



# THERMAL ENVELOPE

AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	AIR BARRIER CRITERIA	INSULATION INSTALLATION CRITERIA
General requirements	A continuous air barrier shall in the building envelope. The exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed.	Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stairs or knee wall doors to unconditioned spaces shall be sealed.	The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.
Walls	The junction of the foundation and sill plate shall be sealed. The exterior thermal envelope shall be sealed. Knee walls shall be sealed.	Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with insulation having a thermal resistance of R-3 per inch minimum. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed. Rim joists shall include the air barrier.	Rim joists shall be insulated.
Floors (including above garage and cantilevered floors)	The air barrier shall be installed at any exposed edge of insulation.	Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of subfloor decking or floor joisting cavity insulation. Spill or perimeter insulation shall be installed with the top edge of the insulation in contact with the top edge of the subfloor decking or floor joisting. Framing and sheathing shall extend from the bottom of the sill perimeter floor framing members.
Crawl space walls	Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.	Where provided instead of floor insulation, insulation shall be permanently attached to the crawl space walls.
Sheds, penetrations	Ducts, stairs, utility penetrations, and tube shafts openings to exterior or unconditioned space shall be sealed.	Barbs in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that conforms to the available cavity space.
Narrow cavities	Air sealing shall be provided between the garage and conditioned spaces.	
Garage separation	Recessed light fixtures installed in the building thermal envelope shall be sealed to the drywall.	Recessed light fixtures installed in the building thermal envelope shall be air tight and IC rated.
Recessed lighting		
Plumbing and wiring	The air barrier installed at exterior walls adjacent to showers and tubs shall separate them from the showers and tubs. The air barrier shall be installed behind electrical or plumbing boxes or in sealed boxes or shall be installed.	Bar framing shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on insulation readily conforms to wiring. Exterior walls adjacent to showers and tubs shall be insulated.
Shower/tub or exterior wall		
Electrical/phone box on exterior walls		
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.	
Concealed sprinklers	When required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or sealant shall not be used to fill gaps between fire sprinkler cover plates and walls or ceilings.	

a. In addition, inspection of top walls shall be in accordance with the provisions of ICC 400.

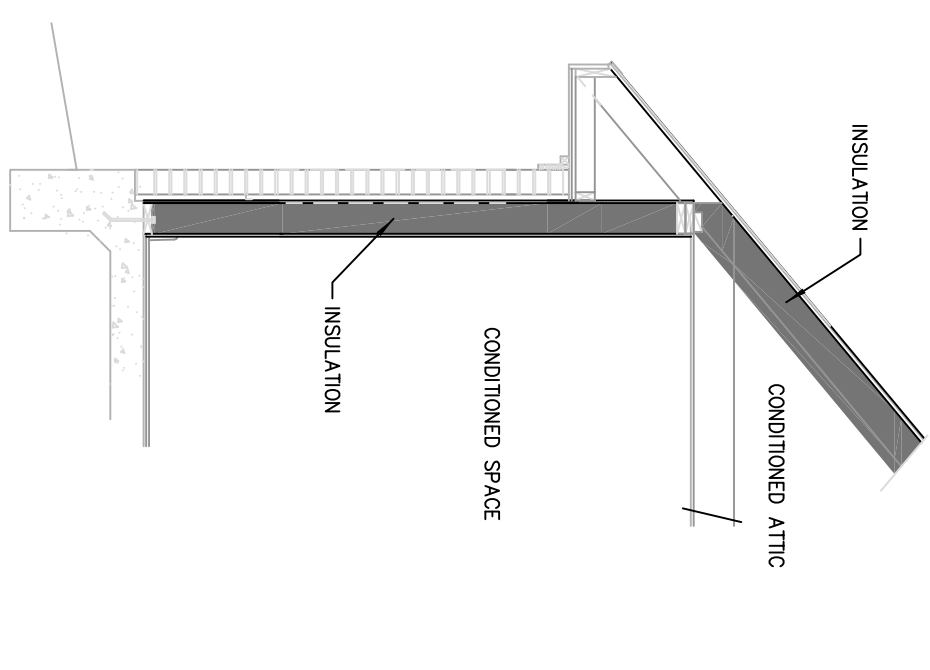
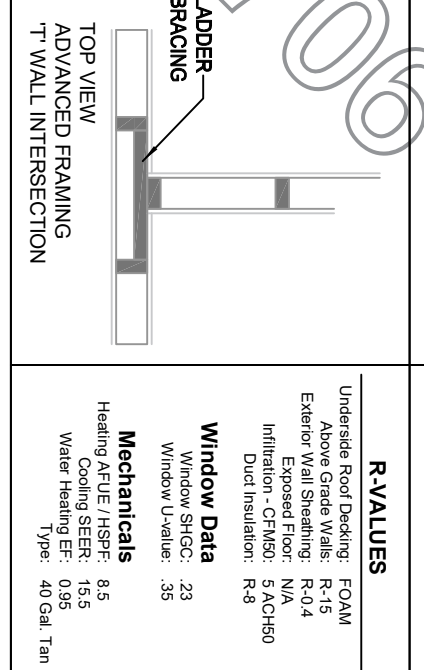
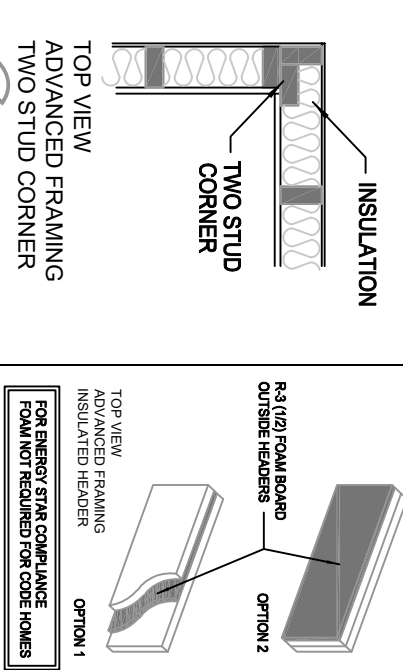
## PRESCRIPTIVE COMPLIANCE REFERENCE VALUES

TABLE R402.1.2  
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT<sup>a</sup>

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	GLAZED FENESTRATION SHGC <sup>b</sup>	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT WALL R-VALUE	SLAB R-VALUE	SPACE R-VALUE	CREAK R-VALUE
2	NR	0.75	0.25	30	13	34	13	0	0	0	0
3	0.40	0.65	0.25	38	13	46	13	0	0	0	0
4 EXCEPT MARINE	0.35	0.55	0.25	38	20 or 13+5 <sup>c</sup>	61/3	19	5/15 <sup>d</sup>	0	5/13	0
5 AND MARINE 4	0.32	0.55	0.40	49	20 or 13+5 <sup>c</sup>	81/3	19	10/13	0	10/13	0
6	0.32	0.55	NR	49	20 or 13+5 <sup>c</sup>	13/17	30 <sup>e</sup>	15/19	10, 2 ft	15/19	15/19
7 AND 8	0.32	0.55	NR	49	20+5 or 13+10 <sup>f</sup>	15/20	30 <sup>e</sup>	15/19	10, 4 ft	15/19	15/19
7 AND 8	0.32	0.55	NR	49	20+5 or 13+10 <sup>f</sup>	19/21	38 <sup>e</sup>	15/19	10, 4 ft	15/19	15/19

For SI: 1 foot = 304.8 mm.  
 a. R-values are minimums. U-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the depth or design thickness of the fenestration, the SHGC column applies to all glazed fenestration. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in climate zone 1 through 3 where the SHGC for each skylight does not exceed 0.30.  
 b. "15/19" means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "10, 2 ft" shall be permitted to be met with R-10 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home.  
 c. R-5 shall be added to the required slab edge R-value for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Climate Zones 1 through 3 for heated slabs.  
 d. There are no SHGC requirements in the Marine Zone.  
 e. Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1  
 f. The first value is cavity insulation, the second value is continuous insulation, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation.  
 1. The second R-value applies when more than half the insulation is on the interior of the mass wall.

Note: Performance Values May Represent Actual Values Listed Above.



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