

Converting Unconditioned Basement to Conditioned Space - Code Notes

[2009 IECC]

Background

Converting a basement to conditioned space increases the living space of a house. As with most construction activities, the conversion or remodeling must be done in compliance with construction codes in force at the time the remodel permit is issued. Compliance shall be demonstrated by meeting the requirements of the 2009 International Energy Conservation Code (IECC). The IECC offers both prescriptive and performance compliance approaches. The prescriptive compliance approach uses either the R-value of insulating materials for each component (Sections 402.1.1 and 402.1.2 and Table 402.1.1) or the U-factor for each assembly (Section 402.1.3 and Table 402.1.3). Section 402.1.4 is an alternative to the prescriptive approach--the total building thermal envelope UA is less than or equal to the total UA resulting from using the U-factors in Table 402.1.3. The U.S. Department of Energy's REScheck software allows trade-offs among levels of energy efficiency of components to demonstrate compliance using this UA approach. Section 405 offers a simulated performance alternative compliance approach that requires the proposed residence be shown to have an annual energy cost less than or equal to the annual energy cost of the standard reference design.

Applications

The insulation and glazing solutions proposed below are options that can be considered in demonstrating compliance with the 2009 IECC when converting an unconditioned basement to conditioned space. A table provides the code requirement for each climate zone followed by solutions proposed for both a prescriptive compliance approach and the alternative REScheck software overall UA approach which allows trade-offs among levels of component efficiency. The performance approach of Section 405--a computer software simulated comparison of annual energy costs--offers the opportunity to avoid high cost strategies in some areas by exceeding code minimums in others and trading-off the difference.

Mandatory for all Climate Zones -- Air leakage

The IECC requires certain Mandatory requirements be met regardless of insulation R-values and glazing U-factors. Reducing air leakage into the building envelope is important to reduce energy use in the space. The building thermal envelope shall be durably sealed to limit infiltration. Caulk, gasket, weather-strip or otherwise seal with an air barrier material, suitable film or solid material all accessible sources of infiltration and air leakage including plate penetrations; plate / sheathing junctures; plate / floor junctures; plate / drywall junctures; sheathing seams, joints, and penetrations; seal and insulate the rim joist; and verify by blower door test result of <7air changes per hour (7ACH at 50p) or field verified by a code official-approved party. Duct tightness test (duct blaster) is not required if the air handler and all ducts are located within conditioned space.

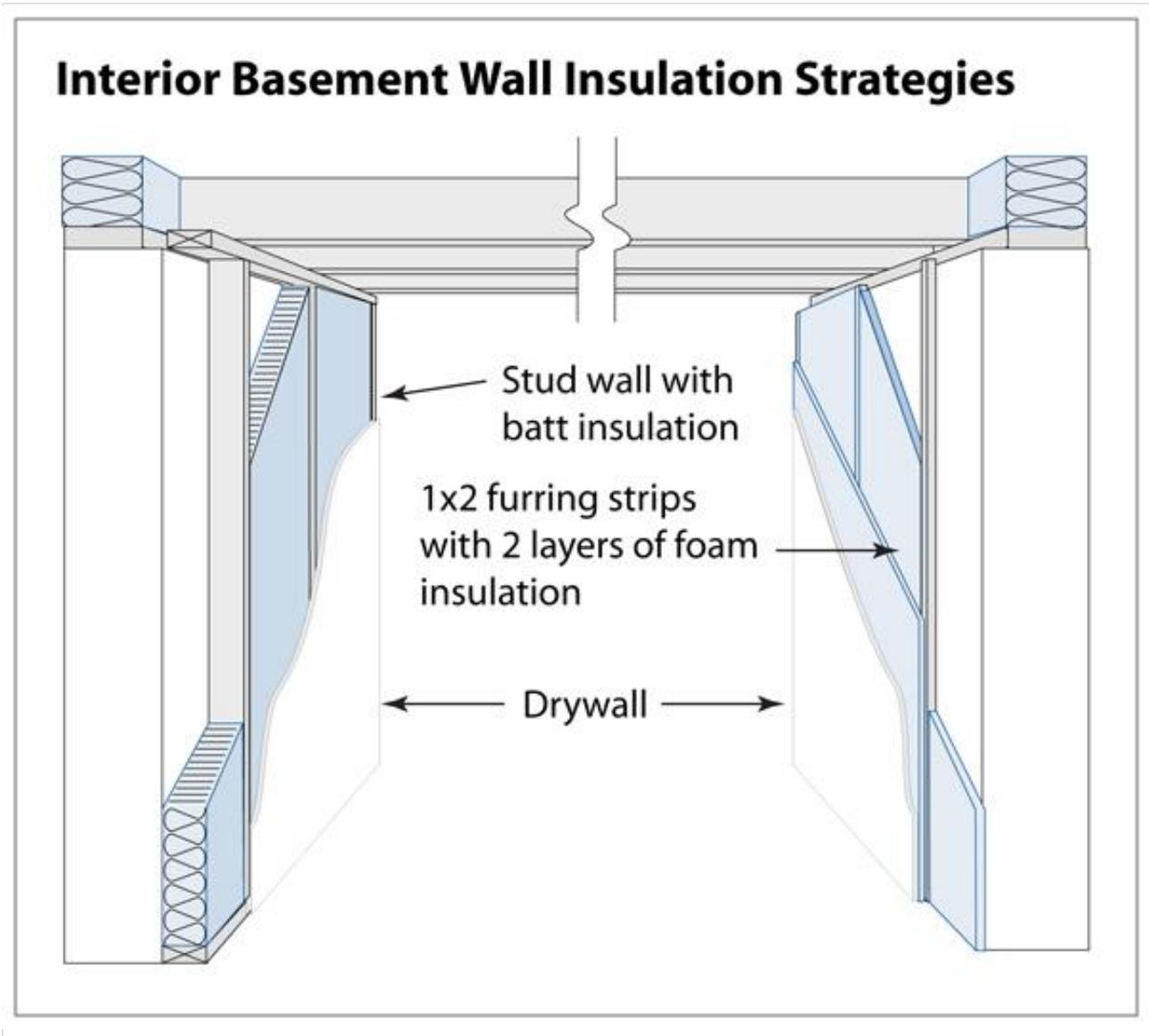
The Prescriptive requirements for the building envelope are presented in Table 1. The assemblies that are presented in this table are typically encountered when converting an unconditioned basement to a conditioned space.

Climate Zone	Fenestration U-Factor	Glazed Fenestration SHGC	Basement Wall R-Value
1	1.2	0.30	0
2	0.65	0.30	0
3	0.50	0.30	5/13
4 except Marine	0.35	NR	10/13



5 and Marine 4	0.35	NR	15/19
6	0.35	NR	15/19
7&8	0.35	NR	15/19

Table 1.



Compliance Solutions for Walls

The following insulation options will meet the requirements for walls listed in Table 1.

- R-0 : Basement wall insulation not required in warm-humid locations as defined by IECC Figure 301.1 and Table 301.1.
- R-5 / 13 : "R-5 / 13" means R-5 continuous insulated sheathing on interior or exterior or R-13 cavity insulation at the interior of the basement wall.
- R-10 / 13 : "R-10 / 13" means R-10 continuous insulated sheathing on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.



- R-15 / 19 : "R-15/19" means R-15 continuous insulated sheathing on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "R-15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulated sheathing on the interior or exterior of the home.

Compliance Solutions for Basement Fenestrations

- Fenestration U-factor: Table U-factors are maximums.
- Glazed Fenestration SHGC: Table SHGC are maximums.

Plan Review

Ensure the drawings detail and call-out the layering of insulating materials--the individual and total R-values of insulating materials comprising the building thermal envelope.

Field Inspection

Verify proper installation and layering of insulating materials; verify proper installation and effectiveness of sealing to minimize air leakage.

Code Citations*

The building thermal envelope shall be durably sealed to limit infiltration. (2009 IECC Section 402.4)

Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component R-value. (2009 IECC Section 402.1.2)

R-values are minimums. U-factors and SHGC are maximums. R-19 batts compressed into a nominal 2"x6" framing cavity such that the R-value is reduced by R-1 or more shall be marked with the compressed batt R-value in addition to the full thickness R-value. (2009 IECC Table 402.1.1)

More Information

[Basement Insulation Systems](#)

[Renovating Your Basement](#)

[Insulated Sheathing](#)

[Basement Insulation](#)

References

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