



How to Do Residential Thermal Performance Calculations Using Table 13-B

This pamphlet is one in a series that describes residential energy conservation requirements of the Oregon One and Two Family Dwelling Code and the Structural Specialty Code for Group R buildings three stories and less in height. Other pamphlets in this series may be obtained from local code authorities or from Oregon Building Codes Division.

Homes may comply with residential energy code through a prescriptive path (Table 13-A) or thermal performance calculations using Table 13-B. The seven prescriptive paths represent different packages of measures that achieve similar performance. Prescriptive Path 1 is the “Base Path.” Paths 2 through 7 are thermal equivalents of Path 1.

Other combinations of measures may be used if thermal performance calculations show that the combination achieves the performance standard of the Base Path. Thermal performance calculations take more time, but have several advantages over prescriptive paths:

Trade-offs can save money. Thermal performance calculations allow “credit” for exceeding requirements. For example, builders often use more efficient windows than prescriptive paths require. Thermal performance calculations allow trading of improved window performance for lower conservation levels elsewhere in the building. Overall building performance still meets the Base Path. Prescriptive paths don’t allow credit for exceeding requirements.

Flexibility. When no prescriptive path seems to work for a particular project, thermal performance calculations may be used to customize the conservation package for the job.

Untested windows, doors and skylights may be used. In general, prescriptive paths require use of tested products. Builders who want to use certain

products that are not yet tested can use thermal performance calculations to demonstrate code compliance. Certain untested products are assigned conservative default U-values (rates of heat transfer per square foot). Other parts of the package are adjusted to compensate for conservative performance estimates of untested components.

Thermal performance calculations should be submitted on a copy of Table 13-B, shown in this pamphlet and in the pamphlet *Table 13-B: Residential Thermal Performance Calculations*. Use of a standard format expedites review of the calculations by the code official.

How Table 13-B works

In a thermal performance calculation, a component U-value is multiplied by total area (A) of the component in square feet. The result of this calculation is the “UA.” The UA indicates rate of heat transfer through total component area. Totaling rates of heat transfer for listed building components gives a “UA total,” or a heat transfer rate for all items that affect code compliance.

In Table 13-B, building heat loss is first calculated as if the building was built using measures in the Base Path (Prescriptive Path 1). On the Table 13-B worksheet this is called “Base Path 1.” The heat loss total is called “Code UA.” Next, the UA is calculated for alternate conservation measures under consideration by the builder or designer. On the worksheet this is called the “Proposed Alternate.” The heat loss rate is called “Proposed UA.”

If Proposed UA is equal to or less than Code UA, proposed measures meet energy code performance standards. If the Proposed Alternate doesn’t initially

qualify, the builder or designer improves conservation levels in one or more building components until it does.

The process starts with determining areas (in square feet) of each building component. Then Code UA and Proposed UA are calculated using guidelines in this pamphlet and in footnote 2 to Table 13-B. The U-value column for Base Path 1 on the Table 13-B worksheet lists U-values for calculating Code UA. Proposed Alternate U-values are listed in the table “Approved U-Values for Common Assemblies” that accompanies Table 13-B or the list of “Default U-Values for Group R Buildings Three Stories and Less in Height - Wood Frame Construction” on pages 7-8 of this pamphlet.

Minimum component requirements

Thermal performance calculations allow trading of lower energy performance of one component for higher energy performance of another. However, the Proposed Alternate must at least meet the minimum component requirement listed in footnote 3 to Table 13-B. U-values for minimum component R-values are in the table “Approved U-Values for Common Assemblies” that accompanies Table 13-B.

Prescriptive Path 1 area limits apply to Table 13-B calculations

Prescriptive Path 1 contains component area limitations: wood main entry doors are limited to 24 square feet; R-30 vaulted ceilings are limited to 50 percent of heated space floor area; and skylights (U-0.41 to U-0.50) are limited to 2 percent of heated floor space. These component limits must be observed when calculating Base Path 1 in Table 13-B. Footnote 2 in Table 13-B and this pamphlet explain how component area limits are modeled in the Base Path 1 calculation. Example calculation worksheets are on pages 9-11 of this pamphlet.

Calculating component areas

The first step in using Table 13-B is to find component areas of each component:

Flat ceilings

Area equals length times width. Use outside dimensions and round to the nearest whole square foot. Deduct skylight area and use “net ceiling area.”

Minimum component requirement is R-38, or U-0.031.

Vaulted ceilings

Area equals length times width of the ceiling surface. Measure vault length along the slope to the peak. Deduct skylight area and use “net vault area.”

Minimum component requirement is R-21, or U-0.047.

R-30 vault area limit in Base Path calculation: For Base Path 1, enter area of the R-30 vault, not to exceed 50 percent of heated floor space. Include excess vault area with “Flat Ceilings.” For Proposed Alternate, enter actual area of vaulted ceiling under “Vaulted Ceilings.” If there are two or more vaulted ceilings with different U-values, enter each vaulted ceiling UA on separate lines for the Proposed Alternate calculation.

Opaque (solid) walls

Area equals length times height, using outside dimensions and rounding to the nearest whole square foot. For triangular walls at vaults and gable ends, area equals base times height divided by two.

Account for all walls that divide heated and unheated spaces. Remember to include walls between house and garage, vault end walls, skylight wells, pony walls, knee walls, and stairway walls that may divide heated and unheated spaces. Subtract area of windows and exterior doors from total opaque wall area. Use this “net wall area” for the performance calculation.

Minimum component requirement is R-15, or U-0.080.

Windows

For rectangular windows, area equals width times height. Since window U-values include heat loss through the frame, use rough opening dimensions to calculate window area. Round to the nearest whole square foot. For whole circles, area equals π (3.14) times radius squared ($A = \pi r^2$). For half-round windows, figure whole circle area and divide by two. For triangular windows, area equals base times height divided by two.

Deduct window area from gross wall area.

Window line A: If window area for the building exceeds 13 percent of the “heated space floor area,” use actual window area in the window heat loss calculation for both Base Path 1 and Proposed Alternate.

Window line B (for detached single-family dwellings only): If window area is less than 13 percent of heated space floor area, use 13 percent of heated space floor area as window area for Base Path 1. Use actual window area (less than 13 percent) for the Proposed Alternate. This gives a qualification advantage to detached single-family dwellings with reduced glazing area.

Minimum component requirement is U-0.65, or a class 65 window — typically a double glazed window with a thermally-improved metal frame.

For untested windows, use default U-values from the following table:

Window Type	Glazing Type	U-Value
Site built	Clear, 1/2" air space	0.65
Site built	Low-e, 3/8" air space	0.60
Certain manufactured, wood framed	Clear, 1/2" air space	0.65
Certain manufactured, wood framed	Low-e, 3/8" air space	0.60

1 percent unique glazing exemption: Glazing area equal to 1 percent of heated space floor area may be exempt from meeting window U-value standards if it

is a “unique architectural glazing feature.” That includes door sidelights, stained glass, glass contained in a door, garden windows and other decorative glass. Skylights and conventional window configurations that include but are not limited to horizontal sliders, double-hung and picture windows are not eligible as unique architectural features. Do not include unique exempted glazing in thermal performance calculations. A note accompanying calculations should indicate which windows were exempted and exempted window area.

Skylights

Area equals rough opening dimension: length times width. Deduct skylight area from gross flat or vaulted ceiling area.

Minimum component requirement is U-0.65. If skylights are untested, use window default U-values.

2 percent skylight area limit in the Base Path calculation: For Base Path 1 actual skylight area, up to 2 percent of the heated space floor area is entered as “Skylight” (U-0.50). If actual area exceeds 2 percent of heated space floor area, enter excess area under “Window” (U-0.40). Excessive skylight area entered as window may bump the window area total above 13 percent and preclude use of the line B window trade-off.

For the Proposed Alternate, enter actual skylight area using the tested U-value or appropriate default U-value. If skylights have different U-values, calculate each skylight UA separately.

Main entry door

Area equals width times height of the rough opening. Include sidelights with windows.

Unglazed doors, untested or tested: For Base Path 1 door area, enter up to 24 square feet as “Main Entry Door” (U-0.54). Enter excess door area as “Other Exterior Doors” (U-0.20).

For the Proposed Alternate, enter door area as “Main Entry Door” using the tested door U-value or the default value (U-0.54). If an untested 1-3/4- inch foam core door with a thermal break is used, use a U-0.20 default value for the Proposed Alternate.

1 percent unique glazing exemption for doors with less than 2.5 square feet of glazing: If the 1 percent unique glazing exemption is taken, note excluded glazing area on the Table 13-B worksheet, but do not include it in Base Path 1 or Proposed Alternate calculations. Use net door area: total door area minus exempted glazing area.

In Base Path 1, enter up to 24 square feet of net door area under “Main Entry Door” (U-0.54). Enter under “Other Exterior Doors” (U-0.20) remaining door area. If excess glazing area remains, use the base case window default value (U-0.40).

For Proposed Alternate opaque door area, use U-0.54 or the 1-3/4-inch foam core door with thermal break default value (U-0.20) and enter under “Main Entry Door.” Use default values even if the door has a tested value. The glazing exemption “removes” the glass from the door. Thus, tested U-values are no longer valid. If excess glazing area remains after the exemption, use default glazing U-values (0.60 or 0.65).

No glazing exemption for doors with less than 2.5 square feet of glazing: For Base Path 1, enter up to 24 square feet of door area under “Main Entry Door” (U-0.54). Enter excess opaque area under “Other Exterior Doors” (U-0.20). Enter excess glazing as “Window” (U-0.40).

Tested doors: Use actual door area and tested U-value for the Proposed Alternate.

Untested doors: Use actual door area and U-0.54 or the 1-3/4-inch foam core door with thermal break default value (U-0.20) for the Proposed Alternate. Use window default values (U-0.60 or 0.65) for glazed areas.

1 percent unique glazing exemption for doors with more than 2.5 ft² glazing: If the 1 percent unique glazing exemption is taken, note excluded glazing area on the Table 13-B worksheet, but do not include it in Base Path 1 or Proposed Alternate calculations. Use net door area: total door area minus exempted area.

Tested doors: Exclude exempted area from calculations. For Base Path 1, enter up to 24 square feet of net door area under “Main Entry Door” (U-0.54). Enter excess opaque area under “Other Exterior Doors” (U-0.20). Enter excess glazed area as “Window” (U-0.40).

For Proposed Alternate, use U-0.54 or the 1-3/4-inch foam core door with thermal break default value (U-0.20) for net opaque door area. Use default window values (0.60 or 0.65) for glazed area and enter under “Window.” Use defaults even though a tested value is available because the 1 percent exemption “removes” glazing from the door. Thus, tested U-values are no longer valid.

Untested doors: For Base Path 1, enter up to 24 ft² of net door area under “Main Entry Door” (U-0.54). Enter excess glazed area as “Window” (U-0.40). Excess glazed area may preclude use of the line B window trade-off. Enter excess opaque door area under “Other Exterior Doors” (U-0.20).

For Proposed Alternate, use U-0.54 or the 1-3/4-inch foam core door with thermal break default value (U-0.20) for net opaque door area. Enter net glazed area under “Window” using default window U-values (0.60 or 0.65).

No glazing exemption for doors with more than 2.5 ft² glazing:

Tested doors: For Base Path 1, enter up to 24 ft² of door area under “Main Entry Door” (U-0.54). Enter excess glazed area as “Window” (U-0.40).

For Proposed Alternate, enter actual door area as “Main Entry Door” using the tested U-value.

Untested doors: For Base Path 1, enter up to 24 ft² of door area as “Main Entry Door” (U-0.54). Enter excess glazing as “Window” (U-0.40).

For Proposed Alternate opaque door area, use U-0.54 or the 1-3/4-inch foam core door with thermal break default value (U-0.20) and enter under “Main Entry Door.” Use window default values (U-0.60 or 0.65) for glazed door area.

Deduct entire door area from gross wall area.

Minimum component requirement for the main entry door is U-0.54.

Other exterior doors

Area equals width times height of rough opening. Deduct other door area from gross wall area.

Minimum component requirement is U-0.54. An unglazed, untested wood door has a default U-value of 0.54.

Underfloor

Underfloor area is floor area that divides heated from unheated spaces. Examples include floors above unheated crawl spaces or unheated basements, cantilevered floors, and floors above unheated garages.

Underfloor area called for in the calculation may be different from total “heated space floor area” of the home. Heated space floor area in a two-story home includes the area of both the first and second floors because both are heated. But in many homes, only the

first floor divides heated from unheated space, so only first floor area is used as underfloor area for the calculation.

The minimum component requirement for underfloor area is R-21, or U-0.035.

Slab edge (in linear feet of perimeter)

To calculate slab heat loss, first determine linear footage of the slab perimeter. Slab edge losses pertain to on-grade slabs only, which are part of the heated space floor area.

Minimum component requirement is R-10, or F-0.54.

Basement walls

Basement walls are not included in Table 13-B calculations because the minimum component requirement is R-21. The basement wall insulation requirement includes insulation at the rim joist.

Air infiltration

Air infiltration is not included in Table 13-B thermal performance calculations.

Footnote 1

Footnote 1 indicates that performance trade-offs are limited to building components listed in Table 13-B. Furnace efficiency, duct insulation and passive and active solar heating are not considered in thermal performance calculations.

Component U-values

Base Path 1 U-values

To calculate Code UA, use U-values listed in the U-value column of the Base Path 1 calculation.

Proposed U-values

To calculate Proposed UA using an assembly not listed in the Base Path, use U-values listed in the table “Default U-Values for Group R Buildings Three Stories and Less in Height - Wood Frame Construction” in this pamphlet. Another source of approved Proposed U-values is Table 13-B footnotes.

Default U-Values for Group R buildings three stories and less in height — wood fram construction

Flat ceilings

<i>Insulation</i>	<i>Type</i>	<i>U-value</i>
R-38	Conventional	0.031
R-38	8/12 pitch or greater	0.028
R-38	Advanced frame	0.026
R-49	Conventional	0.025
R-49	8/12 pitch or greater	0.024
R-49	Advanced frame	0.020

Vaulted ceilings

<i>Insulation</i>	<i>Type</i>	<i>U-value</i>
R-21	Rafter	0.047
R-30	Rafter	0.033
R-38	Rafter	0.027
R-21	Scissor	0.055
R-30	Scissor	0.046
R-38	Scissor	0.042
R-49	Scissor	0.039
R-30	Advanced scissor	0.032
R-38	Advanced scissor	0.026
R-49	Advanced scissor	0.020
R-29	8-1/4" EPS foam core panel	0.037
R-37	10-1/4" EPS foam core panel	0.030
R-44	12-1/4" EPS foam core panel	0.025

Exterior walls

<i>Insulation</i>	<i>Insulation Sheathing</i>	<i>Frame</i>	<i>U-value</i>
R-15	0	Conventional	0.080
R-15	0	Advanced	0.075
R-19	0	Conventional	0.065
R-19	0	Intermediate*	0.063
R-19	0	Advanced	0.061
R-21	0	Conventional	0.060
R-21	0	Intermediate*	0.058
R-21	0	Advanced	0.055
R-11	3.5	Conventional	0.069
R-11	5	Conventional	0.063

Exterior walls continued

<i>Insulation</i>	<i>Insulation Sheathing</i>	<i>Frame</i>	<i>U-value</i>
R-11	7	Conventional	0.055
R-11	3.5	Advanced	0.067
R-11	5	Advanced	0.061
R-11	7	Advanced	0.054
R-13	3.5	Conventional	0.064
R-13	5	Conventional	0.058
R-13	7	Conventional	0.052
R-13	3.5	Advanced	0.062
R-13	5	Advanced	0.056
R-13	7	Advanced	0.050
R-15	3.5	Conventional	0.060
R-15	5	Conventional	0.055
R-15	7	Conventional	0.049
R-15	3.5	Advanced	0.057
R-15	5	Advanced	0.052
R-15	7	Advanced	0.047
R-19	3.5	Conventional	0.052
R-19	5	Conventional	0.047
R-19	7	Conventional	0.043
R-19	3.5	Advanced	0.049
R-19 (R-24A)	5	Advanced	0.045
R-19	7	Advanced	0.041
R-21	3.5	Conventional	0.048
R-21	5	Conventional	0.044
R-21	7	Conventional	0.040
R-21	3.5	Advanced	0.044
R-21	5	Advanced	0.042
R-21	7	Advanced	0.038

<i>Insulation</i>	<i>U-value</i>
R-14.88 4-1/2" EPS foam core panel	0.065
R-22.58 6-1/4" EPS foam core panel	0.045
R-29.31 8-1/4" EPS foam core panel	0.035

Floors

<i>Insulation</i>	<i>Type</i>	<i>U-value</i>
R-21	Underfloor	0.035
R-25	Underfloor	0.032
R-30	Underfloor	0.028
R-10	Slab edge	F=0.54**
R-15	Slab edge	F=0.52**

Windows - Untested

<i>Type</i>	<i>U-value</i>
<i>See section 5303(c)2E for specifications</i>	
Site-built - wood	
1/2-inch dead air space, clear glass	0.65
3/8-inch dead air space, low-e glass	0.60
Certain manufactured - wood frame only	
1/2-inch dead air space, clear glass	0.65
3/8-inch dead air space, low-e glass	0.60

**Intermediate framing consists of studs placed at 16 o.c. with insulated corners, intersections of interior partition walls and headers.*

***F=The heat loss coefficient, in Btu/hr/°F per foot of perimeter.*

Footnote 4 to Table 13-B states that U-values calculated using standard ASHRAE methodology may be used. Consult the Oregon Building Codes Agency for information about assumptions used to calculate new component U-values.

What happens if Proposed UA exceeds Code UA?

If Proposed UA exceeds Code UA, the building does not meet energy code. Make changes in proposed U-values until you find a combination of measures equivalent to or less than Code UA.

Example calculations

Following are examples of Table 13-B thermal performance calculations:

In Example 1, the builder is using windows that exceed code standards and wants to do trade-offs with other building components.

In Example 2, window area is less than 13 percent of floor area. The builder is taking advantage of the line B window trade-off.

Example 3 shows how to do calculations for a building that has R-30 vaults in excess of 50 percent of heated floor space.

Example 4 shows how to do calculations for a building that has R-30 vaults in excess of 50 percent of heated floor area and skylights in excess of 2 percent of heated floor space.

Example 5 shows how to do calculations when a wood main entry door exceeds the 24 square foot limit.

Example 6 shows how to treat untested glazing in thermal performance calculations.

Example 1:

Builder trades window performance against other measures

$$\frac{\text{Heated Floor Area}}{\text{Slab}} = \frac{674}{2301} = 29\%$$

$$\frac{\text{Window Area}}{\text{Floor Area}} = \frac{327}{2301} = 14\%$$

$$\frac{\text{Crawl}}{\text{Total}} = \frac{1672}{2301 \text{ Ft}^2}$$

More efficient windows make it possible to decrease vault, wall, floor, and slab R-values. A less efficient skylight (0.60) also may be used.

**Table No. 13-B
Residential Thermal Performance Calculations**

BUILDING COMPONENTS ¹ (Areas from Plan Take-offs in sq. ft.)	U-VALUES						
	Base Path 1			Proposed Alternate			
	Areas ²	U-Value	Areas x U	R-Value ³	Areas ²	U-Value ⁴	Areas x U
Flat Ceilings	1965	0.031	60.91	R-38	1965	.031	60.91
Vaulted Ceilings ⁸	407	0.033	13.43	R-21	407	.047	19.13
Opaque Walls	1754	0.060	105.24	R-19 std.	1754	.065	114.01
Windows (Use A or B) ⁵							
A. If glazing area is greater than 13% of heated space floor area:	Take-off area 327	0.400	130.8		Take-off area 327	.34	111.18
B. If glazing area is less than 13% of heated space floor area and trade-off is desired:	13% of floor area NA	0.400			Take-off area		
Skylights	16	0.500	8.0	Insul.	16	.6	9.6
Main entry door	20	0.540	10.8	Insul.	20	.19	3.8
Other exterior doors	17	0.200	3.4	R-21	17	.19	3.23
Underfloor	1627	0.032	52.06	R-10	1627	.035	56.95
Slab Edge (perimeter ft.)	117 LF	F=0.520 ⁶	60.84		117 LF	.54	63.18
CODE UA=			445.48	Proposed UA ⁷ =			441.99

Example 2:

Line B window trade-off

$$\frac{\text{Window Area}}{\text{Floor Area}} = \frac{276}{2301} = 12\% \text{ Therefore use Window Line B}$$

Reducing window area to 13 percent or less gives the Proposed Alternate a compliance advantage over Base Path 1

Base Path 1 Wall Area

$$2118 \text{ Gross Wall} - (299 \text{ Windows} + 37 \text{ Doors}) = 1782 \text{ Ft}^2$$

Proposed AH - Wall Area:

$$2118 - (276 \text{ Windows} + 37 \text{ Doors}) = 1805 \text{ Ft}^2$$

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Residential Thermal Performance Calculations**

BUILDING COMPONENTS ¹ (Areas from Plan Take-offs in sq. ft.)	U-VALUES						
	Base Path 1			Proposed Alternate			
	Areas ²	U-Value	Areas x U	R-Value ³	Areas ²	U-Value ⁴	Areas x U
Flat Ceilings	1965	0.031	60.91	R-38	1965	.031	60.91
Vaulted Ceilings ⁸	407	0.033	13.43	R-21	407	.047	19.13
Opaque Walls	1782	0.060	106.92	R-21 std.	1805	.06	108.3
Windows (Use A or B) ⁵							
A. If glazing area is greater than 13% of heated space floor area:	Take-off area NA	0.400			Take-off area		
B. If glazing area is less than 13% of heated space floor area and trade-off is desired:	13% of floor area 299 2301 x .13	0.400	119.6		Take-off area 276	.4	110.4
Skylights	16	0.500	8.0	Insul.	16	.6	9.6
Main entry door	20	0.540	10.8	Insul.	20	.19	3.8
Other exterior doors	17	0.200	3.4	R-21	17	.19	3.2
Underfloor	1627	0.032	52.06	R-10	1627	.035	56.94
Slab Edge (perimeter ft.)	117 LF	F=0.520 ⁶	60.84		117 LF	.54	63.18
CODE UA=			435.96	Proposed UA ⁷ =			435.46

Example 3:

Home exceeds prescriptive R-30 vault area limit

Floor Area = 2301 Flat Ceiling = 857

Vault (Gross) = 1463 Skylights = 16

Allowable Vault $2301 \times .5 = 1151 \text{ Ft}^2$ (Note max = 50% of floor area)

Net Vault = Gross Vault 1463 - Skylights 16 = 1447

Excess Vault as Flat Ceiling: Net Vault 1447 - Allowable Vault 1151 = 296 Vault as Flat Ceiling

When R-30 vault area exceeds 50 percent of the floor area, enter vault in excess of 50 percent as flat ceiling for Base Path 1.

Table No. 13-B
Residential Thermal Performance Calculations

BUILDING COMPONENTS ¹ (Areas from Plan Take-offs in sq. ft.)	U-VALUES						
	Base Path 1			Proposed Alternate			
	Areas ²	U-Value	Areas x U	R-Value ³	Areas ²	U-Value ⁴	Areas x U
Flat Ceilings	857 + 296	0.031	35.74	R-49 std.	857	.0245	21.43
Vaulted Ceilings ⁸	1151	0.033	37.98	R-30	1447	.033	47.75
Opaque Walls	2447	0.060	146.82	R-19 std.	2497	.065	159.05
A. If glazing area is greater than 13% of heated space floor area:	Take-off area 327	0.400	130.8	/ / / / / / / /	Take-off area 327	.34	111.18
B. If glazing area is less than 13% of heated space floor area and trade-off is desired:	13% of floor area NA	0.400		/ / / / / / / /	Take-off area		
Skylights	16	0.500	8.0	Insul.	16	.6	9.6
Main entry door	20	0.540	10.8	Insul.	20	.19	3.8
Other exterior doors	17	0.200	3.4	R-25	17	.19	3.23
Underfloor	1627	0.032	52.06	R-10	1627	.032	52.06
Slab Edge (perimeter ft.)	117 LF	F=0.520 ⁶	60.84		117 LF	.54	63.18
CODE UA=			486.44		Proposed UA⁷=		
					471.28		

Example 4:

Home exceeds R-30 vault and 2 percent skylight limit

Actual Skylight Area: 48 Ft² Allowable Skylight Area $2301 \times .02 = 46 \text{ Ft}^2$

1463 Gross Vault - 48 Skylight = 1415 Net Value

1415 - 1151 = 264 Excess Vault Area to Flat Ceiling

48 Actual Skylight - 46 Allowed = 2 Ft² to Window

Enter excess R-30 vault as flat ceiling and excess skylight area as window for Base Path 1.

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Residential Thermal Performance Calculations

BUILDING COMPONENTS ¹ (Areas from Plan Take-offs in sq. ft.)	U-VALUES						
	Base Path 1			Proposed Alternate			
	Areas ²	U-Value	Areas x U	R-Value ³	Areas ²	U-Value ⁴	Areas x U
Flat Ceilings	857 + 264	0.031	34.75	R-38 F	857	.031	26.57
Vaulted Ceilings ⁸	1151	0.033	37.98	R-30 V	1415	.033	46.70
Opaque Walls	2447	0.060	146.82	R-21 std.	2447	.06	146.82
A. If glazing area is greater than 13% of heated space floor area:	Take-off area 327 + 2	0.400	131.6	/ / / / / / / /	Take-off area 327	.4	130.8
B. If glazing area is less than 13% of heated space floor area and trade-off is desired:	13% of floor area NA	0.400		/ / / / / / / /	Take-off area		
Skylights	46	0.500	23.0	Insul.	48	.5	24.0
Main entry door	20	0.540	10.8	Insul.	20	.19	3.8
Other exterior doors	17	0.200	3.4	R-25	17	.19	3.23
Underfloor	1627	0.032	52.06	R-10	1627	.032	52.06
Slab Edge (perimeter ft.)	117 LF	F=0.520 ⁶	60.84		117 LF	.54	63.18
CODE UA=			501.25		Proposed UA⁷=		
					497.16		

Example 5:

Main entry door exceeds wood door limits

Actual Main Door 40 Ft²

Allowable Main Door 24 Ft²

Excess Area to Other Door: 40 - 24 = 16 Ft²

When actual main door area exceeds 24 square feet and the door is wood, enter excess area as "other door" for Base Path 1.

Table No. 13-B
Residential Thermal Performance Calculations

BUILDING COMPONENTS ¹ (Areas from Plan Take-offs in sq. ft.)		U-VALUES					
		Base Path 1			Proposed Alternate		
	Areas ²	U-Value	Areas x U	R-Value ³	Areas ²	U-Value ⁴	Areas x U
Flat Ceilings	1965	0.031	60.92	R-49std.	1965	.05	49.13
Vaulted Ceilings ⁸	407	0.033	13.43	R-30	407	.033	13.43
Opaque Walls	1734	0.060	104.04	R-21std.	1734	.06	104.04
Windows (Use A or B) ⁵							
A. If glazing area is greater than 13% of heated space floor area:	Take-off area 327	0.400	130.8		Take-off area 327	.40	130.8
B. If glazing area is less than 13% of heated space floor area and trade-off is desired:	13% of floor area NA	0.400			Take-off area		
Skylights	16	0.500	8.0	Wood	16	.5	8.0
Main entry door	24	0.540	12.96	Insul.	40	.54	4.6
Other exterior doors	17 + 16	0.200	6.6	R-25	17	.20	3.4
Underfloor	1627	0.032	52.06	R-15	1627	.032	52.06
Slab Edge (perimeter ft.)	117 LF	F=0.520 ⁶	60.84		117 LF	.052	63.84
CODE UA=			449.65	Proposed UA ⁷ =			443.30

Example 6:

House with untested door sidelight

Untested Sidelight 12 Ft²

Default U-Value = .65 (Wood Frame, 1/2" Air Space Clear Glass)

Use the default U-value for an untested door sidelight for the Proposed Alternate.

Table No. 13-B
Residential Thermal Performance Calculations

BUILDING COMPONENTS ¹ (Areas from Plan Take-offs in sq. ft.)		U-VALUES					
		Base Path 1			Proposed Alternate		
	Areas ²	U-Value	Areas x U	R-Value ³	Areas ²	U-Value ⁴	Areas x U
Flat Ceilings	1965	0.031	60.92	R-38	1965	.031	60.92
Vaulted Ceilings ⁸	407	0.033	13.43	R-30	407	.033	13.43
Opaque Walls	1754	0.060	105.24	R-21A	1754	.057	99.98
Windows (Use A or B) ⁵							
A. If glazing area is greater than 13% of heated space floor area:	Take-off area 327	0.400	130.8		Take-off area 315 12	.40 .65	126.0 7.8
B. If glazing area is less than 13% of heated space floor area and trade-off is desired:	13% of floor area NA	0.400			Take-off area		
Skylights	16	0.500	8.0	Insul.	16	.5	8.0
Main entry door	20	0.540	10.8	Insul.	20	.54	10.8
Other exterior doors	17	0.200	3.4	R-25	17	.2	3.4
Underfloor	1627	0.032	52.06	R-15	1627	.032	52.06
Slab Edge (perimeter ft.)	117 LF	F=0.520 ⁶	60.84		117 LF	.52	60.84
CODE UA=			445.49	Proposed UA ⁷ =			443.23

Information presented in this publication supports the Oregon Residential Energy Code, or Chapter 13 of the 1996 Oregon Structural Specialty Code. This publication does not include all requirements of the code. Refer to the code and check with your code official for additional requirements. If information in this publication conflicts with the code or your local officials, follow the requirements of the code and your local officials.

For more information about the new residential energy code, call the Building Codes Division at 378-4133 or the Oregon Office of Energy — 378-4040 in Salem or toll-free, 1-800-221-8035.

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