ENERGY STAR Single-Family New Homes
ENERGY STAR Multifamily New Construction
Slab Edge Insulation Exemptions and Alternatives

With the release of Revision 14 of the Single-Family New Homes (SFNH) Program, and Revision 05 of the Multifamily New Construction (MFNC) Program, the EPA eliminated the mandatory requirements for slab edge insulation. For the SFNH program, homes certified using Revision 13 or prior are still required to meet this requirement. For the MFNC program, slab edge insulation is not required for any building pursuing certification, regardless of the revision used, if compliance with the thermal backstop is documented in ERI software or the Multifamily Workbook.
Prior to the release of these revisions, this document defined exemptions and alternatives to slab edge insulation applicable to homes and apartments certified. It is being maintained as a reference for projects where such exemptions and alternatives may still be applicable. Therefore, checklist Item numbers and mandatory requirements in this document reflect Revision 13 of the SFNH program and Revision 04 of the MFNC Program.

Item 3.2 of the ENERGY STAR SFNH National Rater Field Checklist, Version 3 / 3.1 / 3.2, and Item 3.4 of the ENERGY STAR MFNC National Rater Field Checklist, Version 1 / 1.1 / 1.2, define minimum slab edge insulation requirements. For slabs on grade in CZ 4 and higher, 100% of the slab edge must be insulated to ≥ R-5 at the depth specified by the 2009 IECC and aligned with the thermal boundary of the walls.

Consistent with the 2009 IECC, slab edge insulation is only required for slab-on-grade floors with a floor surface less than 12 in. below grade in the ENERGY STAR SFNH program and 24 in. below grade in the ENERGY STAR MFNC program. Slab insulation must extend to the top of the slab to provide a complete thermal break. If the top edge of the insulation is installed between the exterior wall and the edge of the interior slab, it is permitted to be cut at a 45-degree angle away from the exterior wall. Where an insulated wall separates a garage, patio, porch, or other unconditioned space from the conditioned space of the house or building, slab insulation must also be installed at this interface to provide a thermal break between the conditioned and unconditioned slab.

Additionally, Item 3.5 of the ENERGY STAR MFNC National Rater Field Checklist defines minimum slab edge insulation requirements for above-grade and at-grade concrete floor edges. For above-grade and at-grade concrete floor edges in CZ 4-8 (e.g., podiums and projected balconies), 100% of the floor edge must be insulated to ≥ R-5 & aligned with the thermal boundary of the walls. At this boundary, concrete floors resting on mass walls must provide insulation that extends ≥ 8ft. below the bottom of the floor edge & for floors resting on columns, insulation must surround the column, at a depth of 4ft.

Partners have received exemptions for specific aspects of the following details, as defined and illustrated below:

1. A continuous post-tensioned slab.
2. Monolithic slabs beneath an insulated wall that separates a garage from conditioned space.
3. The horizontal brick ledge of a monolithic slab.
4. For MFNC only, the horizontal brick ledge of an elevated slab.
5. Where code requires an uninsulated termite view strip in lieu of a termite shield, creating a gap in the slab insulation.
6. Slabs that separate occupiable spaces within the thermal enclosure from adjacent conditioned spaces.

Partners have requested but did not receive exemptions for the following details. Instead, alternative details were provided below to facilitate meeting the relevant requirements:

1. For MFNC only, in lieu of installing exterior insulation that extends for 8 ft. below the bottom of the slab edge, insulation may instead be installed on both interior and exterior surfaces of the wall for a minimum of 4 ft.
2. For MFNC only, in lieu of insulation at the slab edge that extends to the depth specified by Item 3.5 of the MFNC National Rater Field Checklist and is in alignment with the wall, above-grade monolithic slabs may instead install 4 ft. of horizontal, R-5 insulation above and below the slab.
3. For MFNC only, in lieu of extending the slab edge insulation to the depth specified by Item 3.5 of the MFNC National Rater Field Checklist, internally-supported above-grade slabs with R-5 insulation at the slab edge that connects to the under-slab insulation are allowed.

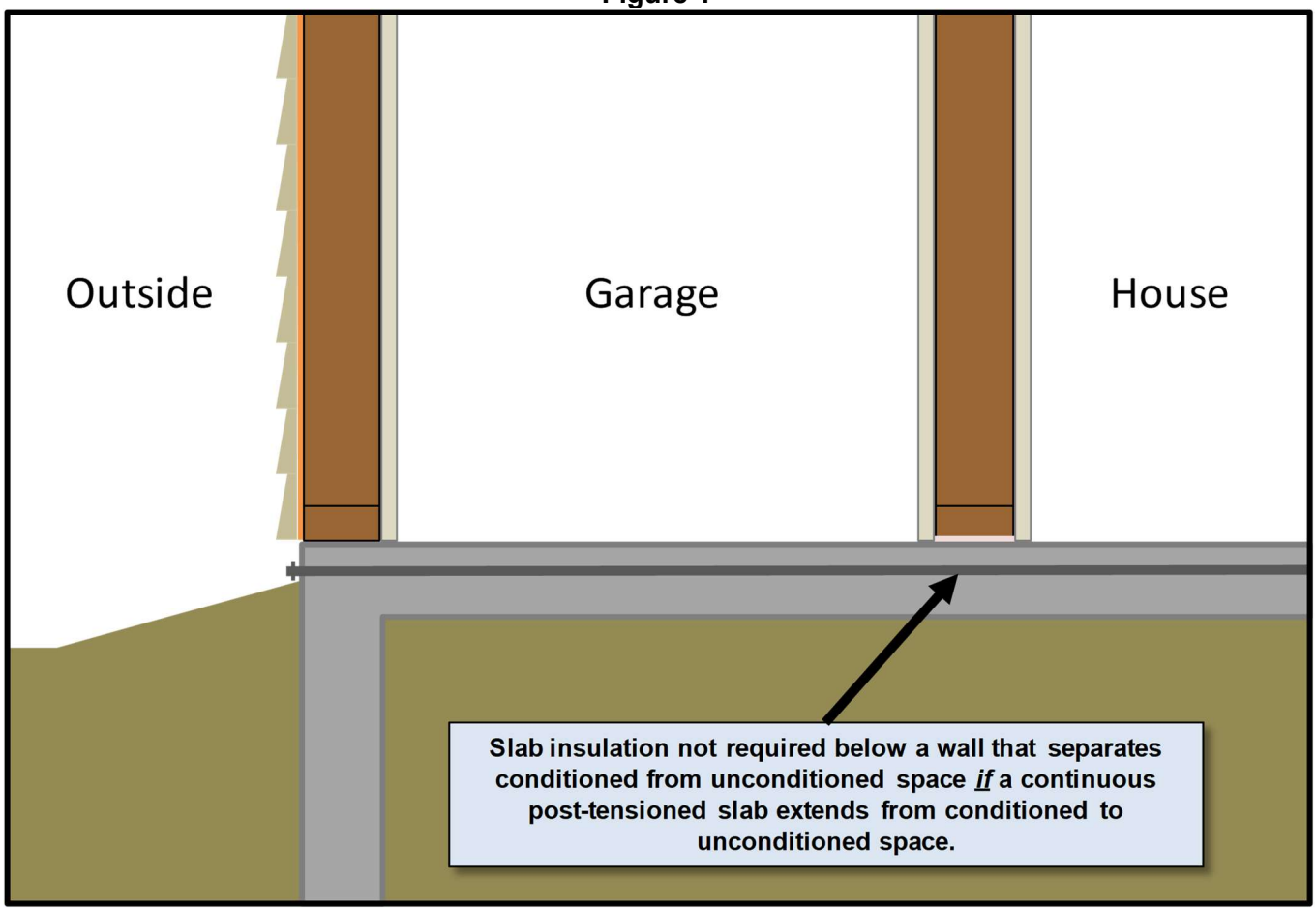
For the ENERGY STAR SFNH program, these exemptions are noted in Policy Record IDs 00031, 00626, 00949, and 01330. For the ENERGY STAR MFNC program, exemptions 1, 3, and 5 were included from the inception of the program, the fourth is addressed in Policy Record ID 00195, and the sixth is addressed in Policy Record ID 00178. Alternative details are addressed in Policy Record IDs 00106 and 00284.

Note that exemptions will impact the efficiency and comfort of the home; however, the EPA is allowing them because it has not yet identified an alternative method to effectively integrate insulation into the design.

Exempted Slab Edge Detail 1: Post-Tensioned Slabs

The edge of a post-tensioned slab is not required to be insulated. Furthermore, for the scenario illustrated in Figure 1, where a continuous post-tensioned slab extends from conditioned to unconditioned space (e.g., from conditioned space to an adjacent unconditioned garage, to a hallway, to a porch), insulation is not required to be provided at this boundary. These exemptions are provided because of the challenge of accessing the tensioning cable anchors behind insulation and due to the movement of the slab during the tensioning process.

Figure 1



Exempted Slab Edge Detail 2: Monolithic Slabs Beneath an Insulated Wall That Separates a Garage from Conditioned Space

For the scenario illustrated in Figure 2, where a monolithic slab extends from conditioned space to an adjacent garage, slab insulation is not required to be provided at this boundary. This exemption is provided because of the challenge of incorporating a thermal break at this location when there is a need to maintain the structural continuity of the slab into the garage (e.g., to support a wall at the exterior of the garage).

The EPA recommends, but does not require, that alternative slab designs that can accommodate a thermal break be considered. For example, in Figure 3 the soil-bearing conditions are not compromised and the site can support a stem wall with a floating slab.

Figure 2

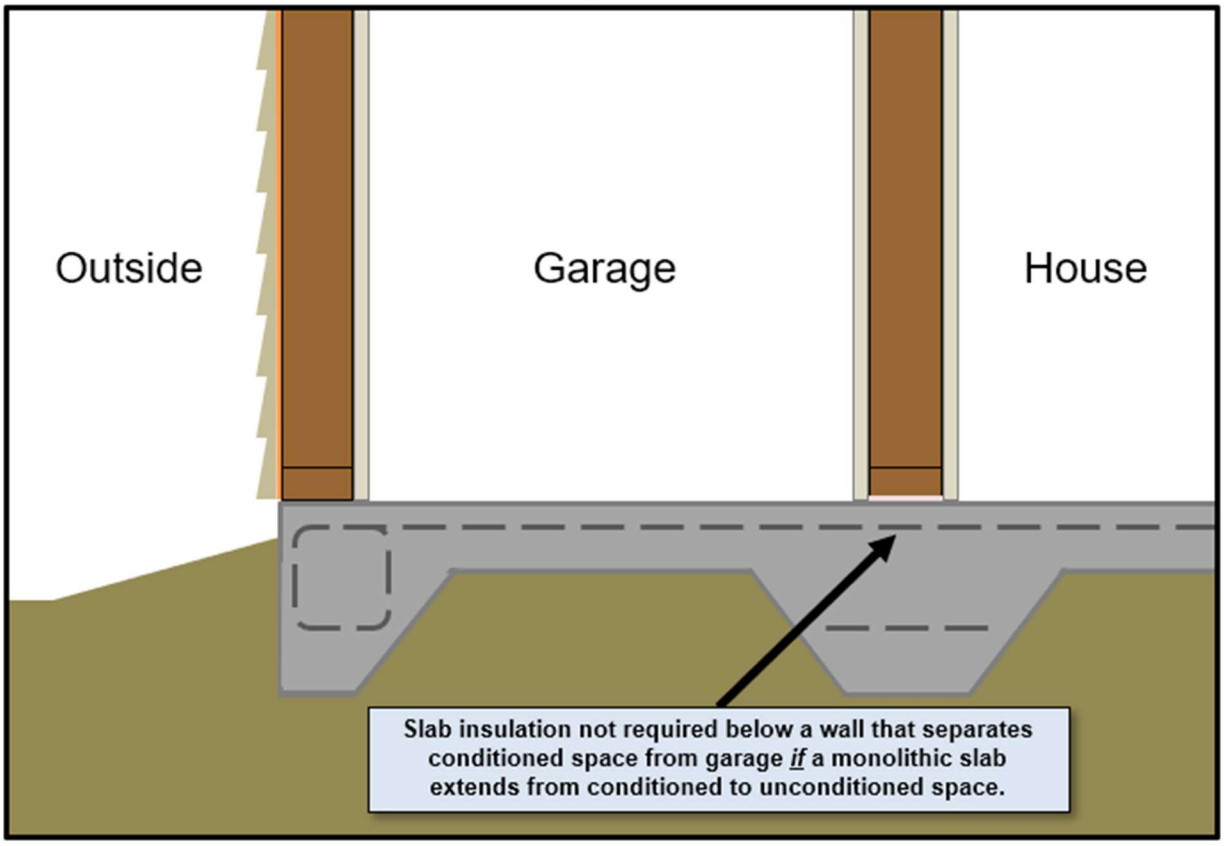
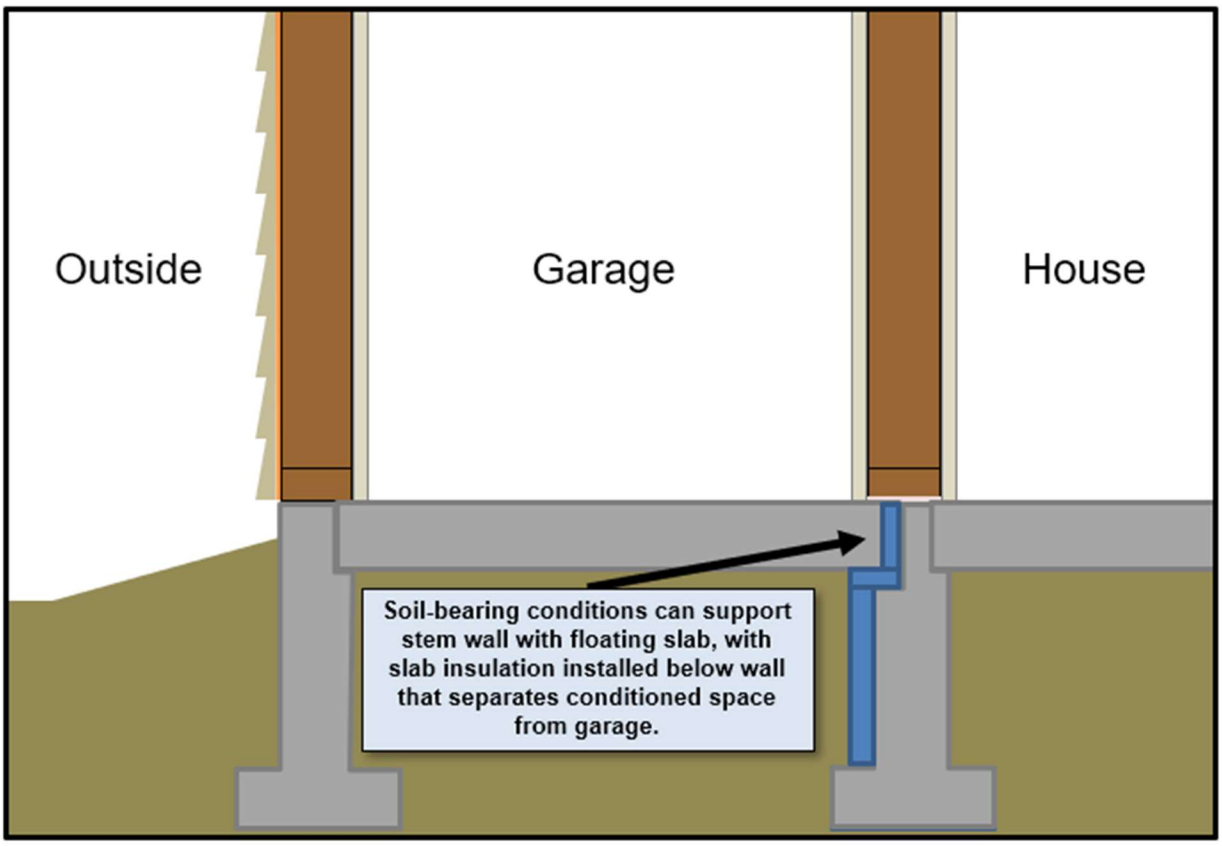


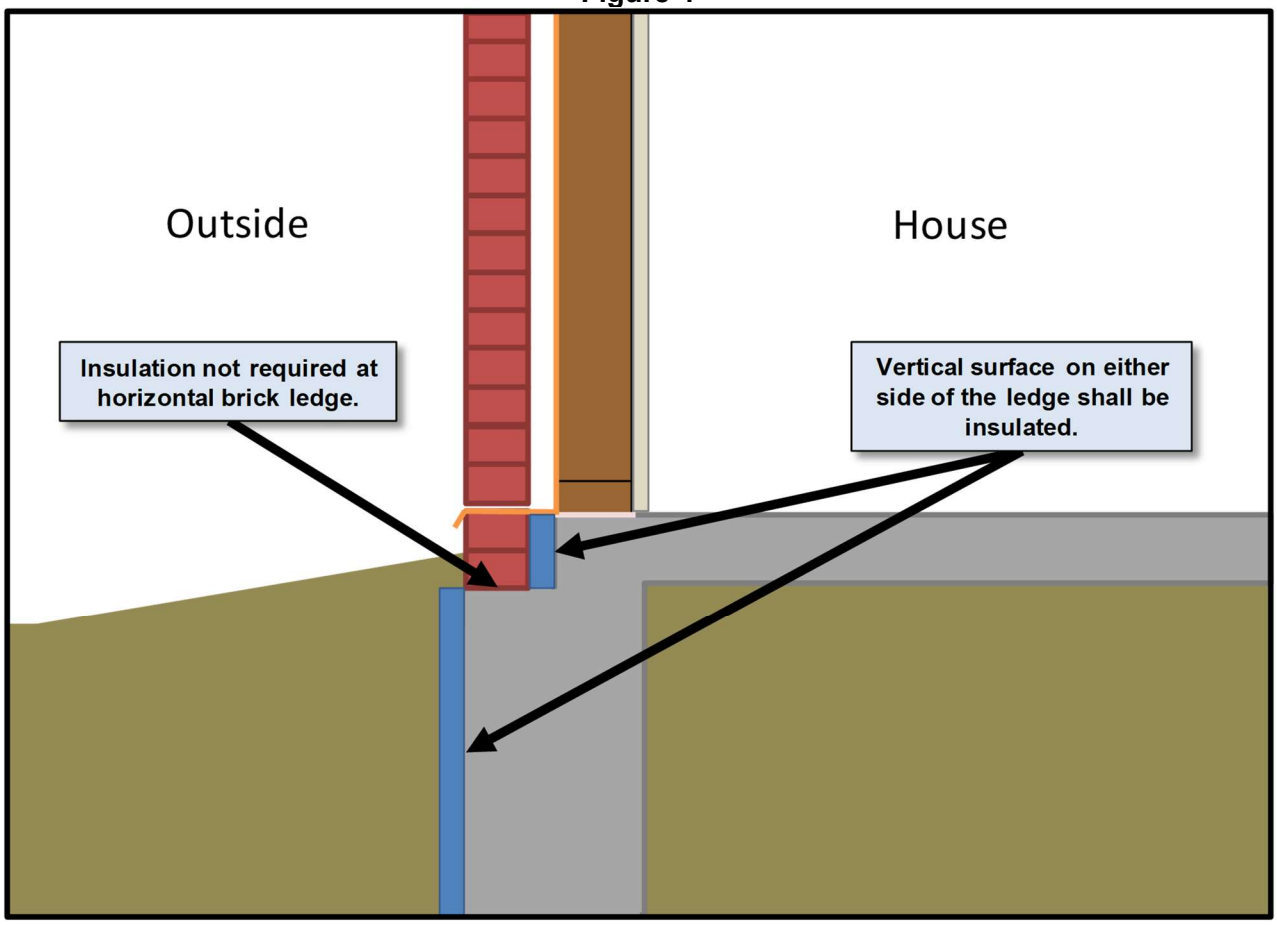
Figure 3


Outside
Garage
House
Soil-bearing conditions can support stem wall with floating slab, with slab insulation installed below wall that separates conditioned space from garage.

Exempted Slab Edge Detail 3: Monolithic Slabs with Brick Ledges

Insulation is not required at the horizontal brick ledge of a monolithic slab, as shown in Figure 4. However, the vertical surface on either side of the ledge shall be insulated. Furthermore, floating slabs with brick ledges are not exempted because the insulation layer can be moved to the interior vertical surface of the foundation. Slabs with multiple pours may be considered monolithic and use this detail if all concrete is in direct contact and reinforced (e.g., with rebar) at the joints.

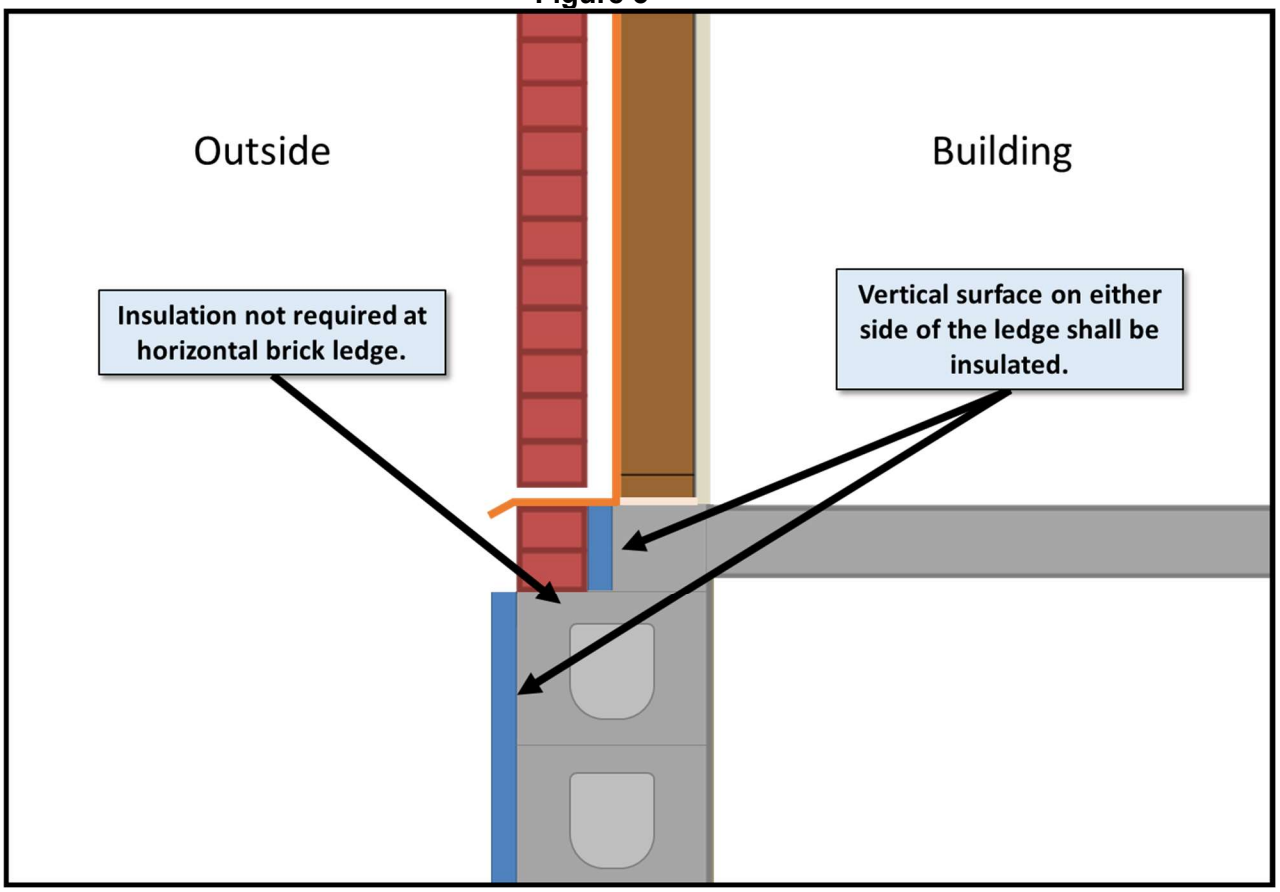
Figure 4



Exempted Slab Edge Detail 4: Elevated Slabs with Brick Ledges

For a project pursuing certification through the ENERGY STAR Multifamily New Construction program, insulation is not required at the horizontal brick ledge of an above-grade elevated slab, as shown in Figure 5. However, the vertical surface on either side of the ledge shall be insulated.

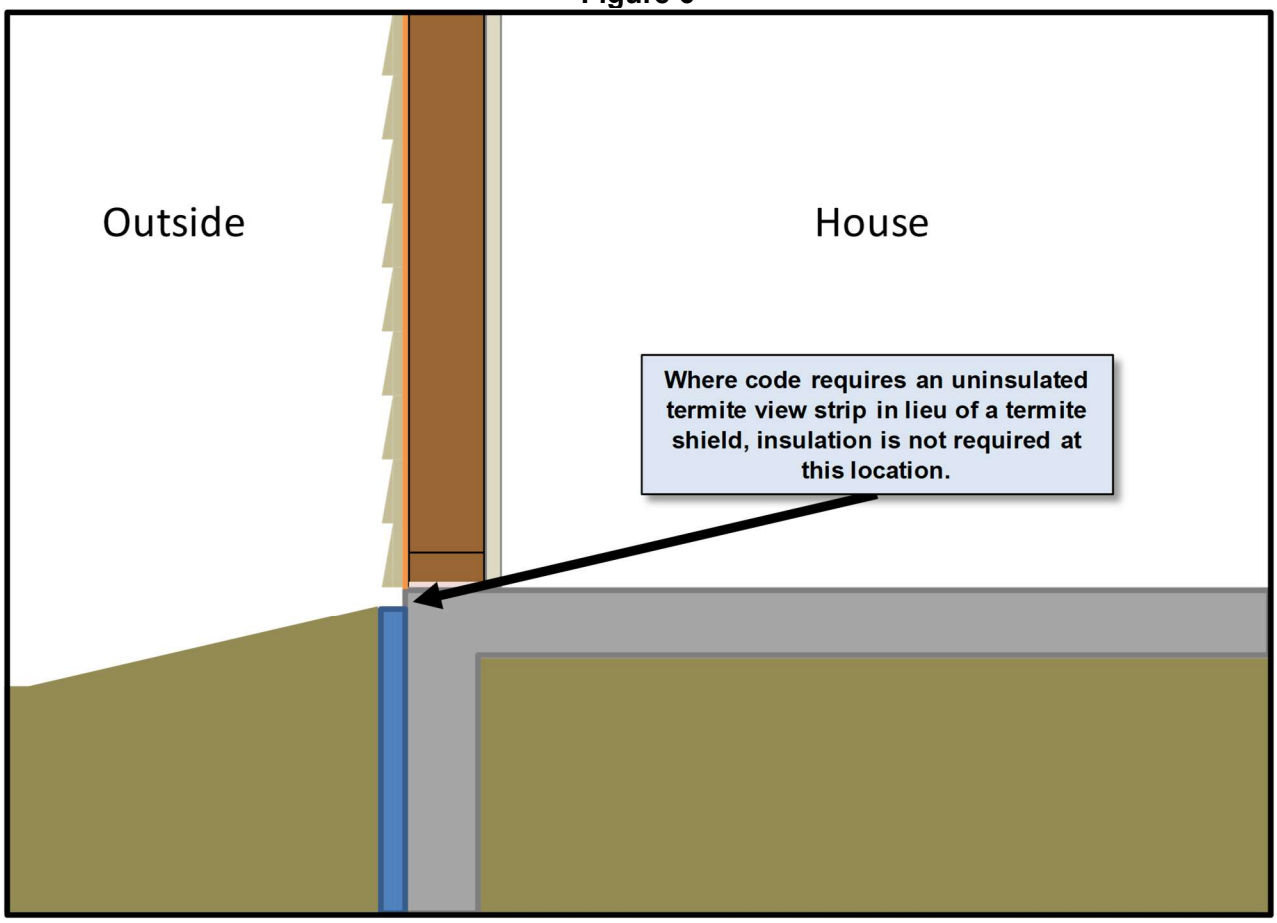
Figure 5



Exempted Slab Edge Detail 5: Termite View Strips

Where code requires an uninsulated termite view strip in lieu of a termite shield, insulation is not required at this location, as shown in Figure 6.

Figure 6



Exempted Slab Edge Detail 6: Slabs that Separate Occupiable Spaces Within the Thermal Enclosure from Adjacent Conditioned Spaces

Where a slab extends from conditioned space (e.g., a dwelling unit) to an adjacent occupiable space that is not conditioned space (e.g., an unconditioned corridor) as illustrated in Figures 7 & 8, insulation is not required to be provided at this boundary under the following conditions:

1. The adjacent occupiable space is entirely within the thermal enclosure of the building, and,
2. The assemblies separating the occupiable space from either the outdoors or not-occupiable space meet both of the following:
    a. Except in California, the assemblies must meet the "Envelope, Windows, and Doors" requirements listed in the ENERGY STAR Reference Design Exhibit of the applicable national or regional program requirements (i.e., insulation levels; Grade I insulation; infiltration; windows; and doors). For the ENERGY STAR Multifamily New Construction program, the requirements are modified by bullets 1 and 2 in the Common Space Applicability Notes and must be followed, as well.

       In California, for the ENERGY STAR Single-Family New Homes program, which does not have an ENERGY STAR Reference Design, these attributes must be equal or better than the predominant performance values of the dwelling units. For the ENERGY STAR Multifamily New Construction program, these attributes in the dwelling units must also be equal or better than the predominant performance values of the dwelling units. In the common spaces, the assemblies must be equal or better than the predominant performance values of the common spaces.
    b. The assemblies must meet Sections 1-4 of the ENERGY STAR National Rater Field Checklist, focusing on high-performance fenestration & insulation, fully-aligned air barriers, reduced thermal bridging, and air sealing.

Per ASHRAE 62.2-2010, the term "occupiable space" is defined as any enclosed space inside the pressure boundary and intended for human activities, including, but not limited to, all habitable spaces, toilets, closets, halls, storage and utility areas, and laundry areas. Garages are generally not occupiable space, per this definition, and shall not be counted as such for the purpose of this exemption.

This exemption is provided because the occupiable space is within the building's thermal enclosure. Therefore, a relatively small temperature gradient is expected between the occupiable and conditioned space, and a thermal break at this interface would provide limited benefit compared to the additional effort and cost.

Note that this policy does not apply to a slab that extends from conditioned space to an adjacent space that is not occupiable. For example, at the interface between a conditioned dwelling unit and a garage (which is not an occupiable space), both the assembly and the slab edge must be insulated.

Figure 7

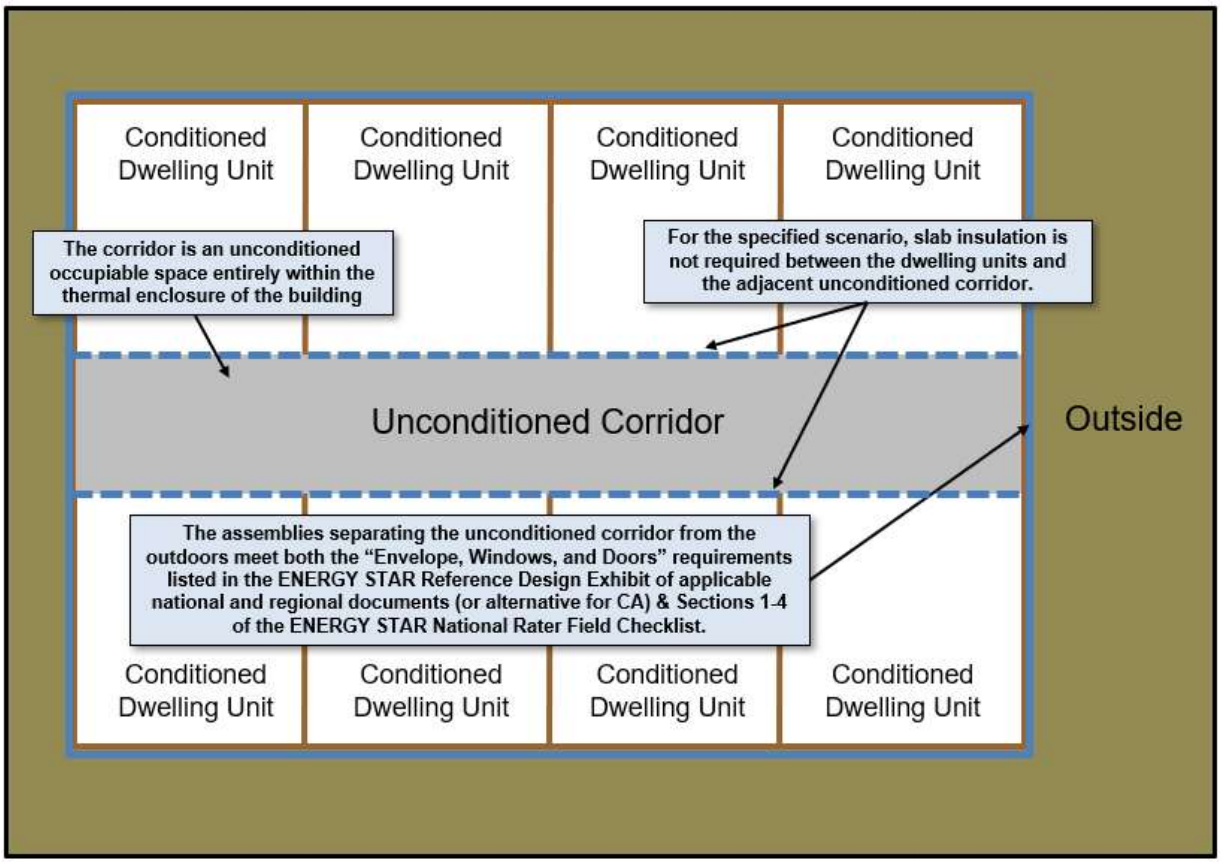
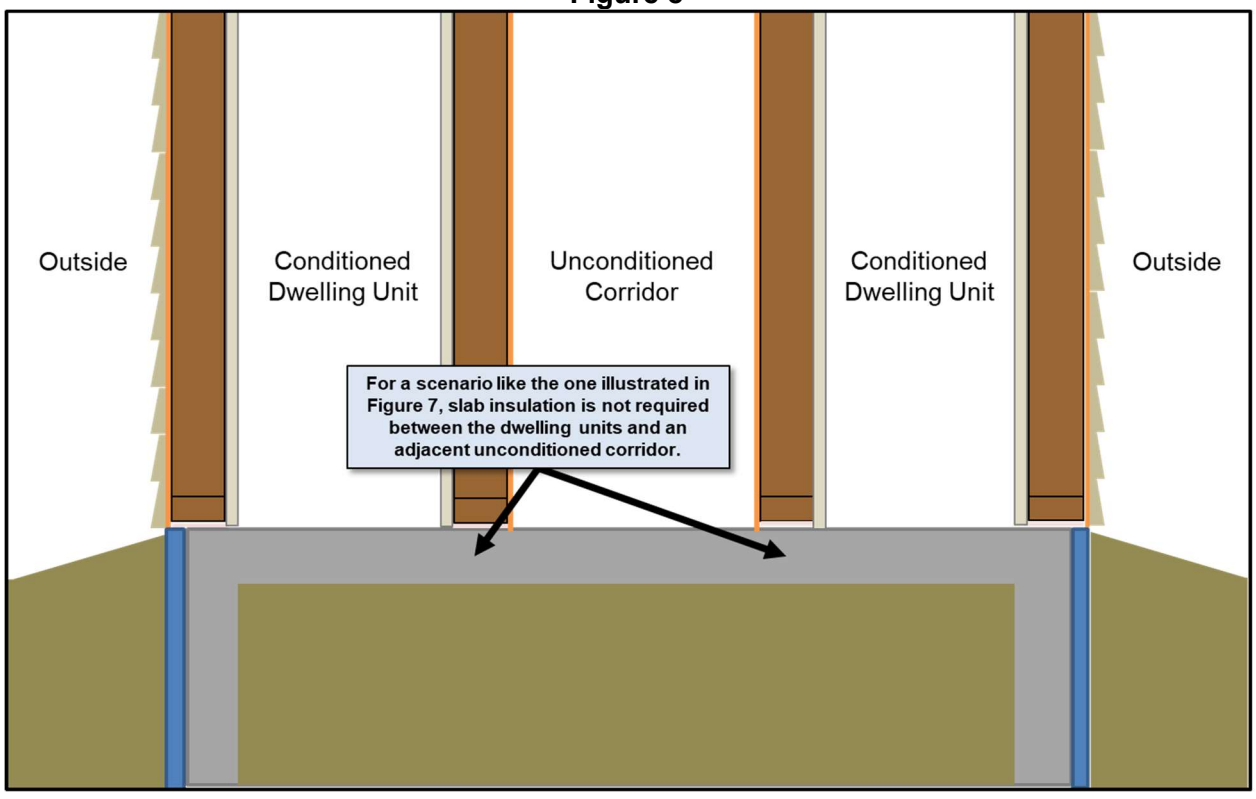


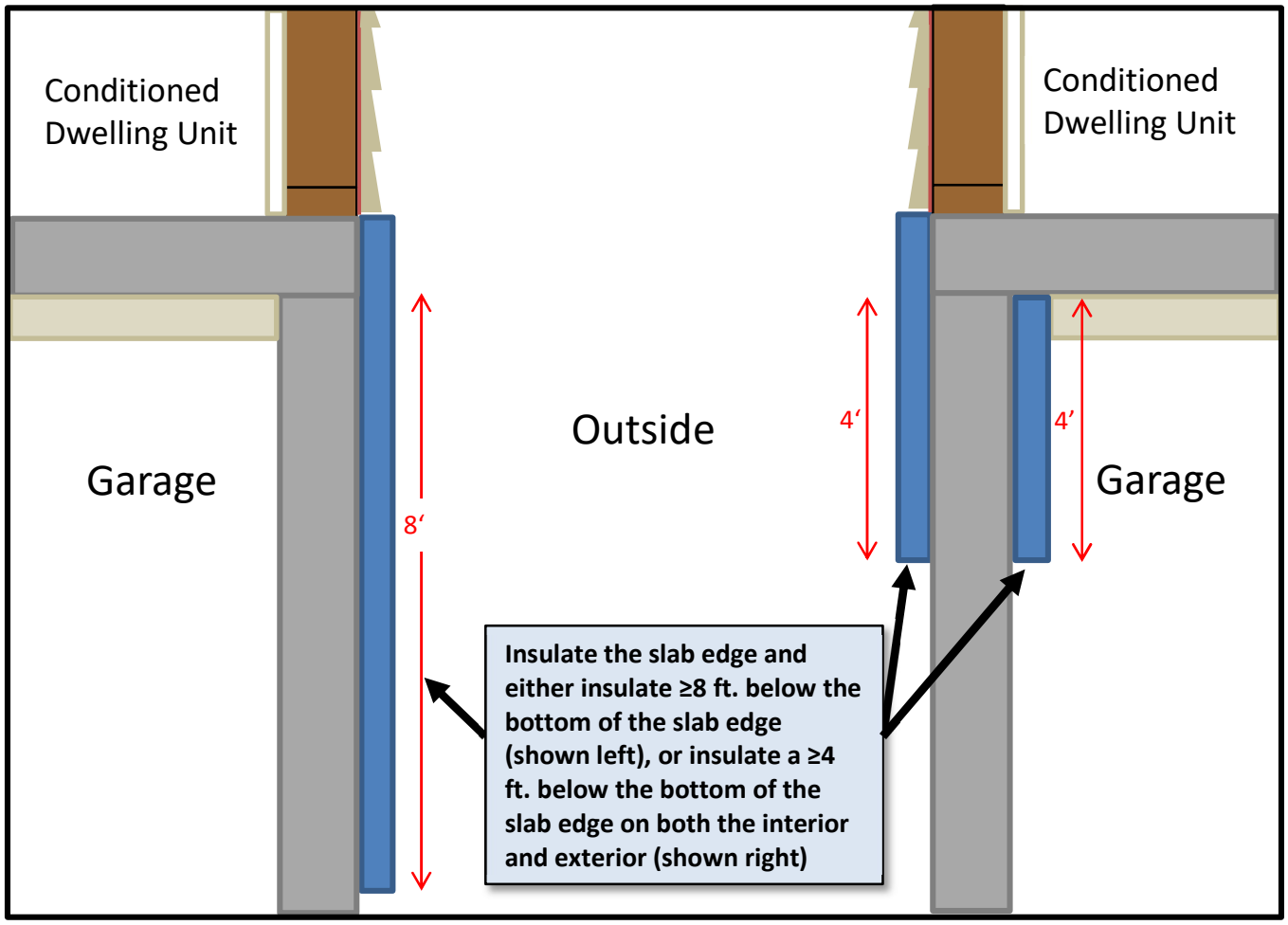
Figure 8



Alternative Slab Edge Detail 1 (MFNC Only):

Per Item 3.5 of the MFNC National Rater Field Checklist, above-grade concrete slab edges (e.g., podiums, balconies) in CZ 4-8 must have the slab edge insulated to ≥ R-5 & aligned with the thermal boundary of the walls. At this boundary, for slabs resting on mass walls, insulation must extend ≥ 8 ft. below the bottom of the slab edge, as shown in Figure 9 on the left. As an alternative, insulation may be installed on both interior and exterior surfaces of the wall for a minimum of 4 ft., as shown in Figure 9 on the right.

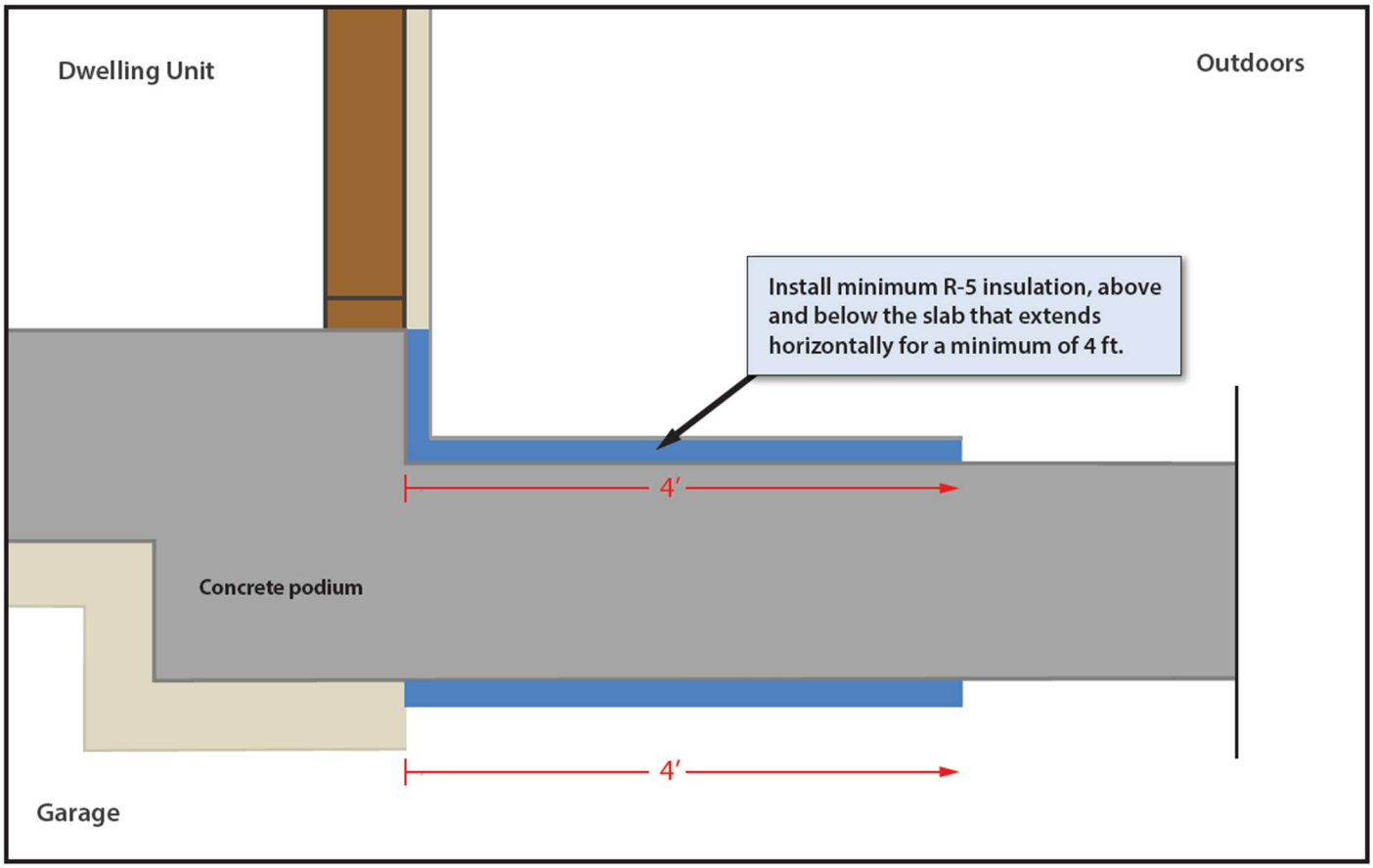
Figure 9



Alternative Slab Edge Detail 2 (MFNC Only):

In lieu of insulation at the slab edge in alignment with the wall as required by Item 3.5 of the MFNC National Rater Field Checklist, above-grade monolithic slabs may install 4 ft. of horizontal, R-5 insulation above and below the slab as shown in Figure 10. Insulation installed on top of slab shall be covered by a durable floor surface.

Figure 10



Alternative Slab Edge Detail 3 (MFNC Only):

In lieu of slab edge insulation extended to the depth specified by Item 3.5 of the MFNC National Rater Field Checklist, internally-supported above-grade slabs with R-5 slab edge insulation that is in full contact with the under-slab insulation are allowed, as shown in Figure 11.

Most elevated slabs rest on concrete walls and, therefore, typically cannot maintain such a thermal break. However, for those elevated slabs designed to be internally supported in such a way that continuous R-5 insulation can be maintained across the slab edge and connect to the under-slab insulation, their slab edge insulation is not required to extend below the slab edge, as shown in the figure below.

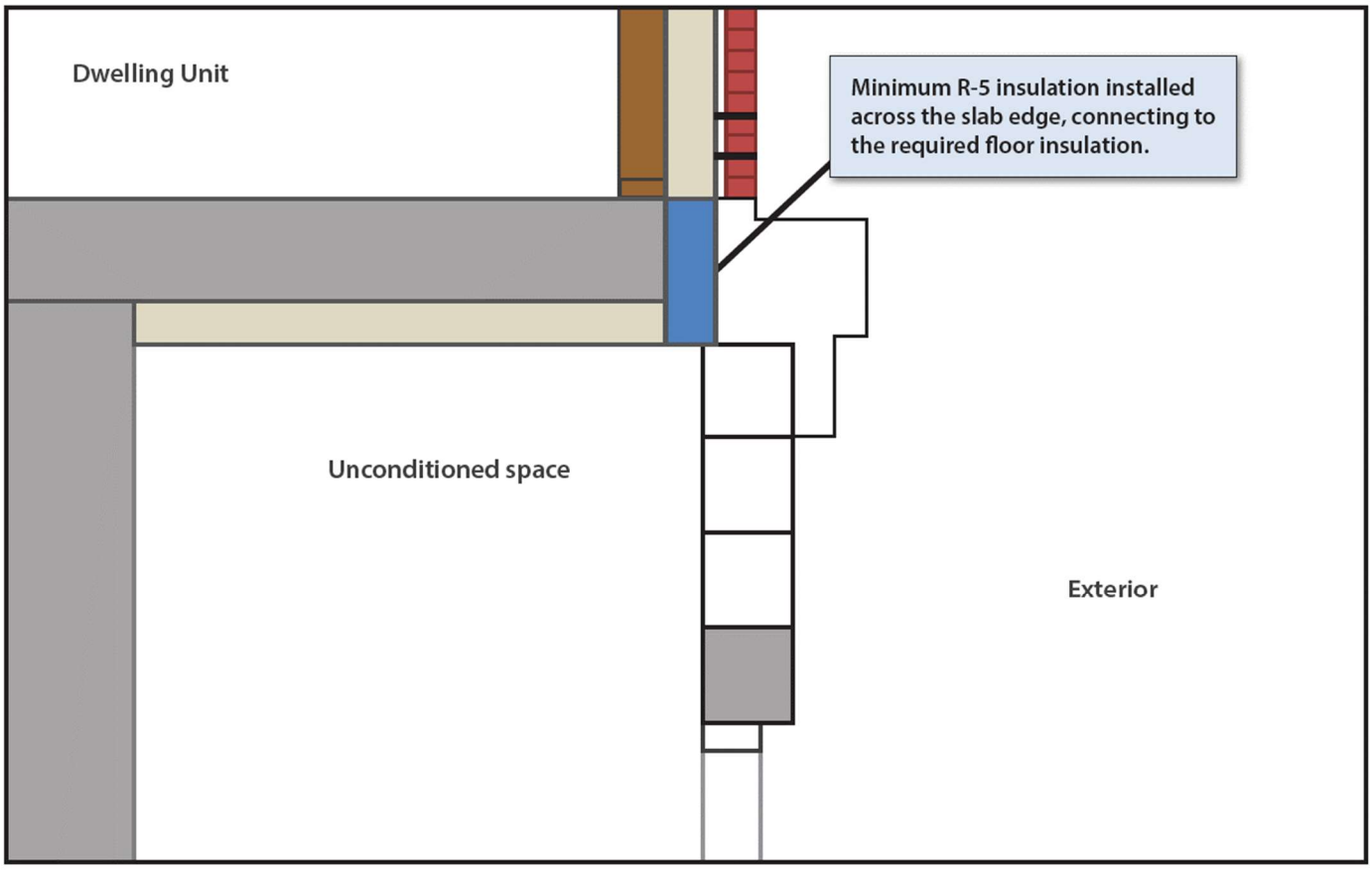



Figure 11