Air Sealing and Insulating Garage Walls - Code Compliance Brief

Overview:

The intent of this brief is to provide code-specific information about air sealing and insulating garage walls to help ensure that the measure will be accepted as being in compliance with the code. Providing notes for code officials on how to plan reviews and conduct field inspections can help builders or remodelers with proposed designs and installations and provide jurisdictional officials with information for acceptance. Providing the same information to all interested parties (e.g., code officials, builders, designers, etc.) is expected to result in increased compliance and fewer innovations being questioned at the time of plan review and/or field inspection.

As in other parts of the home, sealing and insulating the walls and ceiling of your garage can be an effective way to improve energy efficiency in a home. In addition, properly isolating and air sealing attached garages from the living space is critical for preventing the potential infiltration of carbon monoxide and other contaminants into the home. Open joist bays above the garage that extend into living spaces need to be blocked and air sealed at the garage wall. Seams along the rim joist, top plate, sill plate, and foundation wall should be caulked or sealed. If there is living space above the garage, extra care should be taken to seal all seams and any holes in the subfloor, and any doors between the house and the garage should be weather stripped and have a tight-fitting threshold sweep.

Insulation and air-sealing requirements for garage walls shared with conditioned space are found in the International Energy Conservation Code (IECC) and International Residential Code (IRC). Even though each version of the 2009, 2012, and 2015 IECC/IRC codes has included provisions that the *building thermal envelope*[1] should be durably sealed to limit infiltration, the language related to air barriers and insulation in the 2009 version was somewhat vague and did not specify specific components of the *building thermal envelope*. The 2012 IECC/IRC added more specific language regarding areas of the *building thermal envelope* that should be sealed and expanded upon those areas that are now included in the 2015 IECC/IRC as well. This brief provides an overview of the 2009 through 2015 IRC/IECC code requirements related to air sealing and insulating attached garage walls.

[1]"Building Thermal Envelope" is defined as the basement walls, exterior walls, floor, roof, and any other building elements that enclose conditioned space or provide a boundary between conditioned space and exempt or unconditioned space.

Plan Review:

Per the ***IECC/IRC, Section R103.3/R106.3 Examination of documents***. The code official/building official must examine or cause to be examined construction documents for code compliance.

This section lists applicable code requirements and details helpful for plan review regarding the provisions to meet the requirement for insulated and air sealed attached garage walls.

- **Construction Documentation**. Review the construction documents for details describing garage wall insulation, installation and construction techniques.
  - ***2015 IECC/IRC, Section R103.2/N1101.5 Information on Construction Documents***. Construction documents should include:
    - insulation materials and their R-values
    - manufacturer specifications on garage door leading into conditioned space including rated and labeled U-factor
    - air sealing details

- **Air Leakage and Insulation**. Review the construction documents and confirm that the insulation material, R-value, and air-sealing technique meet applicable code requirements.

- ***2015 IECC/IRC, R402.4./N1102.4. Air Leakage***. The building thermal envelope should be constructed to limit air leakage.
- ***R402.4.1/N1102.4.1 Building Thermal Envelope***. The sealing methods between dissimilar materials should allow for differential expansion and contraction.
- ***R402.4.1.1/N1102.4.1.1 Installation***. The components listed in the Air Barrier and Insulation Installation Table[2] should be installed in accordance with the manufacturer's instructions and the criteria listed as the applicable method of construction. Below are the General Requirements and components from the table that are applicable to sealing and insulating attached garage walls.
- ***R402.4.1.1/N1102.4.1.1 Air Barrier and Insulation Installation Table***
  - **Air Barrier General Requirements**. A *continuous air barrier*[3] should be installed in the building envelope. The exterior thermal envelope contains a *continuous air barrier*. Breaks or joints in the *air barrier*[4] should be sealed.
  - **Air Barrier Criteria**:
    - **Walls** – The junction of the foundation and sill plate should be sealed. The junction of the top plate and top of exterior walls should be sealed.
    - **Floors (including above garages)** – The air barrier should be installed at any exposed edge of insulation.
    - **Garage separation** – Air sealing should be provided between the garage and conditioned space.
  - **Insulation Installation**:
    - **Walls** – Cavities within corners and headers of frame walls should be insulated by completely filling the cavity with a material having a thermal resistance of R-3 per inch minimum. Exterior thermal envelope insulation for framed walls should be installed in substantial contact and continuous alignment with the air barrier.
    - **Floors (including above garages)** – Floor framing cavity insulation should be installed to maintain permanent contact with the underside of subfloor decking, or floor framing cavity insulation should be permitted to be in contact with the top side of sheathing, or continuous insulation installed on the underside of the floor framing and extends from the bottom to the top of all perimeter floor framing members.
    - **Narrow cavities** – Batts in narrow cavities should be cut to fit, or narrow cavities should be filled by insulation that on installation readily conforms to the available cavity space.

- ***2012 IECC/IRC, R402.4/N1102.4 Air Leakage***. The building thermal envelope should be constructed to limit air leakage.
  - ***R402.4.1/N1102.4.1 Building Thermal Envelope***. The sealing methods between dissimilar materials should allow for differential expansion and contraction.
  - ***R402.4.1.1/N1102.4.1.1 Installation***. The components listed in the Air Barrier and Insulation Installation Table should be installed in accordance with the manufacturer's instructions and the criteria listed as the applicable method of construction. Below are the components from the table that are applicable to sealing and insulating attached garage walls.
  - ***R402.4.1.1/N1102.4.1.1 Air Barrier and Insulation Installation Table***
    - **Walls** – Corners and headers should be insulated and the junction of the foundation and sill plate should be sealed. The junction of the top plate and top of exterior walls should be sealed. Exterior thermal envelope insulation for framed walls should be installed in substantial contact and continuous alignment with the air barrier.
    - **Garage Separation** – Air sealing should be provided between the garage and conditioned spaces.
    - **Floors (including above-garage floors)** – Insulation should be installed to maintain permanent contact with underside of subfloor decking. The air barrier should be installed at any exposed edge of insulation.
    - **Narrow Cavities** – Batts in narrow cavities should be cut to fit, or narrow cavities should be filled by insulation that on installation readily conforms to the available cavity space.

- ***2009 IECC/IRC, 402.4.1 Air leakage, Building Thermal Envelope***
  - The *building thermal envelope* should be constructed to limit air leakage. The sealing methods between dissimilar materials should allow for differential expansion and contraction. Sources of infiltration should be caulked, gasketed, weather stripped, or otherwise sealed with an air barrier material, suitable film, or solid material:
    - All joints, seams, and penetrations
    - Site-built windows, doors and skylights
    - Openings between window and door assemblies and their respective jambs and framing