps/openings are fully sealed. Add blocking above walls (between the top plate and sheathing above) separating garage and or porch from the conditioned space.
08	Exhaust ducts running between conditioned floors to the exterior walls shall have a damper at the exterior wall.
09	A solid air barrier is installed, from floor to ceiling, on interior walls before tub, shower, or fireplace enclosures are installed against exterior walls. Insure insulation is installed behind the tub, shower and fireplace enclosure.
10	Knee walls have solid and sealed blocking at the bottom, top, left and right sides.
11	All doors weatherstripped including between garage and home, including interior HVAC closets that are not conditioned.
12	Exhaust ducts for fans and dryer that run through chases include a damper where they exit the building.
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C. Ceiling/Attic Air Barrier	
01	All penetrations through the ceiling are sealed to provide an airtight envelope to the attic.
02	All chases are covered with hard covers and sealed to framing. Including chases for fireplace, HVAC ducts, exhaust ducts etc.
03	Double walls that open to an attic are covered with an air barrier and sealed to the framing.
04	Electrical boxes, smoke detectors, can lights sealed to ceiling.
05	All openings and penetrations in the top plate to unconditioned space in interior and exterior walls are sealed.
06	Attic access gasketed.
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D. Walls for Attached Porch, Attic, Double Wall	
01	All walls that separate conditioned and unconditioned space include a continuous air barrier on the interior and exterior wall.
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.
03	Air barrier installed on all knee walls on the unconditioned side of the assembly.
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E. Conditioned Space Above or Adjacent to Garage Air Barrier

01	If there is a conditioned space above the garage choose option 1 or 2 for proper air sealing.
02	Option 1 – Insulation placed on garage ceiling. Walls separating garage from the conditioned space shall be blocked and sealed. This is to stop air movement from the garage into the living space. Seal the band joist at the perimeter of the condition space above a garage so that the space under the conditioned floor is air tight to the outside. Option 2 – Insulation placed under floor of conditioned space. Walls separating garage from the conditioned space shall be blocked and sealed. This is to stop air movement from the garage into the living space. Seal all subfloor seams and penetrations between the garage and adjacent conditioned space.
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F. 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.
03	Any gaps, cracks, or penetrations in the air barrier of the cantilever are sealed. Can lights in the cantilever must be IC and AT rated and properly sealed to sheathing.
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G. Multifamily Air Barrier

01	Multifamily buildings must meet all air sealing requirements 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, and communication wiring.
04	Elevator penthouse, mechanical penthouse, stairwell doors, roof access hatch, and plumbing stacks are all sealed to reduce air transfer from attached spaces.
05	Common Walls – the 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 – all penetrations through the chase must be sealed to stop air movement through the chase to the surrounding spaces.
07	Vertical Chases - Where each floor/ceiling meets the chase this area must be sealed to the floor and ceiling of each unit to stop air movement up and around the exterior of the chase due to stack effect.
08	Common hallways – penetrations between dwelling units and common hallways are sealed. Doors to dwelling units shall be gasketed.
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STATE OF CALIFORNIA
ENVELOPE AIR SEALING

CEC-CF2R-ENV-02-E (Revised 03/15)

CALIFORNIA ENERGY COMMISSION



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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		
<p>I certify the following under penalty of perjury, under the laws of the State of California:</p> <ol style="list-style-type: none"> 1. The information provided on this Certificate of Installation is true and correct. 2. 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. 3. 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. 4. 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. 5. 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:

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Instructions below are to help clarify the most difficult to understand subsections of the CF2R-ENV-02.

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.

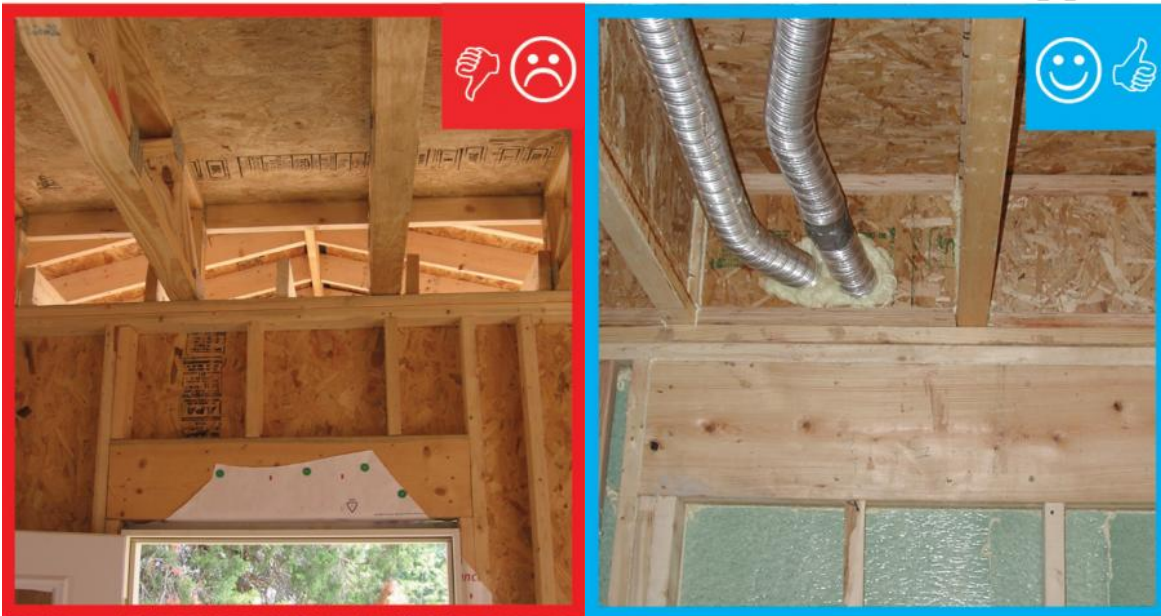
B. WALL/KNEE WALL AIR BARRIER

B. 07 Rim joist gaps/openings are fully sealed.

At all exterior walls blocking must be added between joist bays (or other accepted rigid material) above walls (between the top plate and deck sheathing above) that open to unconditioned space such as a garage or porch.

Ensure that all rim joists and any blocking is fully sealed around their perimeters, to reduce air migration within the framing assembly.

Where there are openings from the outside (or unconditioned space) to the common framing that surrounds the conditioned space, an air barrier must be installed and sealed at the rim joist/rafter or between each joist/rafter. All through-penetrations must be sealed.



No blocking at the rim joist/rafter

Blocking installed at rim joist/rafter and sealed

B. 08 Exhaust ducts running between conditioned floors to the exterior walls shall have a damper at the exterior wall.

At a wall you have conditioned space on the inside and unconditioned space on the outside. The wall is where the air barrier **must** be located. When you install an exhaust duct that penetrates the wall you must install a damper to keep the air barrier at the wall.

On a two or more story building when a duct from the fan travels between floors and exhausts to the outside there must be a damper on the outside of the building. This is required because the duct is in conditioned space and a damper must be installed to stop air from entering the duct.



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B. 10 Knee walls have solid and sealed blocking at the bottom, top, left, and right sides.

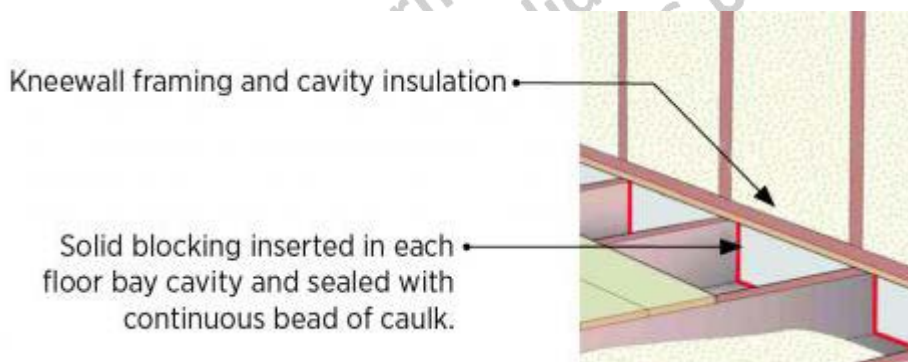
Knee/pony walls, are commonly used to separate conditioned from unconditioned space of an attic, and can be a source of significant air leakage. Blocking must be installed on the perimeter of all knee/pony walls. When the insulation is installed, it must be the same R-value as the exterior walls including any rigid insulation.

- Install a top and bottom plate on all knee/pony walls, or equivalent rigid closure.
- Install blocking on the left and right sides of the knee/pony wall.
- Seal all seams, gaps, and holes in perimeter of all knee/pony walls to prevent infiltration.



Perimeter blocking installed and sealed

No Top Plate installed



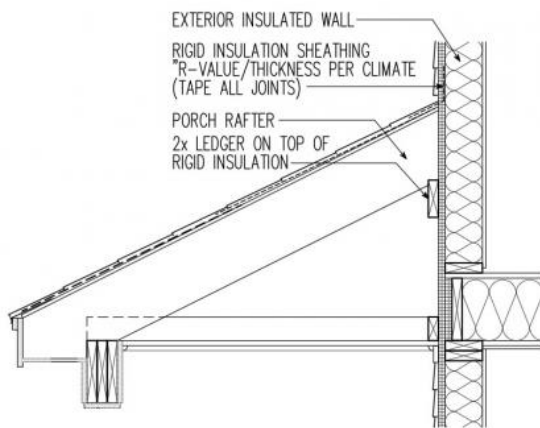
D. WALLS FOR ATTACHED PORCH ATTACHED ATTIC

D. 01 All walls that separate conditioned and unconditioned space include a continuous air barrier on the interior and exterior wall.

All insulated vertical surfaces 60 degrees and greater from the horizontal are considered walls (e.g., exterior walls, knee/pony walls, and steep coffered ceiling frames) and must have an air barrier on the conditioned and unconditioned sides of that wall. Pay special attention to the walls that separate the attached garage from the home.

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

- Install an air barrier on both sides of walls where conditioned space is common to porch, garage, or other unconditioned space.
- Seal all seams, gaps, and holes of the air barrier with caulk, foam, tape, etc.

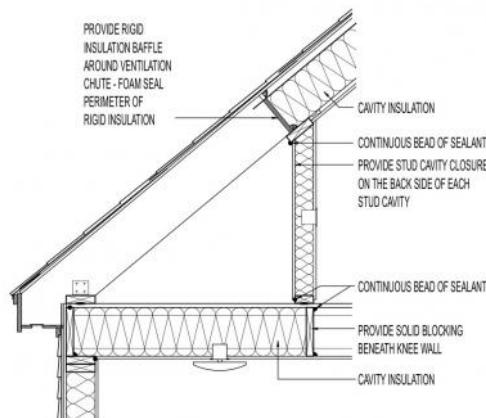


D. 03 Air barrier installed on all kneewalls on the nonconditioned side of the assembly.

- Attic knee/pony walls must be backed with an air barrier material to prevent insulation from sagging and to create a continuous air barrier within framing cavities.
- Seal all seams, gaps, and holes of the air barrier with caulk, foam, tape, etc.



Air barrier installed to unconditioned space



E. CONDITIONED SPACE ABOVE OR ADJACENT TO GARAGE AT AIR BARRIER

An attached garage presents some air sealing challenges. Typically, the garage is a source of car exhaust and other pollutants such as stored chemicals, paint, fertilizer, and gasoline. This means that any air leaks between the garage and the living space can create an immediate indoor air quality concern. In addition, garages are unconditioned and exposed to ambient air temperature and wind conditions. This makes air sealing between the garage and the living space as important as any exterior wall. The key issue with insulation in a floor over a garage is the location of the air barrier, which is often confused, resulting in increased air infiltration and wind washing that can render the insulation ineffective.

Any time there is a conditioned space above a garage, the wall that separates the garage from the conditioned space must have solid blocking added to the rim joist/rafter to stop air movement into the home.

The framings of attached garages are to be completely air sealed from the living areas of the house. 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 (see example below). This is more easily achieved at walls when the rim joists run parallel the common wall, acting as a natural air barrier. If framing runs the other direction, bays between the joists need to be closed off, accomplished with blocking, or other solid material. The faces of these framing materials are to be insulated. 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.

It can be easier to block, insulate and seal floors constructed of dimensional lumber than those constructed with engineered framing members which may have peculiar shapes and openings that require special attention for air sealing. With dimensional lumber, only the open ends of the joist cavities need to be blocked or closed off. The sub-floor and drywall ceilings below can be sealed to the framing members at the time of installation.

Closing off and air sealing a joist bay forms an “air barrier”.



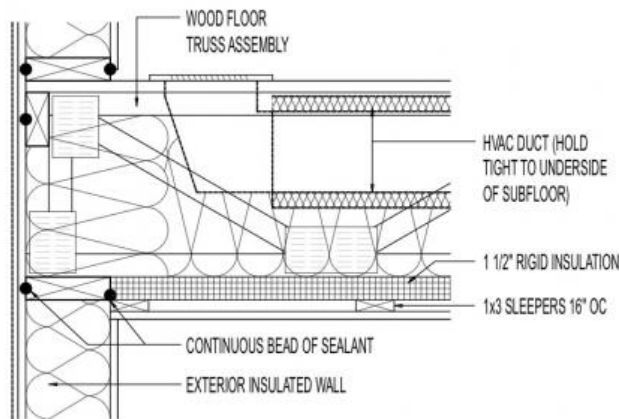
Blocking installed at rim joist/rafter and sealed

Insulation can be placed on the ceiling of the garage or in contact with the conditioned subfloor above. Depending on where the insulation will be installed determines what option must be used for air sealing. If insulation is going to be placed on the garage ceiling (not in contact with subfloor) use Option 1. If insulation is going to be placed in contact with conditioned subfloor use Option 2.

The preferred method for insulating these spaces is to place the insulation in direct contact with the subfloor which is Option 2.

Insulation placed on the garage ceiling

Option 1 – If insulation is placed on the garage ceiling with a void between the insulation and the conditioned floor above, then the perimeter of the space directly under the conditioned subfloor must be made air tight and fully insulated. For simple dimensional lumber framed floor assemblies, this can be done by installing blocking to the perimeter of the space directly under the subfloor. For open-web trusses, solid airtight closure panels must be added to the perimeter of the space directly under the subfloor. When using this option, the air barrier for the conditioned space above the garage is the garage ceiling and the perimeter blocking.



Blocking Added to Perimeter (rigid insulation not required to be installed)

Insulation placed in contact with conditioned subfloor

Option 2 – If insulation is to be placed in contact with the conditioned subfloor then the subfloor seams and all penetrations through the subfloor must be sealed.

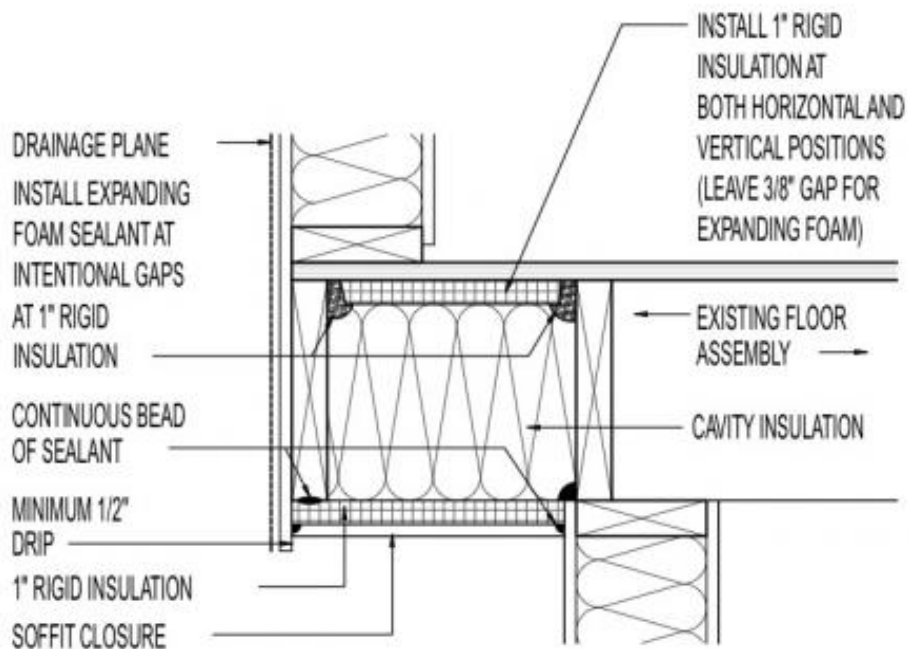
The differences for air sealing between Option 1 and Option 2 is that in Option 1 the air barrier is formed by the garage ceiling gyp board and the perimeter joists/blocking. In Option 2 the air barrier is the subfloor alone. Both options require rigid closure to be added to the joist bay between the garage and house.

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F. CANTILEVERED FLOOR AIR BARRIER

A cantilevered floor is a floor that extends out past the foundation or supporting wall below. It may be a first- or second-story bump-out, a bay window, or a room over an open porch. Floor joist bays that extend from the house out under the cantilevered floor are sometimes left unsealed, allowing outside air to migrate into the home through the framing assembly. Sometimes cantilevered floors are insulated but not air sealed. Air barriers must be put in place across any floor joist bays open to non-conditioned space, to form an air barrier between the cantilever and the conditioned space. The barrier prevents air from migrating through the insulation, which renders the insulation ineffective. Closure material (rigid foam, OSB, plywood, or drywall) must be installed to reduce this migration. Plywood subflooring above the cantilever is to be sealed at the edges and seams. The cantilever floor cavity must be filled with insulation or the insulation must be held in contact with the subfloor. Rigid air barriers can then be installed on the underside of the cantilever, forming a soffit.

- F. 01 Airtight blocking is installed between joists where the wall rim joist would have been located in the absence of a cantilever.** The rim/band joist, blocking added and sealed above the plate line, at a cantilever.



Rigid insulation not required to be installed.