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Project: R-VALUE 2x6 WALL	BY:	Sheet No: 1/1
Location:	Date:	
Client:	Checked:	Job No:
Description: IECC R402.1.3 U-FACTOR ALT	Date:	

U-FACTOR CALCULATION (IECC 402.1.3)

WALL COMPONENT	CAVITY	STUDS/PLATES	HEADERS	
OUTSIDE AIR FILM	.25	.25	.25	
PLYWOOD SIDING	.59	.59	.59	
CONTINUOUS INSULATION	~~0~~	~~0~~	~~0~~	
PLYWOOD SHEATHING	.83	.83	.83	
WOOD STUDS (2x6 @ 24" O.C.)	6.88	6.88	6.88	r-1.25/in x 5.5"
CAVITY INSULATION	19.00	~~0~~	~~0~~	
½" GYPSUM BOARD	.45	.45	.45	
INSIDE AIR FILM	.68	.68	.68	
SUM OF THERMAL RESISTANCES	28.68	9.68	9.68	

CAVITY = 78% OF WALL
STUDS/PLATES = 18% OF WALL
HEADERS = 4% OF WALL

FRAME WALL R-FACTOR W/O R-5 INSULATING SHEATHING

(28.68 / .78) + (9.68 · .18) + (9.68 · .04)

22.37 + 1.74 + .39 = 24.49

U = 1/R = 1/24.49 = .0408 < .048

* 2x6 STUDS @ 24" O.C. W/ R-19 INSULATION MEETS ENERGY CODE REQUIREMENTS

TABLE R402.1.3

CHECK 2x6 STUDS @ 16" O.C.
CAVITY = 75%
STUDS/PLATES = 21%
HEADERS = 4%

R = (28.68 · .75) + (9.68 · .21) + (9.68 · .04)
R = 21.51 + 2.03 + .039 = 23.92

U = 1/23.92 = .042 < .048 O.K

* 2x6 STUDS @ 16" O.C W/ R-19 MEETS ENERGY CODE REQUIREMENT

R402.1.3

When combined with the "systems" requirements (see Section 403), these two sections will provide the total package of energy conservation that the code requires.

The term "Building thermal envelope" is defined in Chapter 2[RE] as being "the basement walls, exterior walls, floor, roof and any other building elements that enclose conditioned spaces. This boundary also includes the boundary between conditioned space or provides a boundary between conditioned space and exempt or unconditioned space." Therefore, when combined with the definition of "Conditioned space," the code has defined the boundaries of the building that will be regulated by this section. The building thermal envelope is a key term and resounding theme used throughout the energy requirements. It defines what portions of the building structure bound conditioned space and are thereby covered by the insulation and infiltration (air leakage) requirements of the code. The building thermal envelope includes all building components separating conditioned spaces (see commentary, "Conditioned space") from unconditioned spaces or outside ambient conditions and through which heat is transferred. For example, the walls and doors separating an unheated garage (unconditioned space) from a living area (conditioned space) are part of the building envelope. The walls and doors separating an unheated garage from the outdoors are not part of the building thermal envelope. Walls, floors and other building components separating two conditioned spaces are not part of the building envelope. For example, interior partition walls, the common or party walls separating dwelling units in multiple-family buildings, and the wall between a new conditioned addition and the existing conditioned space are not considered part of the building envelope.

Unconditioned spaces (areas having no heating or cooling sources) are considered outside the building thermal envelope and are exempt from these requirements (see Section R101.5.2). A space is conditioned if it is heated or cooled directly; communicates directly with a conditioned space; or where a space is indirectly supplied with heating, cooling or both through uninsulated walls, floors or uninsulated ducts or HVAC piping. Boundaries that define the building envelope include the following:

- Building assemblies separating a conditioned space from outdoor ambient weather conditions.
- Building assemblies separating a conditioned space from the ground under or around that space, such as the ground around the perimeter of a slab or the soil at the exterior of a conditioned basement wall. Note that the code does not specify requirements for insulating basement floors or underneath slab floors (except at the perimeter edges).
- Building assemblies separating a conditioned space from an unconditioned garage, unconditioned sunroom or similar unheated/cooled area.

The code specifies requirements for ceiling, wall, floor, basement wall, slab-edge and crawl space wall components of the building envelope. In some cases, it may be unclear how to classify a particular part of a building. For example, skylight shafts have properties of a wall assembly but are located in the ceiling assembly. In these situations, a determination needs to be made and approved by the code official prior to construction so that the proper level of insulation can be installed to complete the building thermal envelope. Generally, skylight shafts and other items that are vertical or at an angle of greater than 60 degrees (1.1 rad) from the horizontal would typically use the wall insulation value.

R402.1.1 Insulation and fenestration criteria. The *building thermal envelope* shall meet the requirements of Table R402.1.1 based on the climate zone specified in Chapter 3.

❖ This section serves as the basis for the code's general insulation and fenestration requirements. Therefore, this is the first place to determine what the requirements for the building thermal envelope will be. There are specific requirements for certain assemblies and locations that are addressed in Sections R402.2 and R402.3. This section begins by establishing the requirements for the building thermal envelope by requiring compliance with the proper component insulation and fenestration requirements of Table R402.1.1. However, once that general requirement is established, Sections R402.1.3 and R402.1.4 will provide two alternative means of showing that the building thermal envelope will comply. Any of the two methods may be used at the discretion of the designer. The two options and their advantages are discussed in the commentary with the subsections. In general, the later sections will provide the designer with more options and flexibility, but they also are more complex than using Table R402.1.1 on an individual component basis.

Table R402.1.1 lists the minimum *R*-value, and maximum *U*-factor and SHGC requirements for different portions of the building thermal envelope, including basement and exterior walls, floor, ceiling and any other building elements that enclose conditioned space. Using the table begins with determining the climate zone for the proposed location from Figure R301.1. Once the climate zone has been determined, each of the *R*-value, *U*-factor or SHGC requirements must be met for the applicable component (e.g., ceilings, walls, floors, etc.).

Maximum fenestration *U*-factor is the first column in Table R402.1.1 that must be complied with (see definition for "Fenestration" in Chapter 2). Except as modified or exempted by Section R402.3, each fenestration product in the proposed building must not exceed the maximum *U*-factor requirement presented in the table for a particular climate zone. For example, a single-family residence located in Climate Zone

5 would require installation of glazed fenestration products with a maximum *U*-factor of 0.32. This would include all glazing in the walls of the building thermal envelope (e.g., vertical windows), and skylights in the roof would be limited to a maximum *U*-factor of 0.55. The proposed glazing *U*-factor should be called out in the building plans either on the floor plan or in a window schedule. This will provide the necessary information to the field inspector, who will then need to verify that what is on the plans is installed in the field.

Fenestration products that do not have National Fenestration Rating Council (NFRC) labels on them must use the default *U*-factors contained in Table R303.1.3(1) or R303.1.3(3). See the commentary to Section R303.1.3 and Table R303.1.3(1). Note that the lowest default *U*-factor included in the table for glazed fenestration is listed at 0.55 for a "nonmetal or metal-clad double-pane window." This *U*-factor will not meet the requirements of the code in Climate Zones 2 and higher.

TABLE R402.1.1. See below.

❖ Table R402.1.1 serves as the basis for establishing the building thermal envelope requirements based on the text of Section R402.1.1 and sets the performance level for each of the individual components listed. See the commentary for Sections R402.1.1, R402.2 and R402.3 for additional discussion related to the components in the table. The simplest compliance approach is to meet these requirements directly. Note that the requirements do not change based on the area of the components of the residence. These same requirements apply to changes in existing buildings; for example, additions.

A few specifics of Table R402.1.1 may benefit from clarification.

When applying the fenestration requirements of this table, it is important to remember the definition of "Fenestration" and that it does include items such as doors, glass block and other items, as well as windows. Therefore, any door located in the building thermal envelope would still be subject to these limitations. Although vertical fenestration (vertical windows and doors) and skylights have a separate column for *U*-factor, the SHGC applies to both. This is reinforced by the provisions of Note b.

The ceiling *R*-value requirements are precalculated for insulation only and already assume a credible *R*-value for other building materials, such as air films, interior sheathing and exterior sheathing. The only *R*-value for ceiling insulation that may be used to meet the requirements is that installed between the conditioned space and the vented airspace in the roof/ceiling assembly. This typically is not an issue because most insulation is installed directly on top of the gypsum board ceiling and the ceiling location represents the building thermal envelope. Insulation installed in the ceiling must meet or exceed the required insulation level. Although not covered in the

TABLE R402.1.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b, e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	200 or 13+5[h]	8/13	19	5/13[f]	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5[h]	8/13	19	10 /13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h]	13/17	30[g]	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10[h]	15/20	30[g]	15/19	10, 4 ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10[h]	19/21	38[g]	15/19	10, 4 ft	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 label or design thickness of the insulation, the installed *R*-value of the insulation shall not be less than the *R*-value specified in the table.

b. The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in Climate Zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.

c. "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. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home. "10/13" means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.

d. R-5 shall be added to the required slab edge *R*-values 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.

e. There are no SHGC requirements in the Marine Zone.

f. Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1.

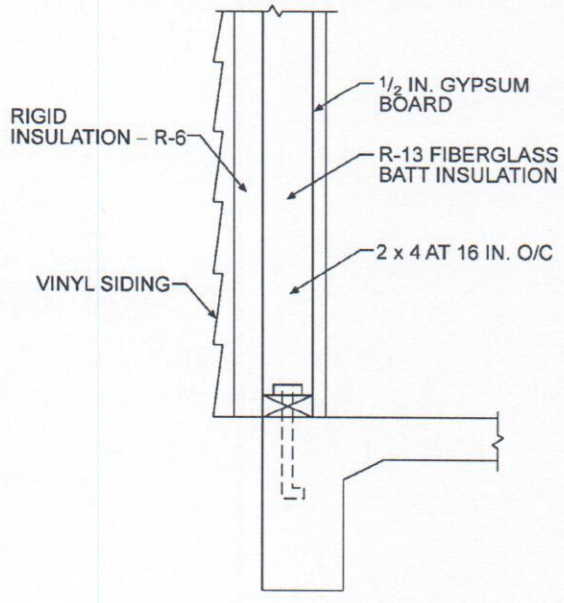
g. Or insulation sufficient to fill the framing cavity, R-19 minimum.

h. First value is cavity insulation, second is continuous insulation or insulated siding, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. If structural sheathing covers 40 percent or less of the exterior, continuous insulation *R*-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.

i. The second *R*-value applies when more than half the insulation is on the interior of the mass wall.

code, the "conditioned attic" requirements of the *International Residential Code*® (IRC®) may be viewed as an acceptable alternative if approved by the code official. These minimum ceiling *R*-values would still be applicable where the provisions of Section R806.4 of the IRC were used to create a conditioned attic assembly. In those cases, the insulation and air barrier (building thermal envelope) are simply located at the roof instead of at the ceiling line. See the commentary to Sections R402.2.1 and R402.2.2 for additional information regarding ceiling insulation requirements.

The *R*-values listed under the "Walls" column of Table R402.1.1, represent the sum of the insulation materials installed between the framing cavity and, if used, the insulating sheathing (see Section 402.1.2 regarding how to compute the *R*-value). Insulating sheathing must have an *R*-value of at least R-2 to be considered. The R-2 limitation comes from the definition of "Insulating sheathing." The *R*-value of non-insulative interior finishes, such as sheetrock, or exterior coverings, such as wood structural panel siding, is not considered when determining whether the proposed wall assembly meets the requirements. For example, in Commentary Figure R402.1.2, the *R*-value of the cavity insulation installed between framing (R-13) is added to the insulating sheathing installed on the outside of the studs (R-6) resulting in an R-19 wall. The R-19 total insulation value can then be compared to the *R*-value requirement for the specific climate zone in Table R402.1.1 to determine compliance.



For SI: 1 inch = 25.4 mm.

Figure R402.1.2
EXTERIOR *R*-VALUES

The insulation *R*-value requirement for exterior walls assumes wood framing. Walls framed using steel studs or constructed of materials such as a concrete masonry unit (CMU) are addressed in Sections R402.2.5 and R402.2.6. Whenever a residence has more than one type of wall (frame or mass) or more than one type of below-grade wall (conditioned basement or crawl space) the requirement for each component is taken from the appropriate column in Table R402.1.1.

Mass walls are defined and have additional requirements listed in Section 402.2.5. Mass walls are intended to be above-grade walls and do not include basement walls, which have a separate entry in the table.

Note a reminds the code user which level of performance is required. Therefore, when dealing with *R*-values, a higher number would be better. When dealing with *U*-factors, the lower the number, the better the performance.

In accordance with Note c, for basement walls and crawl space walls, the two numbers separated by a "/" represent the values for continuous and cavity insulation; either will meet the code's requirements. For example, in Climate Zone 6, the wall can either be covered with continuous insulation to a minimum level of R-15, or if some type of framing is used (such as a wood frame wall used to finish out a basement), R-19 insulation must be installed in the cavity. This higher level of cavity insulation adjusts for the bridging or reduction in energy efficiency that the framing elements would create.

In accordance with Note d, heated slabs require R-5 insulation in Climate Zones 1, 2 and 3; and R-15 slab-edge insulation in Climate Zones 4 and above. This R-15 insulation is the result of R-5 being "added" to the R-10 insulation level specified in the table for Climate Zones 4 through 8.

In accordance with Note g, where R-30 underfloor insulation is required, less insulation may be used if the framing cavity is filled, down to a minimum of R-19. This recognizes that extending the framing solely to hold more insulation can cost more than it is worth.

R402.1.2 *R*-value computation. Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component *R*-value. The manufacturer's settled *R*-value shall be used for blown insulation. Computed *R*-values shall not include an *R*-value for other building materials or air films.

❖ This section indicates how the *R*-value in Table R402.1.1 is to be determined. Table R402.1.1 specifies the required *R*-values for the insulation products: the nominal *R*-value. This is the *R*-value of the insulation products only. Although other products and features, such as finish materials, air films and airspaces, may contribute to overall energy efficiency, when determining the *R*-value in the code, these additional items are not considered and do not contribute to the nominal *R*-value. For example, if a

wall had R-13 cavity insulation, gypsum board with an *R*-value of almost R-1, and exterior siding that has an *R*-value of R-1, the overall wall *R*-value is simply R-13 because the gypsum board and the exterior siding do not contribute to the *R*-value for purposes of determining code compliance. Where there is more than one layer of insulation, the *R*-values for the layers are summed. For example, a wall with R-13 batts in the framing cavity and R-4 insulated sheathing would be treated as an R-17 wall (13 plus 4 is 17). It is only insulation materials that may be summed to determine the component's *R*-value.

R402.1.3 *U*-factor alternative. An assembly with a *U*-factor equal to or less than that specified in Table R402.1.3 shall be permitted as an alternative to the *R*-value in Table R402.1.1.

❖ For residences built with common insulation products, the most direct method of compliance is often the *R*-values in Table R402.1.1. As an alternative, compliance can be demonstrated by calculating the *U*-factor for a component. Table R402.1.3 gives *U*-factors that are deemed to be equivalent to the *R*-values in the prescriptive tables. Unlike the *R*-values in Table R402.1.1, which consider only the insulation, *U*-factors consider all the parts of the construction. *U*-factors for a wall might include exterior siding, gypsum board and air films, all of which would be excluded from the *R*-value computation by Section R402.1.2; for example, whether wall framing is 16 or 24 inches (406 or 610 mm) on center matters in computing the *U*-factor. Whether framing is metal or wood can have a significant impact on *U*-factor.

U-factors are well suited to several applications. Construction types that limit the amount of framing or include thermal breaks as part of their design may benefit from *U*-factor calculations. Components with complex or nonuniform geometries can use testing to establish *U*-factors. Compliance with the "total UA alternative" or trade-off approach in Section R402.1.4 also requires the use of the *U*-factor tables.

Example of *U*-factor calculation in Table R402.1.3:

WALL COMPONENT	CAVITY	STUDS, PLATES	HEADERS
	R-value	*R*-value	*R*-value
Outside air film	0.25	0.25	0.25
Plywood siding	0.59	0.59	0.59
Continuous insulation	5	5	5
Plywood sheathing	0.83	0.83	0.83
Wood studs	—	~~4.38~~	~~4.38~~
Cavity insulation	13	—	—
1/2" Gypsum board	0.45	0.45	0.45
Inside air film	0.68	0.68	0.68
Sum of thermal resistance	20.8	12.18	12.18

The above table includes the *R*-values for the cavity and framing (studs, plates and headers). The *U*-factor is 1/*R*-value. To calculate the *U*-factor for the combination of the cavity and framing at 16 inches on-center spacing, calculate the *U*-factor based on the weighting factors of 75-percent cavity, 21-percent studs and plates, and 4-percent headers (78-percent cavity, 18-percent studs and plates and 4-percent headers for 24 inches on-center spacing). An assembly with a *U*-factor equal to or less than that calculated in this table must be permitted as an alternative to an assembly in Table R402.1.1.

The *U*-factor for the above assembly may be calculated as shown below:

$$U = \frac{0.75}{20.8} + \frac{0.21}{12.18} + \frac{0.04}{12.18} = 0.057$$

Example of *U*-factor alternative:

WALL COMPONENT	CAVITY	STUDS, PLATES	HEADERS
	R-value	*R*-value	*R*-value
Outside air film	0.25	0.25	0.25
Plywood siding	0.59	0.59	0.59
Continuous insulation	13.1	13.1	31.1
Plywood sheathing	0.83	0.83	0.83
Wood studs	—	~~4.38~~	~~4.38~~
Cavity insulation	0.91	—	—
1/2" Gypsum board	0.45	0.45	0.45
Inside air film	0.68	0.68	0.68
Sum of thermal resistance	16.81	20.28	20.28

In the above assembly, the R-13 cavity insulation is removed and a value of 0.91 is assumed for the airspace in the stud cavity. The continuous insulation is increased to 13.1. The framing spacing is increased to 24 inches (610 mm) on center.

The *U*-factor for the above assembly may be calculated as shown below:

$$U = \frac{0.78}{16.81} + \frac{0.18}{20.28} + \frac{0.04}{20.28} = 0.057$$

The *U*-factor from the above assembly is equal to or less than that specified in Table R402.1.3.

It should be noted that the *U*-factor alternative could be used for all or part of a wall. Thus, the prescriptive *R*-values in Section R402.1.2 can be applied to one segment of the wall, and the *U*-factors in this section can be used to determine the construction of another segment of the wall. One possible combination would be to apply the prescriptive requirements of Table R402.1.1 for a portion of the exterior wall thermal envelope with structural sheathing and the *U*-factor alternative (Table R402.1.3) for the portion of the exterior wall thermal envelope which does not have structural sheathing. Note h of Table R402.1.1 could be applied to 40 percent of the wall when structural sheathing is present, allowing a reduction in the *R*-value of R-3 for this segment.

When approved by the code official based on equivalency and intent of the code in accordance with Section R102, alternative methods of construction, materials and insulation systems may also be used

as an alternative to the prescriptive *R*-values of Table R402.1.1. For example, designers may substitute greater stud spacing, insulated plates and insulated headers in walls as an alternative to the prescribed cavity or continuous insulation.

TABLE R402.1.3. See below.

❖ This table provides the equivalent *U*-factors that may be used in accordance with Sections R402.1.3 and R402.1.4. See the commentary for Section R402.1.3 for discussion related to this table.

R402.1.4 Total UA alternative. If the total *building thermal envelope* UA (sum of *U*-factor times assembly area) is less than or equal to the total UA resulting from using the *U*-factors in Table R402.1.3 (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table R402.1.1. The UA calculation shall be done using a method consistent with the ASHRAE *Handbook of Fundamentals* and shall include the thermal bridging effects of framing materials. The SHGC requirements shall be met in addition to UA compliance.

❖ This alternative allows the insulation in one portion of the building to make up for less insulation in another part. It recognizes that there may be reasons for less insulation in some parts of the building, which can be compensated for by more insulation in other parts of the residence. The key concept is that the overall building thermal flow (UA) complies with the code. This concept could allow a ceiling to make up for a wall or vice versa. As a practical matter, whether a building will comply with this method can sometimes be estimated quickly. A large area that is significantly over the required *R*-value will make up for a small area only mildly under the required *R*-value. Likewise, it will sometimes be obvious that a small area that mildly exceeds the requirement will not make up for a large area well below the requirement.

This section will allow for such trade-offs, but only if the total UA for the proposed building is below the aggregate UA calculation using the required values in Table R402.1.3 and the same assembly areas as the actual building. In other words, under this alternative, components with varying insulating values can be "traded off" with one another as the builder sees fit as long as the total UA calculation for the entire building complies with a calculation for that same house that uses the same assembly areas and the maximum UA values from Table R402.1.3.

The UA is the sum of the component *U*-factors times each assembly area. The maximum allowable UA is the UA for a proposed design as if it was insulated to meet exactly the individual component *U*-factor requirements. This trade-off provision allows the type of insulation and installed fenestration to vary, which permits significant design flexibility. The desire for trade-offs in construction is common because of unexpected problems or design conflicts, and a UA trade-off analysis is usually calculated with the assistance of electronic compliance tools, depending on the jurisdiction. (For example, the Department of Energy (DOE) has online compliance software for the code called REScheck™, which can be downloaded from the DOE web site at www.energycodes.gov. REScheck, if approved by the jurisdiction as compliant with the code, can be used to perform a UA trade-off analysis.)

This section explicitly prohibits the trade-off of SHGC requirements, requiring that the "SHGC requirements be met in addition to UA compliance." As a result, glazed fenestration must comply with the SHGC values shown in Table R402.1.1, even if the *U*-factor is modified by trading off against some other component.

The requirements of this section establish specific additional requirements for any trade-off. First, the baseline house must have the same assembly areas as the proposed house (e.g., the same area of each assembly—fenestration, skylights, ceiling, wall and floor). Second, the calculation should be done consistent with the ASHRAE *Handbook of Fundamentals*. Third, the calculation must include the thermal bridging effects of framing materials. To meet these requirements, the calculation method must either specifically combine the actual framing and insulation paths (with their specific areas and *U*-factors) or use

TABLE R402.1.3
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

a. Nonfenestration *U*-factors shall be obtained from measurement, calculation or an approved source.

b. When more than half the insulation is on the interior, the mass wall *U*-factors shall be a maximum of 0.17 in Climate Zone 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.

c. Basement wall *U*-factor of 0.360 in warm-humid locations as defined by Figure R301.1 and Table R301.1.