5.1.2.1 The minimum requirements of Section 5.3 are met:

5.1.2.2 The design of the building envelope complies with either the prescriptive criteria of Section 5.4 or the system performance criteria of Section 5.5. For the design of buildings with high internal heat gains, unusual operating schedules, or that incorporate innovative design strategies, consideration shall be given to using the compliance paths set forth in Sections 11.0 or 12.0.

5.1.3 The prescriptive compliance alternative of Section 5.4 provides requirements for buildings designed to take advantage of perimeter daylighting, thermal mass, high performance glazings, and fenestration shading. The designer is allowed to make trade-offs between thermal mass, wall insulation, amount of fenestration, shading coefficients, shading projections, thermal transmittance of the glazing, daylighting for several different climate locations.

5.1.4 The systems performance compliance alternative of Section 3.5 provides calculation procedures that give credit for the benefits of more complex energy conserving envelope designs.

5.1.5 Information on thermal properties, performance of building envelope sections and components, and heat transfer shall be obtained from the *ASHRAE Handbook, 1985 Fundamentals Volume*. When information is not available from this source, the data shall be obtained from laboratory or field test measurements conducted in accordance with *ASTM Standard C-177-85*, "Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Guarded Hot Plate," *ASTM Standard C-518-85*, "Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter," *ASTM Standard C-236-80*, "Standard Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box," and *ASTM Standard C-976-82*, "Thermal Performance of Building Assemblies By Means of a Calibrated Hot Box."

5.1.6 *Daylighting Credit*. In this section, daylighting credit for reduced energy use resulting from the use of automatic lighting control devices in conjunction with fenestration, is given only for space heating and cooling loads. Credit for the reduced use of electric lighting energy is calculated in Section 3.5.6. If daylighting credit for reduced electric lighting energy use is desired to be applied to other building systems, such as more fenestration area, Section 11.0 or 12.0 should be used.

5.1.7 The requirements of this section are not intended to replace building loads calculation procedures.

5.2 Principles of Design

5.2.1 Building Loads

5.2.1.1 Building loads result from sources external and internal to the building. (1) External loads, from outdoor temperature, humidity, wind, and insolation, fluctuate daily and seasonally. (2) Internal loads from the activities conducted within the building, including heating and moisture produced by the occupants, lights, and process equipment (e.g., appliances, computers) vary with internal activities. Improving energy efficiency in a building depends on achieving a balance between and among the internal and external loads. The building design should, therefore, offset gains and losses of heat, light, and moisture between the interior and exterior of the building, among interior spaces, and over-time, (daily, seasonally, and annually).

5.2.1.2 This balance of loads can be most efficiently achieved if the building envelope is viewed as, and designed to be, a controlled membrane rather than an immutable barrier. The typical design of a modern building has considered the building envelope to be a fixed barrier that restricts heat and air flow to the maximum extent possible. This will not usually yield the most energy efficient building.

5.2.1.3 The desired goal of the energy design of the building envelope shall be to produce a controlled membrane that allows or prevents heat, light, and moisture flow to achieve a balance between internal and external loads. Thus the envelope becomes an integral part of the building's environmental conditioning systems.

5.2.1.4 To achieve control of the building envelope as a membrane, and to simultaneously achieve occupant comfort in the perimeter zones, many of the traditional building skin components must be used (insulation, mass, caulking and weather stripping). However, other concepts shall also be considered to temper supply air or utilize waste heat in exhaust air to temper envelope conditions, such as operable solar shading devices, and the integration of glazing systems with the HVAC distribution system.

5.2.1.5 Control of External Loads

5.2.1.5.1 Control of Conduction

(a) Controlled conductivity may be considered through the careful use of insulation, sensible (mass) or phase-change storage and movable insulation at levels which minimizes net heating and cooling loads on a time integrated (annual) basis.

(b) Unintentional or uncontrolled thermal bridges shall be minimized and considered in energy related calculations since they can radically alter the conductivity of a building envelope. Examples include wall studs, balconies, ledges, and extensions of building slabs.

5.2.1.5.2 Control of Infiltration (Heat Loss or Gain)

(a) Infiltration shall be minimized and all efforts to achieve a zero level shall be taken. This will minimize fan energy consumption in pressurized buildings during occupied periods and heat loss (or unwanted heat gain in warm climates) during unoccupied periods. Infiltration reduction shall be accomplished through design details that enhance the fit and integrity of building envelope joints in a way that may be readily achieved during building construction. This includes infiltration control by caulking, weather stripping, vestibule doors and/or revolving doors with construction meeting or exceeding accepted specifications.

(b) The quantity of mechanical ventilation must vary with the need, with recommended values at any given time equal to that required by ASHRAE Standard 62-1981. Higher levels of ventilation (e.g., economizers) shall be considered to substitute for mechanical cooling.

(c) Operable windows may be considered to allow for occupant controlled ventilation. When using operable windows, the design of the building's mechanical system must be carefully executed to minimize unnecessary HVAC energy consumption, and building operators must be cautioned about the improper use of the operable windows.

(d) Non-mechanical ventilation can be enhanced in the shape of the building as well as the physical elements of the building envelope, such as cupolas.

(e) For hotels and high rise dwelling units and other systems having exhaust totalling 3000 cfm or more, with annual operation in excess of 3000 hours and within 200 linear ft of simultaneous make-up air equipment, they shall incorporate energy recovery or treatment to ASHRAE 62-1981 quality levels and reuse exhaust air when allowed by code.

5.2.1.5.3 Control of Radiated Heat Losses and Gains

(a) Capability for occupant radiant comfort shall be maintained regardless of whether the building envelope is

designed to be a static or dynamic membrane. Opaque surfaces shall be designed so that the *average* inside surface temperatures will remain within 5 °F of room-temperature in the coldest anticipated weather (i.e., winter design conditions), and the coldest inside surface will remain within 25 °F of the room temperature.

(b) In a building with time-varying internal heat generation, thermal mass may be considered for controlling radiant comfort. In the perimeter zone, thermal mass is more effective when it is positioned internal to the envelope insulation.

(c) The effective control of solar radiation is critical to the design of energy-efficient buildings due to the high level of internal heat production already present in most commercial building types. In some climates, the lighting energy consumption savings due to daylighting techniques can be greater than the heating and cooling energy penalties from additional glazed surface area, provided that the building envelope is properly designed for daylighting and lighting controls are installed and used. In other climates they may not. Daylighting designs are most effective if direct solar beam radiation is not allowed to cause glare in building spaces.

(d) The transparent portions of the building envelope shall be designed to prevent solar radiant gain above that necessary for effective daylighting and solar heating. On south-facing facades, the use of low shading coefficients is generally not as effective as external physical shading devices in achieving this balance. Light shelves offer a very effective means of admitting daylight while shading the view glazing and simultaneously allowing occupants to manipulate interior shading devices (draperies, blinds) without eliminating day light.

(e) The solar spectrum contains a range of wavelengths including visible and infrared (heat). Designers shall consider which portion of the spectrum to admit into the building. For example, low emissivity, high-visible-transmittance glazings may be considered for the effective control of radiant heat gains and losses. For shading control designers may consider the careful use of vegetation that can block excess gain, year-around or seasonally depending on the plant species chosen.

5.3 Minimum Requirements

5.3.1 Overall Thermal Transmittance (U_o)

5.3.1.1 The overall thermal transmittance of the building envelope above grade assembly shall be calculated as follows:

$$U_o = \Sigma U_i A_i / A_o = (U_1 A_1 + U_2 A_2 + \ldots + U_n A_n) / A_o$$

Equation 5.3-1

Where:

U_o = the area weighted average thermal transmittance of the gross area of the building envelope assembly, e.g., the exterior wall assembly including fenestration and doors; roofs and ceiling assembly; or the floor assembly, Btu/h-ft²-°F.

A_o = the gross area of the envelope assembly, ft².

U_i = the thermal transmittance of each individual path of the envelope assembly (see Section 5.3.2). $U_i = 1/R_i$ (where R_i is the total resistance to heat flow of an individual path through an envelope assembly).

A_i = the area of each individual element of the envelope assembly, ft².

5.3.2 *Thermal Resistance of Below Grade Components (R)*

5.3.2.1 In calculating the thermal resistance of all below grade components, the thermal performance of the adjacent ground shall be excluded.

5.3.2.2 *Slabs*

5.3.2.2.1 The R-value required for slabs refers only to the insulation materials. Insulative continuity shall be maintained in the design of slab edge insulation systems. Continuity shall be maintained from the wall insulation through the slab/wall/footing intersection to the body of the slab edge insulation.

5.3.2.2.2 Slab-on-grade floors shall have insulation around the perimeter of the floor with the thermal resistance (R_s) of the insulation specified in accordance with Figure 5.5-2. The slab insulation specified shall extend either in a vertical plane downward from the top of the slab for the minimum distance shown or downward to the bottom of the slab then in a horizontal plane beneath the slab or outward from the building for the minimum distance shown. The horizontal length, or vertical depth, of insulation required varies from 24 in. to 48 in. depending upon the R-value selected. For heated slabs, an R of 2 shall be added to the thermal resistance required.

5.3.2.2.3 Vertical insulation shall not be required to extend below the foundation footing. There are no insulation requirements for slabs in locations having less than 3,000 HDD65 or for footings extending less than 18 in. below grade.

5.3.2.2.4 The dimensional requirements for horizontal insulation refers to the insulation materials only. Horizontal applications shall have a thermal break in the slab edge that provides continuity between the wall insulation on the slab and the horizontal insulation.

Below Grade Walls

5.3.2.3.1 The R-value required for Below Grade Walls refers to the overall R-value of the wall assembly excluding air film coefficients and the thermal performance of the adjacent ground.

5.3.3 Thermal Transmittance (U_i) of an Envelope Assembly

5.3.3.1 The thermal transmittance of each envelope assembly shall be determined with due consideration of all major series and parallel heat flow paths through the elements of the assembly. Compression of insulation shall be considered in determining the thermal resistance.

5.3.3.2 The thermal transmittance of opaque assemblies U_i shall be determined using a series path procedure that corrects parallel paths, such as insulation and studs in a wall cavity or the roof assembly shown in Figure 5.3-1. Table 5.3-1 prescribes the procedure to be used for Subsections 5.3.3.2.1 and 5.3.3.2.2.

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Figure 5.3-1

Example of Total Resistance of an Envelope Assembly Including Series Resistance and Parallel Path Equivalent Resistance Elements

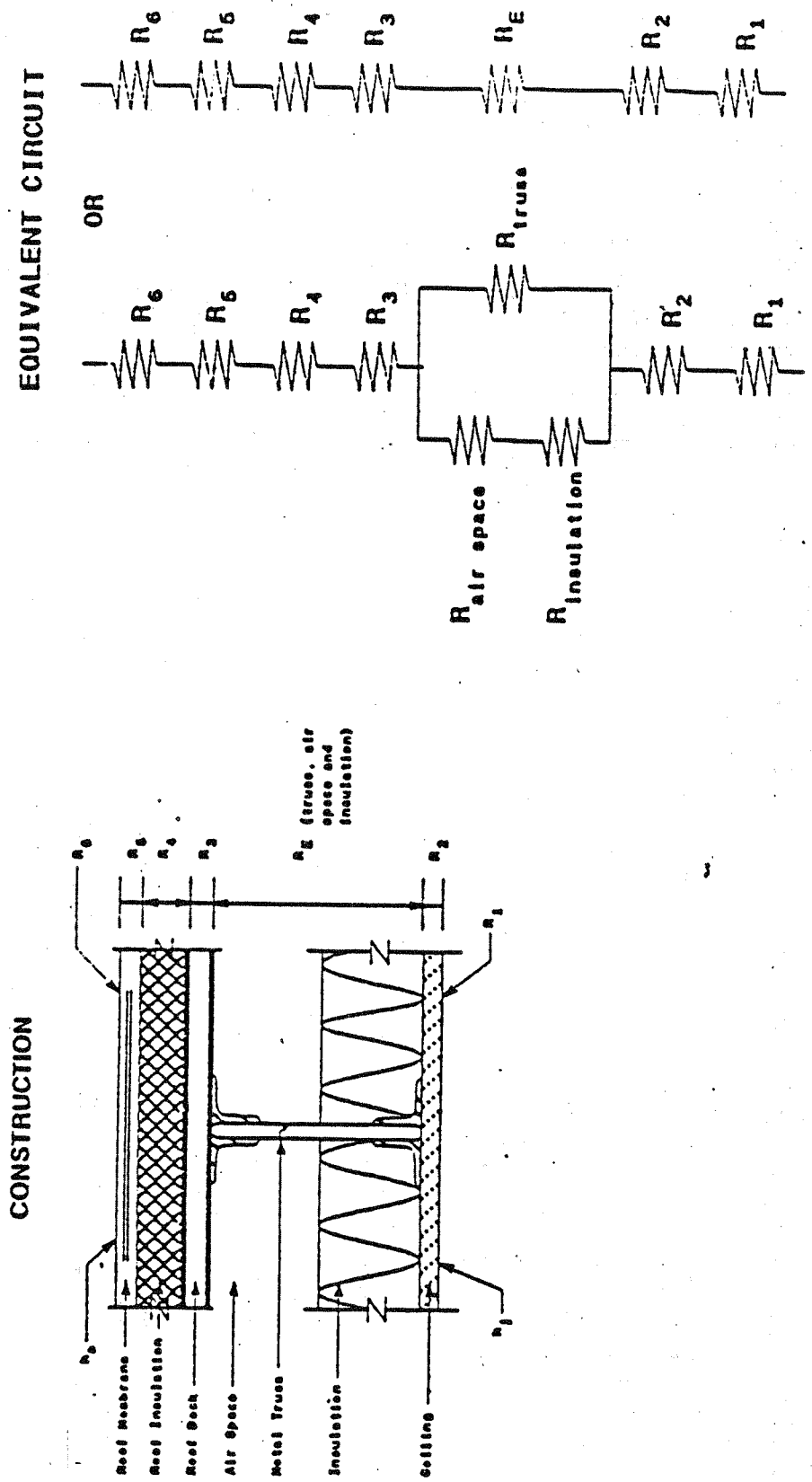

Table 5.3-1

Calculation Procedures for Thermal Transmittance Through Opaque Envelope Assemblies

Material Attached To Thermal Bridge Material	Thermal Bridge Material	Calculation Procedure(s)
Metal	Metal	Thermal Bridges Sheet Metal Construction, 5.3.3.2.1 (d)
Metal	Non-Metal	Parallel/Series 5.3.3.2.2
Non-Metal	Metal	Case Specific Correction 5.3.3.2.1 (b), or 5.3.3.2.1 (c)
Non-Metal	Non-Metal	Parallel/Series 5.3.3.2.2

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5.3.2.2.1 For envelope assemblies containing metal framing, the U_t shall be determined by using one of the following methods:

(a) Results from laboratory or field test measurements, using one of the procedures specified in Section 5.1.5.

(b) For non-metal surfaces attached to metal framing, where data from tests conducted using procedures specified in Section 5.1.5, such as those provided in Tables 5.3–2 and 5.3–3, is available, the total resistance of the series path may be calculated using Equations 5.3–2a and 5.3–2b, and illustrated in Figure 5.3–1:

Table 5.3-2

Parallel Path Correction Factors[1]

Bridged R-Value	0	5	10	15	20	25	30	35	40	45	50	55
Correction Factor	1.0	0.96	0.92	0.88	0.85	0.81	0.79	0.76	0.73	0.71	0.69	0.67

1. Table 5.3-2 values are based upon metal trusses with 4 ft spacing that penetrate the insulation, and 0.66 in. diameter crossmembers every 1 ft.

Table 5.3-3

Wall Sections With Metal Stops

Parallel Path Correction Factors

Size of Members	Gauge of Stud	Spacing of Framing, In.	Cavity Insulation R-Value	Correction Factor
2 X 4	18-16	16 o.c.	R-11	0.50
2 X 4	18-16	24 o.c.	R-11	0.60
2 X 6	18-16	16 o.c.	R-19	0.40
2 X 6	18-16	24 o.c.	R-19	0.45

$$U_t = 1/R_t$$

Equation 5.3–2a

$$R_t = R_i + R_e$$

Equation 5.3–2b

Where:

R_t = the total resistance of the envelope assembly

R_i = the resistance of the series elements (for i = 1 to n), excluding the parallel path element(s)

R_e = the equivalent resistance of the element containing the parallel path, the value of R_e is:

R_e = (R-value of insulation) × F_c

Equation 5.3–2c

Where:

F_c = the correction factor from Table 5.3–2 or Table 5.3–3.

(c) For elements other than those covered in Item (b) above, the zone method described in Chapter 23 of the *ASHRAE Handbook, 1985 Fundamentals Volume* shall be used. The equations on pages 23.13 and 23.14 shall be used.

(d) For sheet metal construction, internally insulated with an internal metal structure bonded on one or both sides to a metal skin or covering (see Figure 5.3–2), the following steps shall be used to calculate the U-value of the envelope construction.

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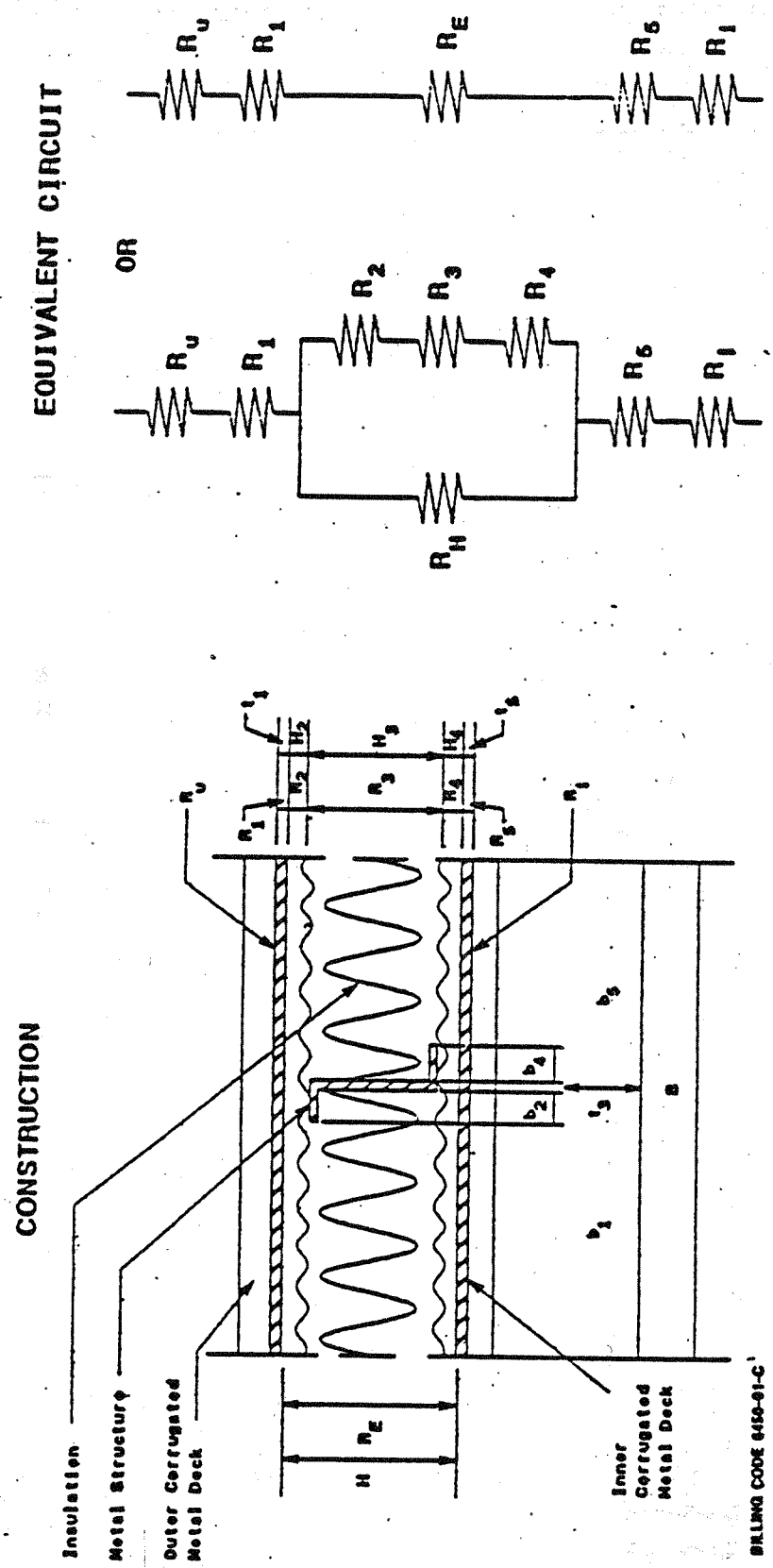
Figure 5.3-2
A Generalized Built-Up Sheet Metal
Construction and Corresponding Resistance Network



(1) First, calculate the resistance of the thermal bridge R_{TB} as follows:

$$R_{TB} = R_1 + R_2 + R_3 + R_4 + R_5$$

Equation 5.3-3

(i) Where R_1, the effective mean flow path along the outer metal surface, is calculated by:

$$R_1 = \frac{1}{2 \times L \sqrt{h_1 k_1 T_1}} - \frac{1}{B \times L \times h_1}$$

Equation 5.3-4

(ii) And if it occurs, the resistance of insulation (R_2) between the outer metal surface and the metal structural member is calculated by:

$$R_2 = \frac{1}{k \times L \cdot \left[\frac{b_2}{H_2} + \frac{2}{\pi} \right]}$$

Equation 5.3-5

(iii) And, the resistance of the structural member (R_3) is calculated by:

$$R_3 = \frac{h_3}{L \times t_3 \times k_3}$$

Equation 5.3-6

(iv) And if it occurs, the resistance of insulation (R_4) between the inner metal surface and the purlin flange is calculated by:

$$R_4 = \frac{1}{k \times L \left[\frac{b_4}{H_4} + \frac{2}{\pi} \right]}$$

Equation 5.3-7

(v) And finally, the effective mean flow path along the inner metal surface (R_5) is calculated by:

$$R_5 = \frac{1}{2 \times L \sqrt{h_5 k_5 T_5}} - \frac{1}{B \times L \times h_5}$$

Equation 5.3-8

Where:
L = total length
h = coefficient of heat transfer
k = thermal conductivity
T = temperature
B = total width
H = partial height
t = thickness of sheet metal

(2) Then calculate the parallel path resistance of the homogeneous insulation R_H as follows:

$$R_H = \frac{\Sigma \left[\frac{H}{K} \right]}{B \times L}$$

Equation 5.3-9

(3) Then obtain the overall construction resistance R_C by combinin R_H and R_{TB} as two parallel resistances:

$$R_C = \frac{R_{TB} \times R_H}{R_{TB} + R_H}$$

Equation 5.3-10

(4) Then add the inside and outside surface resistances R_i and R_o to get the total resistance R_{TOT}:

$$R_{TOT} = R_C + R_i + R_o$$

Equation 5.3-11

(5) The total area resistance m_{TOT} is then calculated by:

$$m_{TOT} = R_{TOT} \times B \times L$$

Equation 5.3-12

(6) And finally, obtain the U-value by

$$U = \frac{1}{m_{TOT}}$$

Equation 5.3-13

(7) Where additional resistances are introduced in the construction, introduc them in lieu of the above (R_2 and R_4) resistances. An example of this would be the calculation of both a metallic fastener and a block of higher thermal conductivity material between the oute sheet metal and the internal structural member as shown in Figure 5.3-3. In thi case the original R_2 is re-calculated by first calculating the thermal bridge R_{2TB} as follows:

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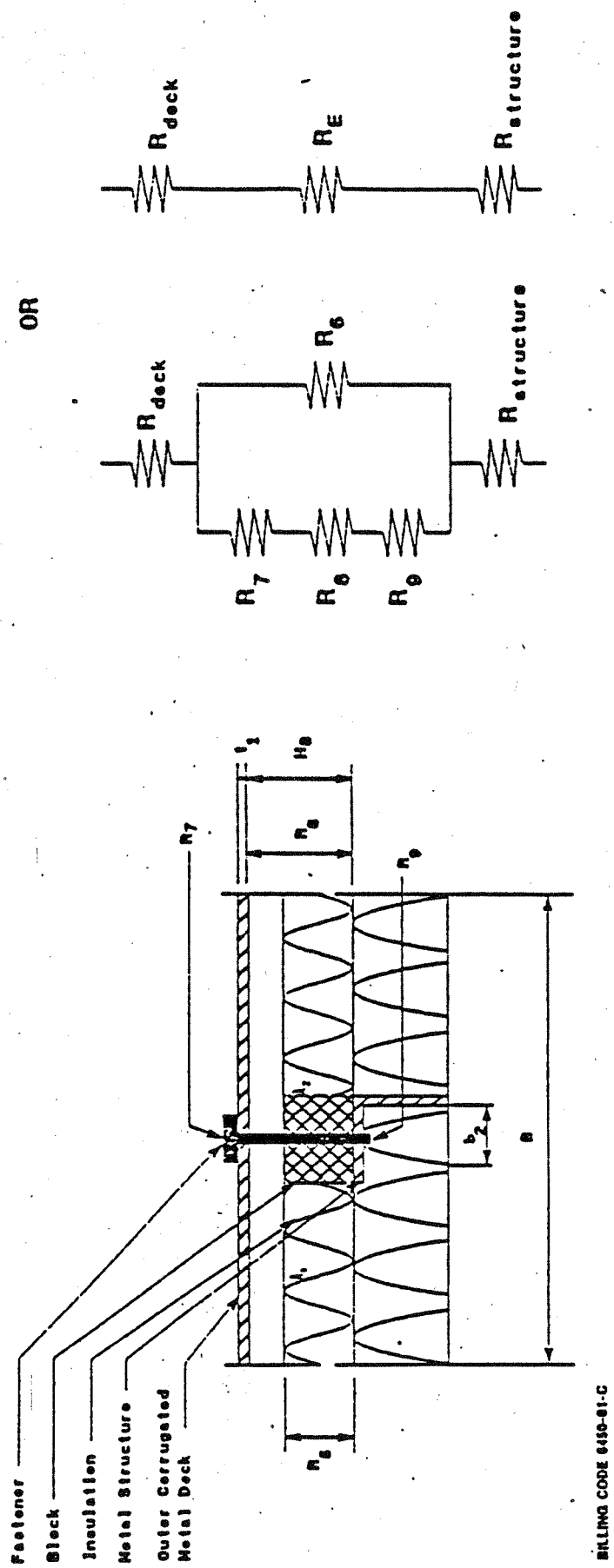
Figure 5.3-3

Detail of Heat Transfer From a Metal Surface to a Structure Through a Metal Fastener and Insulating Block With Corresponding Resistance Network



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$$R_{TTS} = R_T - R_0 - R_s$$

Equation 5.3–14

(i) Where the resistance of the heads of number (N) of fasteners per length (L), adjusting for surface resistance in common with the sheet metal surface, is calculated by:

$$R_T = \frac{1}{N \times 2 \times \pi \times \lambda_1 \times t_1 \times f(\beta r_1, \infty)} - \frac{1}{\alpha_1 \times B \times L}$$

Equation 5.3–15

Where:

N = the number of fasteners in Length L

f = the function of B'r for different values of the ratio r_2/r_1 given in Figure 5.3–4.

$$\beta = \sqrt{\frac{h}{\lambda x t}}$$

r_1 = the radius of the fastener shank.

r_2 = the outer radius of the fastener head.

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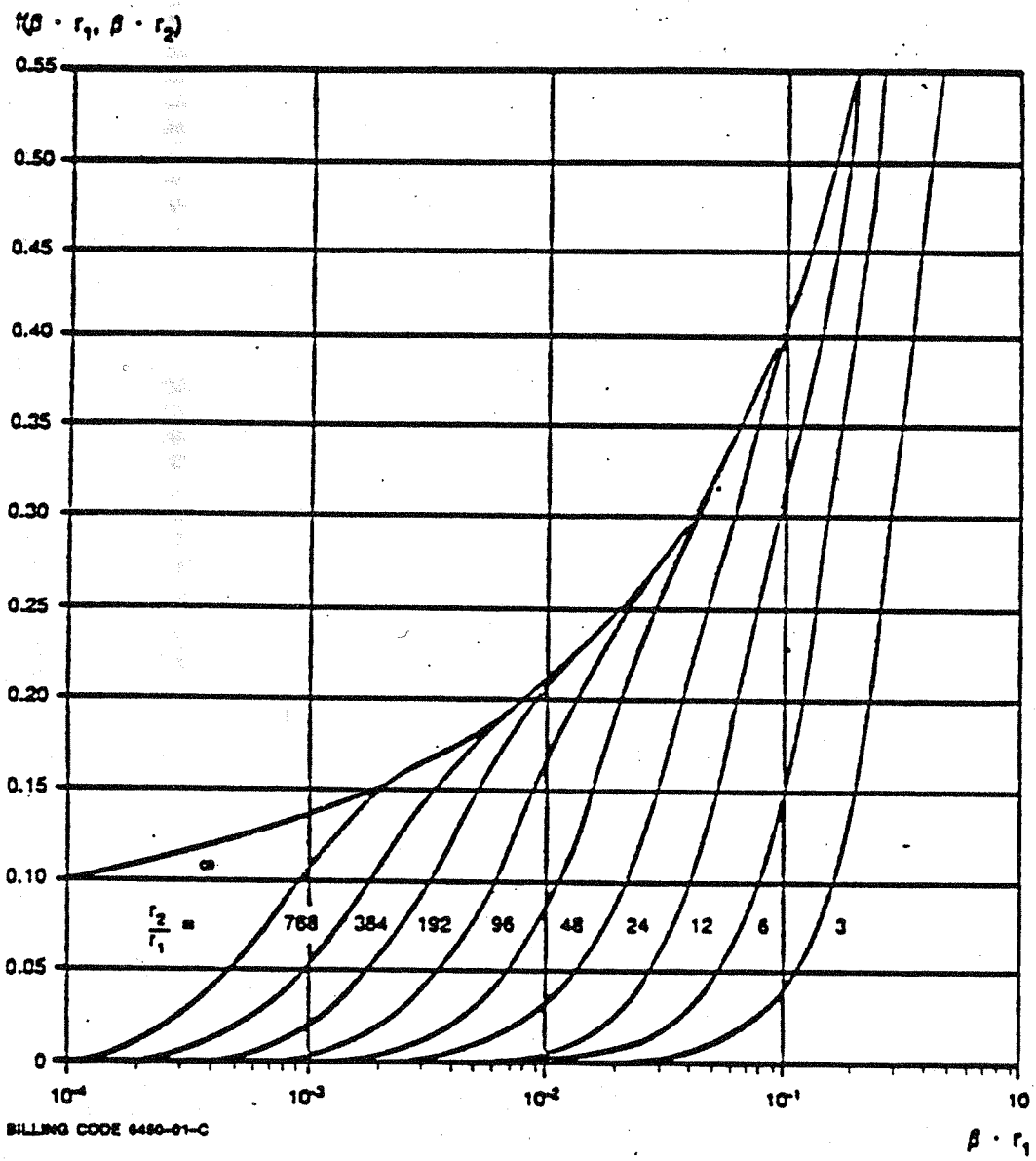
Figure 5.3-4 - The Function (f) Given as a Function of βr and for Different Values of the Ratio, r_1/r_2



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(ii) And, the resistance of the shank of the fastener is calculated by:

$$R_4 = \frac{H_4}{N \times \lambda \times \pi \times r_1^2}$$

Equation 5.3–16

(iii) And, finally, the resistance of the connection to the internal structural member is calculated by:

$$R_9 = \frac{\ln \times \frac{r_2}{r_1}}{N \times 2\pi \times t}$$

Equation 5.3–17

(iv) Then calculate the resistance of the block of higher thermal conductivity material as follows:

$$R_6 = \frac{1}{L_1 \left[1 \frac{h}{H_8} + 2 \frac{2}{\pi} \right]}$$

Equation 5.3–18

Where:

$\lambda_1 > \lambda_4$

(v) Then obtain the resistance to be used in lieu of the original R_3 by:

$$R_8 = \frac{R_{TS} \times R_6}{R_{TS} + R_6}$$

Equation 5.3–19

5.3.3.2.2 For envelope assemblies containing Non-Metal Framing, the U_t shall be determined from one of the laboratory or field test measurements specified in Section 5.3.5 or from the ASHRAE series-parallel method. Formulas in Chapter 23, page 23.2 of the *ASHRAE Handbook, 1985 Fundamentals Volume*, shall be used for these calculations.

5.3.3.3 The thermal transmittance of fenestration assemblies shall be corrected to account for the presence of sash, frames, edge effects and spacers in multiple-glazed units.

If thermal transmittances of sash and frames are known, Equation 5.3–1 shall be used, otherwise the thermal transmittance offenestration assemblies shall be calculated as follows:

$$U_{of} = \Sigma U_{ti} \times F_{f,i} \times A_i / A_{of} = (U_{t,1} \times F_{f,1} \times A_1 + U_{t,2} \times F_{f,2} \times A_2 + \ldots + U_{t,n} \times F_{f,n} \times A_n) / A_{of}$$

Equation 5.3–20

Where:

A_i = area of ith fenestration assembly

i = numerical subscript (1,2, . . . n) refers to each of the various fenestration assemblies present in the wall

n = the number of fenestration assemblies in the wall assembly.

U_{of} = the overall thermal transmittance of the fenestration assembly, including sash and frames, Btu/h·ft²°F.

U_t = the thermal transmittance of the central area of the fenestration excluding edge effects, spacers in multiple-glazed units, and the sash and frame, Btu/h·ft²°F.

$F_{f,i}$ = framing adjustment factor for sash, frames, etc.

A_{of} = the area of all fenestration including glazed portions, sash, frames, etc.

5.3.3.3.1 Values for U_t shall be the winter value obtained from the glazing manufacturer's test data or from Table 13 or Figure 14 of Chapter 27 of the *ASHRAE Handbook, 1985 Fundamentals Volume*. Values for F_f shall be obtained from the frame manufacturer's test data or from the average adjustment factor for a particular product in Table 13, Part C, in Chapter 27 of the *ASHRAE Handbook, 1985 Fundamentals Volume*. For glass products with a U value of 0.45 or less, use the F_f for triple insulated glazing. Alternatively, values of the U_t°F product may be used from manufacturer's test data for open window and frame assemblies tested as a unit provided that the tests referenced edge-effects and windspeed are accounted for winter tested U-values are used.

5.3.4 Gross Area of Envelope Components

5.3.4.1 The gross area of a roof assembly consists of the total surface of the roof assembly exposed to outside air or unconditioned spaces. The roof assembly shall include all roof/ceiling components through which heat may flow between indoor and outdoor environments including skylight surfaces, but excluding service openings.

5.3.4.1.1 For thermal transmittance purposes, when return air ceiling plenums are employed, the roof/ceiling assembly shall not include the thermal resistance of the ceiling, or the plenum space, as part of the total thermal resistance of the assembly.

5.3.4.2 The gross area of a floor assembly over outside or unconditioned space consists of the total surface of the floor assembly exposed to the outside air or an unconditioned space. The floor assembly shall include all floor components through which heat may flow between indoor and outdoor or unconditioned space environments.

5.3.4.3 The gross area of exterior walls enclosing a heated or cooled space is measured on the exterior and consists of the opaque wall including between floor spandrels, peripheral edges of flooring, window areas including sash and door areas, but excluding vents, grilles and pipes.

5.3.5 Shading Coefficients

5.3.5.1 The Shading Coefficient (SC) for fenestration shall be obtained from Chapter 27 of the *ASHRAE Handbook, 1985 Fundamentals Volume* or from manufacturers' test data. For the prescriptive or system performance envelope compliance calculations in Sections 5.4 and 5.5, a factor, SC_v, is used. SC_v is the Shading Coefficient of the fenestration, including internal and external shading devices, but excluding the effect of external shading projections, which is calculated separately. The shading coefficient used for louvered shade screens shall be determined using a profile angle of 30°, as found in Table 41, Chapter 27 of the *ASHRAE Handbook, 1985 Fundamentals Volume*.

5.3.6 Wall Heat Capacity

5.3.6.1 Heat capacity in Btu/°F·ft², shall be determined as the product of the average wall weight in lb/ft² and the weighted average specific heat of the wall component in Btu/lb.°F.

5.3.6.2 If the wall system is defined as having exterior insulation only the properties of the wall elements inside of the insulation layer shall be used in determining the wall heat capacity.

5.3.6.3 For walls with integral insulation, all of the elements of the entire wall system may be used in the calculation of the wall heat capacity.

5.3.7 Air Leakage and Moisture Migration

5.3.7.1 The requirements of this subsection apply only to those locations separating the outdoors from interior building conditioned space. Compliance with the criteria for air leakage through building components shall be determined by *ASTM E 283–1984*, "Standard Method of Test Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors."

5.3.7.2 Air Leakage Requirements for Fenestration and Doors

5.3.7.2.1 Fenestration meeting the following standards for air leakage is acceptable:

(a) *ANSI/AAMA 101–85*, "Aluminum Prime Windows."

(b) *ASTM D–4099–83*, "Specifications for Poly(VinylChloride) (PVC) Prime Windows."

(c) *ANSI/NWMA I.S. 2–80*, "Wood Window Units (Improved Performance Rating Only)."

5.3.7.2.2 Sliding Doors shall meet one of the following standards for air leakage:

(a) *ANSI/AAMA 101–85*, "Aluminum Sliding Glass Doors."

(b) *NWMA I.S. 3–83*, "Wood Sliding Patio Doors."

5.3.7.2.3 Commercial entrance swinging or revolving doors shall limit air leakage to a rate not to exceed 1.25 cfm/ft² of door area, at standard test conditions.

5.3.7.2.4 Residential swinging doors shall limit air leakage to a rate not to exceed 0.5 cfm/ft² of door area, at standard test conditions.

5.3.7.2.5 Where spaces have regular high volume traffic through the building envelope, such as retail store entrances and loading bays, estimates of air leakage for HVAC system design shall be based on air exchange by traffic flow.

5.3.7.2.6 To reduce infiltration due to stack-effect draft in multi-story buildings, the use of vestibules or revolving doors on all primary entries and exits shall be considered.

5.3.7.3 Air Leakage Requirements for Exterior Envelope Joints and Penetrations.

5.3.7.3.1 Exterior joints, cracks, and holes in the building envelope, such as those around window or door frames, between wall and foundation, between wall and roof, through wall panels at penetrations of utility services or other service entry through walls, floors, and roofs, between wall panels, particularly at corners and changes in orientation, between wall and floor, where floor penetrates wall, around penetrations of chimney, flue vents, or attic hatches, shall be caulked, gasketed, weather stripped, or otherwise sealed.

5.3.7.4 Moisture Migration Requirements for Exterior Envelopes

5.3.7.4.1 The building envelope shall be designed to prevent moisture migration that leads to deterioration in insulation performance of the building.

5.3.7.4.2 Vapor retarders shall be considered to prevent moisture from collecting within the envelope. Designs should incorporate the principles of *ASHRAE Handbook, 1985 Fundamentals Volume*, Chapter 21, "Moisture in Building Construction."

5.3.8 Shell Buildings

5.3.8.1 The following conditions shall be assumed if determination of building envelope compliance occurs prior to the determination of lighting power density, equipment power density, or fenestration shading device characteristics:

5.3.8.1.1 *Lighting Power Density and Equipment Power Density.* For Section 5.4, the total power density shall be assumed to be those listed in Table 5.3–4. For Section 5.5, the values in Table 5.3–4 shall be assumed to be apportioned as ⅔ lighting and ⅓ for other equipment. Note that these are not recommended design values, but are for compliance purposes only.

Table 5.3–4

Assumed Internal Loads for Shell and Speculative Buildings

	[illegible]	[illegible]	[illegible]
Shell Buildings	3.5 W/ft²	2.25 W/ft²	1.50 W/ft²
Speculative Buildings	Use the U/A from Table 5.6-1 and the average equipment power density from Table 5.6-32.		

5.3.8.1.2 *Fenestration shading devices.* Only those shading devices that are part of the design when it is being evaluated for compliance shall be considered when determining compliance.

5.3.8.1.3 *Daylighting controls for electric lighting.* Only those controls that are part of the design when it is being evaluated for compliance shall be considered when determining compliance.

5.3.9 Buildings Located in Climates With Greater Than 15,000 HDD Base 65 °F.

5.3.9.1 For locations with a heating degree-day base (HDD) 65 °F greater than 15,000, the envelope criteria listed in Table 5.3–5 shall apply, and the window wall ratio (WWR) shall be less than or equal to 0.20.

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Table 5.3-5
Requirements For Locations With
Heating Degree-Days Base 65 °F Greater Than 15,000

Envelope Statement	Maximum U Value	Minimum R Value	Notes
U_o opaque wall for buildings with ≥ 12,000 ft^2 of gross floor area [1,3]	0.053		See 5.3.3.2
U_o opaque wall for buildings with < 12,000 ft^2 of gross floor area [2,3]	0.040		
U fenestration	0.450		Use Eq 5.3-20
U roof	0.024		
Floor over unconditioned spaces[4]	0.023		See 5.3.3.2
Wall below grade[5]		18	

Slab-on-grade:

Position	Minimum Insulation Distance, in.	Minimum R Value: Unheated Slab	Minimum R Value: Heated Slab
Horizontal	48	15	17
Vertical	48	6	8

Skylights: Not allowed for locations with HDD65 greater than 15,000.

Footnotes for Table 5.3-5:

1. For window to wall ration, WWR ≤ 0.20. Shall include corrections for parallel paths within the envelope assembly. For WWR > 0.20, see Footnote (3).
2. For window to wall ratio, WWR ≤ 0.15. Shall include corrections for parallel paths within the envelope assembly. For WWR > 0.15, see Footnote (3).
3. The window to wall ratio and the stated U-values for opaque wall and fenestration may be increased or decreased provided that the combined thermal wall transmittance shall not exceed 0.125 for buildings ≥ 12,000 ft^2, and 0.091 for buildings < 12,000 ft^2.
4. Including pile-supported floors and elevated floors.
5. Installed on the exterior of perimeter foundation walls for heated foundations.

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5.3.10 Daylight Credits for Skylights.

5.3.10.1 Skylights used in conjunction with automatic lighting controls for daylighting can significantly reduce the lighting energy consumption, thereby more than offsetting the increase in envelope heat transfer.

5.3.10.2 When determining building roof compliance, daylight credits for skylights may be used if the criteria of this subsection are met.

5.3.10.3 Skylights for which daylight credit is taken may be excluded from the calculation of the overall thermal transmittance value (U_{or}) of the roof assembly, if all of the following conditions are met:

5.3.10.3.1 The opaque roof thermal transmittance U_{or} value does not exceed the value determined within the selected Alternate Component Package (ACP) table for the prescriptive method or by Equation 5.5–1 for the systems performance method.

5.3.10.3.2 Skylight areas, including framing, as a percentage of the roof area do not exceed the values specified in Tables 5.3–6A and 5.3–6B for building sites located within the climate ranges listed in the two Tables, where Visible Light Transmittance (VLT) is the transmittance of a particular glazing material over the visible portion of the solar spectrum. Skylight areas shall be interpolated between visible light transmittance values of 0.75 and 0.50, only.

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Table 5.3-6a
(VLT = 0.75)
Maximum Percent Skylight Area for Given Conditions of Lighting Power Density, Light Level (fc), HDD65 and CDH80

BUILDING LOCATION		LIGHT LEVEL IN (fc)	Range of Lighting Power Density (W/ft^2)				
HDD65	CDH80		<1.00	1.01-1.50	1.51-2.00	2.01-2.50	>2.50
0-3000	0-10000	30	2.3	3.1	3.9	4.7	4.7
		50	3.1	4.3	5.5	6.7	6.7
		70	4.3	5.5	6.7	7.9	7.9
0-3000	>10000	30	2.2	2.8	3.4	4.0	4.0
		50	2.3	3.1	3.9	4.7	4.7
		70	2.9	4.1	5.3	6.5	6.5
>3000	ALL	30	2.3	3.4	4.5	5.6	5.6
		50	2.5	4.0	5.5	7.0	7.0
		70	2.8	4.6	6.4	8.2	8.2

Table 5.3-6b
(VLT = 0.50)
Maximum Percent Skylight Area for Given Conditions of Lighting Power Density, Light Level (fc), HDD65 and CDH80

BUILDING LOCATION		LIGHT LEVEL IN FC	Range of Lighting Power Density (W/ft^2)				
HDD65	CDH80		<1.00	1.0-1-1.50	1.51-2.00	2.01-2.50	>2.50
0-3000	0-10000	30	3.6	4.8	6.0	7.2	7.2
		50	4.8	6.6	8.4	10.2	10.2
		70	6.6	8.4	10.2	12.0	12.0
0-3000	>10000	30	3.3	4.2	5.1	6.0	6.0
		50	3.6	4.8	6.0	7.2	7.2
		70	4.2	6.0	7.8	9.6	9.6
>3000	ALL	30	3.6	5.1	6.6	8.1	8.1
		50	3.9	6.0	8.1	10.2	10.2
		70	4.2	6.9	9.6	12.3	12.3

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5.3.10.3.3 The skylight area associated with daylight credit can be taken is the area under each skylight whose dimension in each direction (centered on the skylight) is equal to the skylight dimension in that direction plus a distance equal to the floor to ceiling height.

5.3.10.3.4 Skylight areas that overlap areas that have already taken daylight credit (perimeter window areas or other skylight areas) do not again take daylight credit.

5.3.10.3.5 All electric lighting fixtures within skylight areas are controlled by daylight-activated automatic lighting controls.

5.3.10.3.6 For buildings located in climates that have less than 8000 HDD65, the overall thermal transmittance of the skylight assembly, including framing, is less than or equal to 0.7 Btu/h·ft²·°F. For locations greater than 8000 HDD65, the overall thermal transmittance of the skylight assembly, including framing, is less than or equal to 0.45 Btu/h·ft²·°F.

5.3.10.3.7 Skylight curbs have thermal transmittance (U) values no greater than 0.21 Btu/h·ft²·°F.

5.3.10.3.8 The infiltration coefficient of the skylights does not exceed 0.05 cfm/ft².

5.3.10.4 Skylight areas in Tables 5.3–6A and 5.3–6B may be increased by 50% if a shading device is used that blocks over 50% of the solar gain during the peak cooling design condition.

5.3.10.5 Areas for vertical glazing in clerestories and roof monitors shall be included in the wall fenestration calculation.

5.3.10.6 For shell buildings, the permitted skylight area from Tables 5.3–6A and 5.3–6B shall be based on a light level of 30 fc and a lighting power density (LPD) of less than 1 W/ft².

5.3.10.7 For speculative buildings, the permitted skylight area from Tables 5.3–6A and 5.3–6B shall be based on the unit lighting power allowance from Table 3.4–1 and an illuminance level as follows:

5.3.10.7.1 For LPD less than or equal to 1.0 W/ft², use 30 fc;

5.3.10.7.2 For LPD greater than 1.0 W/ft² and less than 2.5 W/ft², use 50 fc; and

5.3.10.7.3 For LPD greater than 2.5 W/ft², use 70 fc.

5.3.10.8 Buildings with roof assembly devices that cannot be evaluated under this subsection shall be evaluated using the Building Energy Compliance Methods of Section 11.0 or 12.0.

5.4 Building Envelope—Prescriptive Compliance Alternative

5.4.1 General.

5.4.1.1 This section provides a simple compliance path using precalculated prescriptive requirements for selected exterior envelope configurations of new buildings.

5.4.1.2 The Alternate Component Packages (ACP), found in this subsection, provide design criteria for use with the following options:

5.4.1.2.1 "Base Case"—buildings with envelopes designed without perimeter daylighting.

5.4.1.2.2 "Perimeter Daylighting"—buildings with envelopes that use additional fenestration area by incorporating automatic lighting controls in the perimeter zone to permit the use of daylighting in lieu of electric lighting. This ACP is not available for those climates that do not usually require space cooling by means of mechanical refrigeration.

(a) This daylighting credit is in addition to the increased lighting power allowance provided in Section 3.5. Some perimeter daylighting options allow a greater proportion of fenestration area due to the increased visible and decreased thermal transmittances of high performance glazings in combination with automatic lighting controls.

5.4.1.3 Each ACP provides a limited number of complying combinations of building variables for a set of climate ranges. The criteria, such as maximum percent fenestration, were calculated using the system performance criteria of Section 5.5. Values were chosen from within climate and other variable ranges for the most restrictive results, to ensure compliance of any combination of values within those ranges. Thus, for most climate locations and envelope parameters, the prescriptive criteria may be slightly more stringent than the system performance criteria of Section 5.5.

5.4.1.4 Both the base and perimeter daylight cases have two or three fenestration U-value ranges depending on the climate.

5.4.2 Compliance.

5.4.2.1 The envelope design of the building being evaluated is in compliance with the prescriptive criteria of this section provided that:

5.4.2.1.1 The minimum requirements of Section 5.3 are met.

5.4.2.1.2 All envelope thermal transmittance (U) values are less than or equal to those chosen from the ACP Table selected for roofs, opaque walls, walls next to unconditioned spaces, and floors over unconditioned spaces.

5.4.2.1.3 The percentage of fenestration of the combined gross wall area is less than or equal to the value permitted for internal load range and glazing in the selected ACP Table.

5.4.2.1.4 Slab-on-grade floors have insulation around the perimeter of the floor with the thermal resistance (R_{sl}) of the insulation as listed in the ACP table. The slab insulation specified shall extend either in a vertical plane downward from the top of the slab for the minimum distance shown or downward to the bottom of the slab then in a horizontal plane beneath the slab or outward from the building for the minimum distance shown. The horizontal length, or vertical depth, of insulation required varies from 24 in. to 48 in. depending upon the R-value selected. For heated slabs, an R of 2 shall be added to the thermal resistance required.

(a) Vertical insulation shall not be required to extend below the foundation footing.

(b) There are no insulation requirements for slabs in locations having less than 3,000 HDD65 or for footings extending less than 18 in. below grade.

5.4.2.1.5 The thermal resistance of the below-grade wall assembly must be greater than or equal to that listed in the ACP table, or the heat loss calculated in accordance with Chapter 25 of the *ASHRAE Handbook, 1985 Fundamentals* shall be less than or equal to that of a wall below grade having a thermal resistance equal to that specified in Figure 5.5–3. No insulation is required for climates with less than 3,000 HDD65 or for those portions of walls more than one story below grade.

5.4.3 Procedure for Using the Alternate Component Packages (ACP).

5.4.3.1 The prescriptive envelope criteria for each of 30 climate ranges are contained in Tables 5.4–2 through 5.4–31.

5.4.3.2 The following steps shall be used to determine compliance with these prescriptive envelope criteria.

5.4.3.2.1 Determine appropriate climate range using either (a) or (b) below.

(a) From Table 5.4–1, select the appropriate ACP Table based on the climate for the building site. The main climate variables that are needed for the proper selection of an ACP Table are cooling degree-days base 65 °F (CDD65), heating degree-days base 50 °F (HDD50), and annual average daily incident of solar radiation on the east or west vertical surface of the facade, Btu/ft²/day (VSEW). For certain climate ranges this must be augmented by cooling degree-hours base 80 °F (CDH80).

(1) This data, for a specific building location, may be acquired from the U.S. Weather Service of the National

Oceanic and Atmospheric Administration or the local weather bureau. The column designated "ACP Table No." in Table 5.4–1 contains the table number of the appropriate ACP Table.

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Table 5.4-1
Climate Data Grouped by ACP Tables

ACP Table Number	HDD50 Range	CDD65 Range	VSEW Range	CDH80 Range	Example Cities
5.4-2	0	3001-4500	>800		Barbers Point, Hilo, Honolulu, Lihue
5.4-3	0	>4500	>845		Guantanamo Bay, Kwajalein, San Juan, Wake Island
5.4-4	1-1000	0-1150	560-845		Arcata, North Bend
5.4-5	1-1000	0- 300	>845		Oakland, San Francisco, Santa Maria, Sunnyville
5.4-6	1-1000	301-1150	>845		El Toro, Long Beach, Los Angeles, San Diego
5.4-7	1-1000	1151-2000	560-845		Atlanta, Augusta, Birmingham, Cherry Point, Greenville
5.4-8	1-1000	1151-2000	>845		Fresno, Red Bluff, Sacramento
5.4-9	1-1000	2001-3250	560-845		Charleston, Houston, Jackson, Montgomery, New Orleans
5.4-10	1-1000	2001-3250	>845	0-18000	Austin, Bakersfield, El Paso, Fort Worth, Tallahassee, Tampa
5.4-11	1-1000	2001-3250	>845	>18000	China Lake, Las Vegas, Tucson
5.4-12	1-1000	3251-4500	>845	0-18000	Brownsville, Corpus Christi, Miami, Orlando, West Palm Beach
5.4-13	1-1000	3251-4500	>845	>18000	Loredo, Phoenix, Yuma
5.4-14	1001-1750	0- 500	560-845		Olympia, Portland, Salem, Seattle/Tacoma, Whidbey Island
5.4-15	1001-1750	501-1150	560-845		Asheville, Medford
5.4-16	1001-1750	1-1150	>845		Prescott, Winslow, Yucca
5.4-17	1001-1750	1151-2000	560-845		Charlotte, Chattanooga, Knoxville, Norfolk, Raleigh, Richmond
5.4-18	1001-1750	1151-2000	>845		Albuquerque, Lubbock, Oklahoma City, Roswell, Tucumcari
5.4-19	1001-1750	2001-3250	560-845		Fort Smith, Memphis, Tulsa
5.4-20	1751-2600	0-1150	560-845		Baltimore, Boston, Columbus, Harrisburg, New York, Washington
5.4-21	2601-3200	0-1150	560-845		Akron, Chicago, Detroit, Hartford, Indianapolis, Pittsburgh
5.4-22	1751-3200	0-1150	>845		Boise, Colorado Springs, Denver, Reno, Salt Lake City
5.4-23	1751-3200	1151-2000	560-845		Evansville, Lexington, Louisville, Saint Louis, Springfield
5.4-24	1751-3200	1151-2000	>845		Dodge City, Grand Junction
5.4-25	3201-4000	0-1150	560-845		Albany, Buffalo, Concord, Des Moines, Milwaukee, Rapid City
5.4-26	4001-5000	0-1150	560-845		Bangor, Cutbank, Huron, Minneapolis, Rochester, Sioux Falls
5.4-27	3201-4000	0-1150	>845		Casper, Cheyenne, Ely, North Platte, Scottsbluff
5.4-28	4001-5000	0-1150	>845		Bryce, Eagle, Rock Springs
5.4-29	5001-6500	0-1150	560-845		Bismarck, Duluth, Fargo, Glasgow, International Falls
5.4-30	1-6500	< 100	<560		Adak, Anchorage, Juneau, Kodiak, Yakutat
5.4-31	>6500	< 100	<560		Bethel, Fairbanks, King Salmon, Nome, Summit

ALTERNATE COMPONENT PACKAGES FOR:

HLOSS = 0
CDDSS = 3001 - 4500
VSEW = > 800

Barbers Point HI
Hilo HI
Honolulu HI
Lihue HI

TABLE 5.4-2

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCs)	BASE CASE Uof 1.15 to 0.82	BASE CASE Uof 0.81 to 0	BASE CASE Uof N/A	PERIMETER DAYLIGHTING Uof 1.15 to 0.82	PERIMETER DAYLIGHTING Uof 0.81 to 0	PERIMETER DAYLIGHTING VLT ≥ SC	OPAQUE WALL Uow LIGHT WEIGHT WALL	OPAQUE WALL Uow MASS WALL
0 - 1.50	0.000 - 0.249	1.000 - 0.71	17	16		19	19	20		
		0.799 - 0.60	21	20		24	24	24		
		0.599 - 0.50	25	24		29	28	29		
		0.499 - 0.38	31	30		36	34	36		
		0.379 - 0.25	41	40		48	46	47		
		0.249 - 0.00	67	62		77	72	74		
	0.250 - 0.499	1.000 - 0.71	22	21		26	25	28		
		0.799 - 0.60	28	27		32	31	32		
		0.599 - 0.50	33	32		39	37	39		
		0.499 - 0.38	41	39		48	45	47		
		0.379 - 0.00	56	52		65	61	63		
	0.500 +	1.000 - 0.71	29	28		34	32	33		
		0.799 - 0.60	36	35		42	41	42		
		0.599 - 0.50	44	42		51	49	50		
		0.499 - 0.00	54	51		63	59	61		
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	14	13		22	21	23		
		0.799 - 0.60	17	17		26	27	29		
		0.599 - 0.50	21	20		33	32	34		
		0.499 - 0.38	25	24		41	39	41		
		0.379 - 0.25	34	33		55	52	55		
		0.249 - 0.00	56	52		85	77	84		
	0.250 - 0.499	1.000 - 0.71	18	18		29	28	30		
		0.799 - 0.60	23	22		37	35	38		
		0.599 - 0.50	28	27		45	42	45		
		0.499 - 0.38	34	32		55	51	54		
		0.379 - 0.00	46	43		73	68	72		
	0.500 +	1.000 - 0.71	24	23		38	36	39		
		0.799 - 0.60	30	29		49	46	49		
		0.599 - 0.50	36	34		58	55	58		
		0.499 - 0.00	45	42		71	66	70		
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	11	10		20	19	22		
		0.799 - 0.60	13	13		25	24	27		
		0.599 - 0.50	16	16		30	29	32		
		0.499 - 0.38	20	19		37	35	39		
		0.379 - 0.25	27	26		51	47	53		
		0.249 - 0.00	43	40		78	72	80		
	0.250 - 0.499	1.000 - 0.71	14	14		27	26	29		
		0.799 - 0.60	18	17		34	32	36		
		0.599 - 0.50	22	21		41	39	43		
		0.499 - 0.38	26	25		51	47	52		
		0.379 - 0.00	36	34		68	63	69		
	0.500 +	1.000 - 0.71	18	18		35	33	37		
		0.799 - 0.60	23	22		45	42	46		
		0.599 - 0.50	28	27		54	50	55		
		0.499 - 0.00	35	33		67	61	67		

Uow (HC(5)	HC RANGE	PCT FEN	INT INS	EXT INS
1.00	HC ≥ 5	17	1.00	1.00
	HC ≥ 10	17	1.00	1.00
	HC ≥ 15	17	1.00	1.00
	HC ≥ 5	77	1.00	1.00
	HC ≥ 10	77	1.00	1.00
	HC ≥ 15	77	1.00	1.00

Uow (HC(5)	HC RANGE	PCT FEN	INT INS	EXT INS
1.00	HC ≥ 5	14	1.00	1.00
	HC ≥ 10	14	1.00	1.00
	HC ≥ 15	14	1.00	1.00
	HC ≥ 5	85	1.00	1.00
	HC ≥ 10	85	1.00	1.00
	HC ≥ 15	85	1.00	1.00

Uow (HC(5)	HC RANGE	PCT FEN	INT INS	EXT INS
1.00	HC ≥ 5	11	1.00	1.00
	HC ≥ 10	11	1.00	1.00
	HC ≥ 15	11	1.00	1.00
	HC ≥ 5	80	1.00	1.00
	HC ≥ 10	80	1.00	1.00
	HC ≥ 15	80	1.00	1.00

Daylight Sensing Controls

	Min R-Value
WALL BELOW GRADE:	0
UNHEATED SLAB ON GRADE: 24"	
Horizontal	0
Vertical	0
36"	
Horizontal	0
Vertical	0
48"	
Horizontal	0
Vertical	0

	Max Uo
ROOF:	0.064
WALL ADJACENT TO UNCOND SPACE:	1.00
FLOOR OVER UNCOND SPACE:	1.19

ALTERNATE COMPONENT PACKAGES FOR:

HDD65 = 0
CDD65 = > 4500
VSEW = > .045

Guantanamo Bay CU
Kwajalein Island
Koror Island
San Juan PR
Wake Island

TABLE 5.4-3

Uof

BASE CASE		
1.15 to 8.82	8.81 to 8	N/A

PERIMETER DAYLIGHTING		
1.15 to 8.82	8.81 to 8	8.81 to 6

OPAQUE WALL Uow	
LIGHT WEIGHT WALL	MASS WALL

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCs)	BASE CASE		PERIMETER DAYLIGHTING (VLT ≥ SC)		
0 - 1.50	0.000 - 0.249	1.000 - 0.71	14	14	17	16	17
		0.700 - 0.60	19	18	21	21	22
		0.590 - 0.50	23	22	26	26	28
		0.490 - 0.38	29	28	33	32	33
		0.379 - 0.25	42	38	40	46	47
		0.249 - 0.00	81	72	96	82	85
	0.250 - 0.499	1.000 - 0.71	20	19	23	22	23
		0.700 - 0.60	28	25	30	29	30
		0.590 - 0.50	32	31	37	35	37
		0.490 - 0.38	41	39	48	45	46
		0.379 - 0.00	62	56	73	66	68
	0.500 +	1.000 - 0.71	27	26	31	30	31
		0.700 - 0.60	35	34	41	39	40
		0.590 - 0.50	45	42	53	49	50
		0.490 - 0.00	59	54	70	63	65
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	12	12	19	19	21
		0.700 - 0.60	18	15	25	24	26
		0.590 - 0.50	19	19	31	30	32
		0.490 - 0.38	24	23	40	28	40
		0.379 - 0.25	35	33	60	54	58
		0.249 - 0.00	55	60	100	93	100
	0.250 - 0.499	1.000 - 0.71	16	16	27	28	28
		0.700 - 0.60	22	21	35	34	36
		0.590 - 0.50	27	26	46	42	46
		0.490 - 0.38	34	32	59	53	57
		0.379 - 0.00	51	47	87	77	82
	0.500 +	1.000 - 0.71	22	22	37	35	38
		0.700 - 0.60	29	28	50	46	49
		0.590 - 0.50	37	35	66	58	61
		0.490 - 0.00	48	45	83	74	78
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	9	9	17	17	19
		0.700 - 0.60	12	12	23	22	25
		0.590 - 0.50	15	14	28	27	31
		0.490 - 0.38	18	18	36	34	38
		0.379 - 0.25	26	25	55	50	55
		0.249 - 0.00	49	46	100	86	96
	0.250 - 0.499	1.000 - 0.71	13	12	24	23	27
		0.700 - 0.60	18	16	32	31	34
		0.590 - 0.50	25	20	41	38	43
		0.490 - 0.38	26	25	54	49	54
		0.379 - 0.00	38	36	86	71	78
	0.500 +	1.000 - 0.71	17	17	34	32	36
		0.700 - 0.60	22	22	46	42	47
		0.590 - 0.50	28	27	56	54	59
		0.490 - 0.00	36	34	77	69	76

Daylight Sensing Controls

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
1.00	HC ≥ 5	14	1.00	1.00
	HC ≥ 10	14	1.00	1.00
	HC ≥ 15	14	1.00	1.00
	HC ≥ 5	85	1.00	1.00
	HC ≥ 10	85	1.00	1.00
	HC ≥ 15	85	1.00	1.00

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
1.00	HC ≥ 5	12	1.00	1.00
	HC ≥ 10	12	1.00	1.00
	HC ≥ 15	12	1.00	1.00
	HC ≥ 5	93	1.00	1.00
	HC ≥ 10	93	1.00	1.00
	HC ≥ 15	93	1.00	1.00

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
1.00	HC ≥ 5	9	1.00	1.00
	HC ≥ 10	9	1.00	1.00
	HC ≥ 15	9	1.00	1.00
	HC ≥ 5	86	1.00	1.00
	HC ≥ 10	86	1.00	1.00
	HC ≥ 15	86	1.00	1.00

	Min R-Value
WALL BELOW GRADE:	0

UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	0	0	0
Vertical	0	0	0

	Max Uo
ROOF:	0.057
WALL ADJACENT TO UNCOND SPACE:	1.00
FLOOR OVER UNCOND SPACE:	1.10

ALTERNATE COMPONENT PACKAGES FOR:

Arcata CA
Humboldt Bay CZ

TABLE 5.4-4

HDD65 = 1 - 1000
CDD65 = 0 - 1150
VSEY = 560 - 845

Uof

BASE CASE		
0.81 to 0.46	0.46 to 0.30	0.30 to 0

PERIMETER DAYLIGHTING	
N/A	

OPAQUE WALL Uow	
LIGHT WEIGHT WALL	MASS WALL

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	BASE CASE			PERIMETER DAYLIGHTING (VLT ≥ SC)	
0 - 1.50	0.000 - 0.249	1.000 - 0.71	24	32	33		
		0.799 - 0.60	26	37	39		
		0.599 - 0.50	28	41	45		
		0.499 - 0.38	29	46	51		
		0.379 - 0.25	30	52	59		
		0.249 - 0.00	31	60	70		
	0.250 - 0.499	1.000 - 0.71	27	39	42		
		0.799 - 0.60	29	45	49		
		0.599 - 0.50	30	49	55		
		0.499 - 0.38	30	53	61		
		0.379 - 0.00	31	58	66		
	0.500 +	1.000 - 0.71	30	47	52		
		0.799 - 0.60	31	53	58		
		0.599 - 0.50	31	56	64		
		0.499 - 0.00	31	59	69		
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	22	27	28		
		0.799 - 0.60	25	33	34		
		0.599 - 0.50	27	37	39		
		0.499 - 0.38	30	42	45		
		0.379 - 0.25	32	50	55		
		0.249 - 0.00	35	60	69		
	0.250 - 0.499	1.000 - 0.71	27	35	38		
		0.799 - 0.60	29	41	43		
		0.599 - 0.50	31	46	49		
		0.499 - 0.38	33	51	58		
		0.379 - 0.00	35	59	65		
	0.500 +	1.000 - 0.71	30	43	46		
		0.799 - 0.60	32	49	53		
		0.599 - 0.50	34	53	59		
		0.499 - 0.00	35	58	68		
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	21	25	28		
		0.799 - 0.60	24	31	32		
		0.599 - 0.50	27	36	37		
		0.499 - 0.38	29	40	43		
		0.379 - 0.25	32	48	52		
		0.249 - 0.00	36	59	67		
	0.250 - 0.499	1.000 - 0.71	26	33	34		
		0.799 - 0.60	28	38	41		
		0.599 - 0.50	31	43	48		
		0.499 - 0.38	32	49	53		
		0.379 - 0.00	35	56	63		
	0.500 +	1.000 - 0.71	29	40	42		
		0.799 - 0.60	32	46	50		
		0.599 - 0.50	33	51	56		
		0.499 - 0.00	35	56	63		

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.000	HC ≥ 5	24	0.10	0.11
	HC ≥ 10	24	0.12	0.13
	HC ≥ 15	24	0.13	0.14
	HC ≥ 5	70	0.10	0.12
	HC ≥ 10	70	0.11	0.13
	HC ≥ 15	70	0.13	0.14

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.000	HC ≥ 5	22	0.10	0.12
	HC ≥ 10	22	0.13	0.10
	HC ≥ 15	22	0.10	0.19
	HC ≥ 5	60	0.10	0.12
	HC ≥ 10	60	0.12	0.18
	HC ≥ 15	60	0.15	0.18

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.000	HC ≥ 5	21	0.10	0.12
	HC ≥ 10	22	0.14	0.18
	HC ≥ 15	21	0.18	0.21
	HC ≥ 5	67	0.10	0.12
	HC ≥ 10	67	0.13	0.17
	HC ≥ 15	67	0.16	0.19

Daylight Sensing Controls

	Min R-Value
WALL BELOW GRADE:	8

UNINSULATED SLAB ON GRADE:	24"	36"	48"
Horizontal	15	13	10
Vertical	7	6	4

	Max Uo
ROOF:	0.070
WALL ADJACENT TO UNCOND SPACE:	0.15
FLOOR OVER UNCOND SPACE:	0.082

ALTERNATE COMPONENT PACKAGES FOR:

HDOSB = 1 - 1890
CDDB = 0 - 390
VSEF = > 846

Oakland CA
Point Mugu CA
San Francisco CA
Santa Maria CA
Sunnyvale CA

TABLE 5.4-6

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	BASE CASE Uwf	BASE CASE VLT	BASE CASE SC	PERIMETER DAYLIGHTING Uwf	PERIMETER DAYLIGHTING VLT	PERIMETER DAYLIGHTING SC
0 - 1.50	0.000 - 0.249	1.000 - 0.71	24	28		28	28	29
		0.799 - 0.60	29	31		32	34	38
		0.599 - 0.50	34	36		36	39	43
		0.499 - 0.38	39	43		41	46	51
		0.379 - 0.25	47	54		49	57	66
		0.249 - 0.00	68	72		81	76	96
	0.250 - 0.499	1.000 - 0.71	31	33		33	36	39
		0.799 - 0.60	37	40		39	43	46
		0.599 - 0.50	42	46		44	50	56
		0.499 - 0.38	47	54		56	57	67
		0.379 - 0.00	58	68		68	89	85
	0.500 +	1.000 - 0.71	38	42		41	45	50
		0.799 - 0.60	45	50		47	54	61
		0.599 - 0.50	50	57		52	61	71
		0.499 - 0.00	55	65		57	69	84
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	19	20		20	27	28
		0.799 - 0.60	24	25		31	33	35
		0.599 - 0.50	28	29		35	38	41
		0.499 - 0.38	32	34		40	45	49
		0.379 - 0.25	40	44		49	58	64
		0.249 - 0.00	54	62		61	74	93
	0.250 - 0.499	1.000 - 0.71	26	28		32	35	37
		0.799 - 0.60	31	32		38	42	46
		0.599 - 0.50	35	38		43	48	54
		0.499 - 0.38	41	44		49	56	65
		0.379 - 0.00	49	58		57	68	83
	0.500 +	1.000 - 0.71	32	33		40	44	48
		0.799 - 0.60	38	41		46	52	59
		0.599 - 0.50	43	47		51	59	70
		0.499 - 0.00	49	55		57	67	82
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	17	17		25	26	27
		0.799 - 0.60	21	21		30	32	34
		0.599 - 0.50	24	25		34	37	40
		0.499 - 0.38	29	30		39	43	48
		0.379 - 0.25	36	39		47	54	63
		0.249 - 0.00	49	56		66	72	90
	0.250 - 0.499	1.000 - 0.71	22	23		31	34	36
		0.799 - 0.60	27	28		37	41	45
		0.599 - 0.50	31	33		42	47	53
		0.499 - 0.38	36	39		47	54	63
		0.379 - 0.00	45	56		56	66	81
	0.500 +	1.000 - 0.71	28	29		38	42	47
		0.799 - 0.60	34	36		45	50	58
		0.599 - 0.50	38	42		50	57	68
		0.499 - 0.00	44	49		55	65	79

Daylight Sensing Controls

Uwe (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.15	HC ≥ 5	24	0.21	0.37
	HC ≥ 10	24	0.38	0.58
	HC ≥ 15	24	0.47	0.58
	HC ≥ 5	85	0.21	0.37
	HC ≥ 10	85	0.35	0.49
	HC ≥ 15	85	0.45	0.56

Uwe (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.15	HC ≥ 5	19	0.28	0.49
	HC ≥ 10	19	0.48	0.72
	HC ≥ 15	19	0.67	0.88
	HC ≥ 5	93	0.28	0.38
	HC ≥ 10	93	0.38	0.53
	HC ≥ 15	93	0.49	0.61

Uwe (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.15	HC ≥ 5	17	0.32	0.53
	HC ≥ 10	17	0.53	0.69
	HC ≥ 15	17	0.74	0.88
	HC ≥ 5	90	0.22	0.39
	HC ≥ 10	90	0.39	0.58
	HC ≥ 15	90	0.52	0.66

	Min R-Value		
WALL BELOW GRADE:	7		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	11	9	7
Vertical	6	5	4

	Max Uo
ROOF:	0.088
WALL ADJACENT TO UNCOND SPACE:	0.21
FLOOR OVER UNCOND SPACE:	0.034

ALTERNATE COMPONENT PACKAGES FOR:

HCDS8 = 1 - 1900
CDD8E = 381 - 1150
YSEN = > 845

El Toro CA
Long Beach CA
Los Angeles CA
San Diego CA

TABLE 5.4-6

Uwf

BASE CASE		
1.15 to 5.82	5.81 to 8	N/A

PERIMETER DAYLIGHTING		
1.15 to 5.82	5.81 to 8	5.81 to 6

OPAQUE WALL Uow	
LIGHT WEIGHT WALL	MASS WALL

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	BASE CASE		PERIMETER DAYLIGHTING			OPAQUE WALL Uow	
							VLT ≥ SC	LIGHT WEIGHT WALL	MASS WALL
0 - 1.50	0.000 - 0.249	1.000 - 0.71	18	18	21	21	21	0.23	
		0.799 - 0.60	23	23	26	26	26		
		0.599 - 0.50	27	27	30	31	31		
		0.499 - 0.38	33	33	36	37	38		
		0.379 - 0.25	43	44	47	49	50		
		0.249 - 0.00	64	67	70	73	75		
	0.250 - 0.499	1.000 - 0.71	24	24	27	27	28		
		0.799 - 0.60	30	30	34	34	35		
		0.599 - 0.50	36	36	40	40	41		
		0.499 - 0.38	43	43	47	49	50		
		0.379 - 0.00	56	57	61	64	65		
	0.500 +	1.000 - 0.71	31	32	35	35	36		
		0.799 - 0.60	39	39	43	44	45		
		0.599 - 0.50	46	47	51	52	53		
		0.499 - 0.00	55	56	60	62	64		
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	14	14	21	21	22	0.23	
		0.799 - 0.60	18	18	25	25	27		
		0.599 - 0.50	21	21	31	31	33		
		0.499 - 0.38	26	26	37	37	39		
		0.379 - 0.25	35	34	49	49	52		
		0.249 - 0.00	54	54	72	74	78		
	0.250 - 0.499	1.000 - 0.71	19	19	27	27	29		
		0.799 - 0.60	24	24	34	34	36		
		0.599 - 0.50	28	28	41	41	43		
		0.499 - 0.38	34	34	49	49	52		
		0.379 - 0.00	46	46	64	65	68		
	0.500 +	1.000 - 0.71	25	25	36	36	38		
		0.799 - 0.60	31	31	44	44	47		
		0.599 - 0.50	37	37	52	53	56		
		0.499 - 0.00	45	44	63	64	67		
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	12	12	19	19	21	0.23	
		0.799 - 0.60	15	15	24	24	26		
		0.599 - 0.50	18	17	29	29	31		
		0.499 - 0.38	21	22	35	35	38		
		0.379 - 0.25	29	28	46	46	50		
		0.249 - 0.00	45	44	69	70	73		
	0.250 - 0.499	1.000 - 0.71	18	15	25	25	28		
		0.799 - 0.60	20	19	32	32	35		
		0.599 - 0.50	23	23	38	38	42		
		0.499 - 0.38	28	28	46	46	50		
		0.379 - 0.00	36	38	60	61	66		
	0.500 +	1.000 - 0.71	28	28	33	33	38		
		0.799 - 0.60	26	25	41	42	45		
		0.599 - 0.50	30	30	48	48	54		
		0.499 - 0.00	37	37	59	60	65		

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.23	HC ≥ 5	18	0.50	0.00
	HC ≥ 10	18	0.00	0.00
	HC ≥ 15	18	0.00	0.00
	HC ≥ 5	75	0.40	0.00
	HC ≥ 10	75	0.00	0.30
	HC ≥ 15	75	0.00	0.00

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.23	HC ≥ 5	14	0.00	0.00
	HC ≥ 10	14	0.00	0.00
	HC ≥ 15	14	0.00	0.00
	HC ≥ 5	78	0.00	0.00
	HC ≥ 10	78	0.00	0.00
	HC ≥ 15	78	0.00	0.00

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.23	HC ≥ 5	12	0.00	0.00
	HC ≥ 10	12	0.00	0.00
	HC ≥ 15	12	0.00	0.00
	HC ≥ 5	75	0.72	0.00
	HC ≥ 10	75	0.00	0.00
	HC ≥ 15	75	0.00	0.00

Daylight Sensing Controls

	Min R-Value		
WALL BELOW GRADE:	5		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	0	0	0
Vertical	0	0	0

	Max Uo
ROOF:	0.15
WALL ADJACENT TO UNCOND SPACE:	0.38
FLOOR OVER UNCOND SPACE:	0.18

ALTERNATE COMPONENT PACKAGES FOR:

HCDSB = 1 - 1059
CCDES = 1151 - 2068
YCEN = 668 - 846

Atlanta GA
Birmingham AL
Cape Hatteras NC
Cherry Point NC
Greenville SC

TABLE 5.4-7

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCs)	BASE CASE Uef 1.15 to 0.92	BASE CASE Uef 0.81 to 0	BASE CASE Uef N/A	PERIMETER DAYLIGHTING Uef 1.15 to 0.82	PERIMETER DAYLIGHTING Uef 0.81 to 0	PERIMETER DAYLIGHTING Uef 0.41 to 0	OPAQUE WALL Uew LIGHT WEIGHT WALL	OPAQUE WALL Uew MASS WALL
								VLT ≥ SC		
0 - 1.50	0.060 - 0.249	1.000 - 0.71	19	20		21	22	23		
		0.799 - 0.58	24	25		28	27	28		
		0.599 - 0.50	28	29		33	32	33		
		0.499 - 0.38	32	35		35	38	39		
		0.379 - 0.25	41	45		44	49	50		
		0.249 - 0.00	58	64		59	69	78		
	0.250 - 0.499	1.000 - 0.71	25	26		28	29	30		
		0.799 - 0.68	30	32		33	36	36		
		0.599 - 0.50	35	38		38	42	42		
		0.499 - 0.38	41	45		44	49	50		
		0.379 - 0.00	50	57		54	61	63		
	0.500 -	1.000 - 0.71	31	33		34	37	38		
		0.799 - 0.68	38	41		41	45	46		
		0.599 - 0.50	43	47		47	52	53		
		0.499 - 0.00	49	56		53	60	62		
1.51 - 3.00	0.060 - 0.249	1.000 - 0.71	15	15		21	21	23		
		0.799 - 0.58	19	19		25	27	28		
		0.599 - 0.50	22	22		30	31	33		
		0.499 - 0.38	28	27		35	37	39		
		0.379 - 0.25	33	35		43	48	51		
		0.249 - 0.00	47	52		59	58	71		
	0.250 - 0.499	1.000 - 0.71	20	20		27	29	30		
		0.799 - 0.68	24	25		33	35	37		
		0.599 - 0.50	28	29		38	40	43		
		0.499 - 0.38	33	35		43	48	50		
		0.379 - 0.00	42	46		53	61	64		
	0.500 -	1.000 - 0.71	25	26		34	36	38		
		0.799 - 0.68	30	32		40	44	46		
		0.599 - 0.50	35	37		46	51	54		
		0.499 - 0.00	41	44		52	59	63		
3.01 - 3.50	0.060 - 0.249	1.000 - 0.71	13	13		20	20	22		
		0.799 - 0.68	16	15		24	25	27		
		0.599 - 0.50	18	19		28	29	32		
		0.499 - 0.38	22	23		33	36	38		
		0.379 - 0.25	28	30		41	45	49		
		0.249 - 0.00	41	45		53	64	00		
	0.250 - 0.499	1.000 - 0.71	16	17		25	27	29		
		0.799 - 0.68	20	21		31	33	35		
		0.599 - 0.50	24	25		36	38	41		
		0.499 - 0.38	28	30		41	45	49		
		0.379 - 0.00	36	39		50	57	62		
	0.500 -	1.000 - 0.71	21	22		32	34	36		
		0.799 - 0.68	26	27		38	41	45		
		0.599 - 0.50	30	32		43	48	52		
		0.499 - 0.00	35	38		49	56	61		

Uew (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.18	HC ≥ 5	19	0.21	0.36
	HC ≥ 10	19	0.31	0.39
	HC ≥ 15	19	0.40	0.42
	HC ≥ 5	70	0.26	0.27
	HC ≥ 10	70	0.27	0.36
	HC ≥ 15	70	0.35	0.39

Uew (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.18	HC ≥ 5	15	0.22	0.34
	HC ≥ 10	15	0.36	0.43
	HC ≥ 15	15	0.46	0.47
	HC ≥ 5	71	0.28	0.29
	HC ≥ 10	71	0.29	0.38
	HC ≥ 15	71	0.39	0.40

Uew (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.18	HC ≥ 5	13	0.22	0.34
	HC ≥ 10	13	0.36	0.43
	HC ≥ 15	13	0.46	0.48
	HC ≥ 5	69	0.28	0.29
	HC ≥ 10	69	0.38	0.39
	HC ≥ 15	69	0.48	0.41

Daylight Sensing Controls

	Min R-Value
WALL BELOW GRADE:	7

UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	11	9	7
Vertical	6	5	4

	Max Uo
ROOF:	0.069
WALL ADJACENT TO UNCOND SPACE:	0.21
FLOOR OVER UNCOND SPACE:	0.065

ALTERNATE COMPONENT PACKAGES FOR:

[illegible] = 1 - 1000
[illegible] = 1151 - 2000
[illegible] = > 846

Fresno CA
Redbluff CA
Sacramento CA

TABLE 5.4-8

Uof	BASE CASE			PERIMETER DAYLIGHTING			OPAQUE WALL Uow	
	1.15 to 0.82	0.81 to 0	N/A	1.15 to 0.82	0.81 to 0	0.81 to 0	LIGHT WEIGHT WALL	MASS WALL
						VLT ≥ SC		

INTERNAL LOAD DENSITY (TLD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	BASE CASE		PERIMETER DAYLIGHTING		
0 - 1.50	0.000 - 0.249	1.000 - 0.71	19	20	21	22	22
		0.799 - 0.60	24	25	26	27	28
		0.599 - 0.50	29	29	30	32	33
		0.499 - 0.38	33	35	35	38	39
		0.379 - 0.25	41	45	44	49	50
		0.249 - 0.00	58	65	59	69	78
	0.250 - 0.499	1.000 - 0.71	25	26	27	29	29
		0.799 - 0.60	31	33	33	36	36
		0.599 - 0.50	35	38	38	42	42
		0.499 - 0.38	41	45	44	49	50
		0.379 - 0.00	51	58	53	62	63
	0.500 -	1.000 - 0.71	32	34	34	37	38
		0.799 - 0.60	38	42	41	45	46
		0.599 - 0.50	44	48	47	52	53
		0.499 - 0.00	50	57	53	61	62
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	15	15	20	21	22
		0.799 - 0.60	18	19	25	26	27
		0.599 - 0.50	22	23	29	30	32
		0.499 - 0.38	26	27	34	36	38
		0.379 - 0.25	33	35	42	47	49
		0.249 - 0.00	47	53	58	67	78
	0.250 - 0.499	1.000 - 0.71	20	20	26	28	29
		0.799 - 0.60	24	25	32	34	36
		0.599 - 0.50	28	30	37	40	42
		0.499 - 0.38	33	35	43	47	50
		0.379 - 0.00	42	46	52	60	63
	0.500 -	1.000 - 0.71	25	26	33	35	37
		0.799 - 0.60	31	32	40	43	45
		0.599 - 0.50	35	38	45	50	53
		0.499 - 0.00	41	45	52	59	62
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	13	13	19	20	21
		0.799 - 0.60	16	16	23	24	25
		0.599 - 0.50	19	19	27	29	31
		0.499 - 0.38	22	23	32	34	37
		0.379 - 0.25	29	31	40	44	46
		0.249 - 0.00	42	46	55	64	68
	0.250 - 0.499	1.000 - 0.71	17	17	25	26	28
		0.799 - 0.60	21	21	30	32	35
		0.599 - 0.50	24	25	35	38	40
		0.499 - 0.38	29	30	40	44	48
		0.379 - 0.00	37	46	50	57	61
	0.500 -	1.000 - 0.71	22	22	31	33	36
		0.799 - 0.60	26	28	37	41	44
		0.599 - 0.50	31	33	43	46	51
		0.499 - 0.00	36	39	49	56	60

Daylight Sensing Controls

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.15	HC ≥ 5	19	0.29	0.33
	HC ≥ 10	19	0.34	0.44
	HC ≥ 15	19	0.44	0.49
	HC ≥ 5	70	0.19	0.30
	HC ≥ 10	70	0.29	0.40
	HC ≥ 15	70	0.40	0.44

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.15	HC ≥ 5	15	0.21	0.38
	HC ≥ 10	15	0.37	0.48
	HC ≥ 15	15	0.48	0.53
	HC ≥ 5	70	0.20	0.32
	HC ≥ 10	70	0.32	0.42
	HC ≥ 15	70	0.43	0.47

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.15	HC ≥ 5	13	0.21	0.37
	HC ≥ 10	13	0.38	0.48
	HC ≥ 15	13	0.49	0.54
	HC ≥ 5	60	0.20	0.32
	HC ≥ 10	60	0.32	0.43
	HC ≥ 15	60	0.43	0.48

	Min R-Value		
WALL BELOW GRADE:	0		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	0	0	0
Vertical	0	0	0

	Max Uo
ROOF:	0.060
WALL ADJACENT TO UNCOND SPACE:	0.23
FLOOR OVER UNCOND SPACE:	0.16

ALTERNATE COMPONENT PACKAGES FOR:

HCCSB = 1 - 1358
CCDS5 = 2968 - 3258
VSCN = 228 - 846

Baton Rouge LA
Charleston SC
Columbia SC
Houston TX
Jackson MS

Lake Charles LA
Little Rock AR
Macon GA
Meridian MS
Mobile AL

Montgomery AL
New Orleans LA
Port Angeles TX
Savannah GA
Shreveport LA

TABLE 6.4-8

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCs)	BASE CASE Uof	BASE CASE	BASE CASE	PERIMETER DAYLIGHTING	PERIMETER DAYLIGHTING	PERIMETER DAYLIGHTING (VLT ≥ SC)
			1.15 to 0.32	0.81 to 0	N/A	1.15 to 0.82	0.81 to 0	0.81 to 0
0 - 1.50	0.000 - 0.249	1.000 - 0.71	19	19		21	22	22
		0.799 - 0.60	23	24		25	27	27
		0.599 - 0.50	27	29		30	32	32
		0.499 - 0.38	32	34		36	38	38
		0.379 - 0.25	41	44		46	49	50
		0.249 - 0.00	59	66		63	72	73
	0.250 - 0.499	1.000 - 0.71	24	25		27	28	29
		0.799 - 0.60	30	31		33	35	36
		0.599 - 0.50	35	37		39	41	42
		0.499 - 0.38	41	44		46	49	50
		0.379 - 0.00	52	57		57	63	64
	0.500 -	1.000 - 0.71	31	32		34	36	37
		0.799 - 0.60	38	40		42	45	46
		0.599 - 0.50	44	47		48	52	53
		0.499 - 0.00	51	56		53	62	63
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	15	15		21	21	23
		0.799 - 0.60	18	18		28	27	28
		0.599 - 0.50	22	22		30	31	33
		0.499 - 0.38	25	27		36	38	40
		0.379 - 0.25	34	35		46	49	52
		0.249 - 0.00	49	53		65	72	76
	0.250 - 0.499	1.000 - 0.71	19	20		27	28	30
		0.799 - 0.60	24	24		33	35	37
		0.599 - 0.50	28	29		39	41	44
		0.499 - 0.38	33	35		46	49	52
		0.379 - 0.00	43	46		58	64	67
	0.500 -	1.000 - 0.71	25	25		35	38	38
		0.799 - 0.60	30	31		42	46	47
		0.599 - 0.50	35	37		49	53	56
		0.499 - 0.00	42	46		57	62	66
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	12	12		19	20	22
		0.799 - 0.60	15	15		24	25	27
		0.599 - 0.50	18	18		28	29	32
		0.499 - 0.38	22	22		33	35	38
		0.379 - 0.25	28	29		43	46	50
		0.249 - 0.00	42	46		61	68	73
	0.250 - 0.499	1.000 - 0.71	18	18		25	26	29
		0.799 - 0.60	20	20		31	33	36
		0.599 - 0.50	23	24		36	39	42
		0.499 - 0.38	28	29		43	46	50
		0.379 - 0.00	35	38		54	60	65
	0.500 -	1.000 - 0.71	21	21		32	34	37
		0.799 - 0.60	25	26		39	42	45
		0.599 - 0.50	30	31		46	49	53
		0.499 - 0.00	35	37		53	58	64

Daylight Sensing Controls

SPACE WALL Uow				
LIGHT WEIGHT WALL	MASS WALL			
Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.18	HC ≥ 5	19	0.23	0.35
	HC ≥ 10	19	0.36	0.43
	HC ≥ 15	19	0.45	0.47
	HC ≥ 5	73	0.22	0.32
	HC ≥ 10	73	0.33	0.40
	HC ≥ 15	73	0.42	0.44

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.18	HC ≥ 5	15	0.24	0.37
	HC ≥ 10	15	0.39	0.47
	HC ≥ 15	15	0.49	0.52
	HC ≥ 5	76	0.24	0.36
	HC ≥ 10	76	0.36	0.44
	HC ≥ 15	76	0.46	0.49

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.18	HC ≥ 5	12	0.24	0.37
	HC ≥ 10	12	0.39	0.47
	HC ≥ 15	12	0.49	0.53
	HC ≥ 5	73	0.23	0.35
	HC ≥ 10	73	0.36	0.43
	HC ≥ 15	73	0.45	0.48

	Min R-Value		
WALL BELOW GRADE:	7		
UNHEATED SLAB ON GRADE:	24'	36'	48'
Horizontal	18	9	7
Vertical	6	5	4

	Max Uo
ROOF:	0.064
WALL ADJACENT TO UNCOND SPACE:	0.22
FLOOR OVER UNCOND SPACE:	0.098

ALTERNATE COMPONENT PACKAGES FOR:

/CDD50 = 1 - 1000
<CDD65 = 2251 - 3250
>SFH = > 845

Abilene TX
Apalachicola FL
Austin TX
Bakersfield CA
Daytona Beach FL
Del Rio TX
El Paso TX
Fort Worth TX
Jacksonville FL
San Antonio TX
Sherman TX
Tallahassee FL
Tampa FL
Waco TX
Wichita Falls TX

TABLE 5.4-18

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	BASE CASE Uwf 1.15 to 0.82	BASE CASE Uwf 0.81 to 0	BASE CASE Uwf N/A	PERIMETER DAYLIGHTING Uwf 1.15 to 0.82	PERIMETER DAYLIGHTING Uwf 0.81 to 0	PERIMETER DAYLIGHTING Uwf 0.81 to 0 (VLT ≥ SC)
0 - 1.50	0.000 - 0.249	1.000 - 0.71	19	19		21	21	22
		0.700 - 0.60	23	24		25	27	27
		0.599 - 0.50	27	28		29	31	32
		0.499 - 0.38	32	34		34	37	38
		0.379 - 0.25	40	44		43	48	49
		0.249 - 0.00	55	64		59	69	70
	0.250 - 0.499	1.000 - 0.71	24	28		27	28	29
		0.700 - 0.60	30	32		32	35	35
		0.599 - 0.50	34	37		37	41	41
		0.499 - 0.38	40	44		43	48	49
		0.379 - 0.00	50	56		53	61	62
	0.500 -	1.000 - 0.71	31	33		34	38	37
		0.700 - 0.60	37	40		40	44	45
		0.599 - 0.50	42	47		46	51	52
		0.499 - 0.00	49	55		52	60	61
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	15	15		20	21	22
		0.700 - 0.60	18	19		25	26	27
		0.599 - 0.50	21	22		29	31	32
		0.499 - 0.38	25	27		34	37	38
		0.379 - 0.25	33	35		43	48	50
		0.249 - 0.00	47	53		59	66	72
	0.250 - 0.499	1.000 - 0.71	19	20		26	29	29
		0.700 - 0.60	24	25		32	34	36
		0.599 - 0.50	28	29		37	40	42
		0.499 - 0.38	33	35		43	48	50
		0.379 - 0.00	41	46		53	61	64
	0.500 -	1.000 - 0.71	24	26		33	35	37
		0.700 - 0.60	30	32		40	43	46
		0.599 - 0.50	35	37		46	51	53
		0.499 - 0.00	41	44		52	60	63
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	12	13		19	20	21
		0.700 - 0.60	15	16		23	24	26
		0.599 - 0.50	18	19		27	29	31
		0.499 - 0.38	22	23		32	34	37
		0.379 - 0.25	28	30		40	45	48
		0.249 - 0.00	41	46		56	65	70
	0.250 - 0.499	1.000 - 0.71	16	17		25	28	28
		0.700 - 0.60	20	21		30	32	35
		0.599 - 0.50	24	25		35	38	41
		0.499 - 0.38	28	30		40	45	48
		0.379 - 0.00	36	39		50	57	62
	0.500 -	1.000 - 0.71	21	22		31	33	36
		0.700 - 0.60	26	27		37	41	44
		0.599 - 0.50	30	32		43	48	52
		0.499 - 0.00	35	38		49	56	61

Daylight Sensing Controls

Uwo (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.15	HC ≥ 5	19	0.17	0.26
	HC ≥ 10	19	0.22	0.32
	HC ≥ 15	19	0.29	0.36
	HC ≥ 5	70	0.17	0.23
	HC ≥ 10	70	0.21	0.30
	HC ≥ 15	70	0.27	0.32

Uwo (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.15	HC ≥ 5	15	0.17	0.26
	HC ≥ 10	15	0.23	0.35
	HC ≥ 15	15	0.32	0.38
	HC ≥ 5	72	0.17	0.24
	HC ≥ 10	72	0.22	0.32
	HC ≥ 15	72	0.29	0.35

Uwo (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.15	HC ≥ 5	12	0.17	0.26
	HC ≥ 10	12	0.23	0.35
	HC ≥ 15	12	0.32	0.38
	HC ≥ 5	70	0.17	0.24
	HC ≥ 10	70	0.22	0.32
	HC ≥ 15	70	0.29	0.35

	Min R-Value		
WALL BELOW GRADE:	7		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	18	9	7
Vertical	6	5	4

	Max Uo
ROOF:	0.057
WALL ADJACENT TO UNCOND SPACE:	0.22
FLOOR OVER UNCOND SPACE:	0.100

ALTERNATE COMPONENT PACKAGES FOR:

HDD65 = 1 - 1000
CDD65 = 2001 - 3253
VSEB = > 845
CDHB = > 13000

China Lake CA
Daggett CA
Las Vegas CA
Tucson AZ

TABLE 5.4-11

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	BASE CASE: 1.15 to 0.22	BASE CASE: 0.81 to 0	BASE CASE: N/A	PERIMETER DAYLIGHTING: 1.15 to 0.82	PERIMETER DAYLIGHTING: 0.81 to 0	PERIMETER DAYLIGHTING: 0.81 to 0 (YLT ≥ SC)	OPAQUE WALL Uow: LIGHT WEIGHT WALL	OPAQUE WALL Uow: MASS WALL
0 - 1.50	0.000 - 0.249	1.000 - 0.71	17	17		18	19	19		
		0.799 - 0.60	21	22		23	23	24		
		0.599 - 0.50	25	29		27	28	29		
		0.499 - 0.38	30	31		32	34	35		
		0.379 - 0.25	39	42		42	46	48		
		0.249 - 0.00	53	65		63	70	71		
	0.250 - 0.499	1.000 - 0.71	22	23		24	25	26		
		0.799 - 0.60	28	29		30	31	32		
		0.599 - 0.50	33	34		36	37	38		
		0.499 - 0.38	39	42		42	46	48		
		0.379 - 0.00	51	56		55	60	61		
	0.500 -	1.000 - 0.71	29	30		31	33	33		
		0.799 - 0.60	36	38		39	41	42		
		0.599 - 0.50	42	45		45	49	50		
		0.499 - 0.00	50	54		54	59	60		
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	14	14		18	19	20		
		0.799 - 0.60	17	17		23	23	25		
		0.599 - 0.50	20	21		27	28	30		
		0.499 - 0.38	26	26		33	34	36		
		0.379 - 0.25	33	34		43	45	48		
		0.249 - 0.00	50	54		65	71	75		
	0.250 - 0.499	1.000 - 0.71	18	18		24	25	26		
		0.799 - 0.60	23	23		30	31	33		
		0.599 - 0.50	27	28		36	37	40		
		0.499 - 0.38	33	34		43	46	48		
		0.379 - 0.00	43	46		56	61	65		
	0.500 -	1.000 - 0.71	24	24		32	33	35		
		0.799 - 0.60	29	31		39	41	43		
		0.599 - 0.50	35	37		46	49	52		
		0.499 - 0.00	42	45		55	60	63		
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	12	12		17	17	19		
		0.799 - 0.60	15	15		21	22	24		
		0.599 - 0.50	17	18		25	26	28		
		0.499 - 0.38	21	22		31	32	35		
		0.379 - 0.25	28	29		40	43	46		
		0.249 - 0.00	44	48		61	67	72		
	0.250 - 0.499	1.000 - 0.71	15	16		23	23	25		
		0.799 - 0.60	20	20		28	29	32		
		0.599 - 0.50	23	24		34	35	38		
		0.499 - 0.38	28	29		40	43	46		
		0.379 - 0.00	37	39		53	58	62		
	0.500 -	1.000 - 0.71	20	21		30	31	33		
		0.799 - 0.60	25	26		37	39	42		
		0.599 - 0.50	30	31		44	46	50		
		0.499 - 0.00	36	38		52	56	61		

Daylight Sensing Controls

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.17	HC ≥ 5	17	0.19	0.24
	HC ≥ 10	17	0.24	0.31
	HC ≥ 15	17	0.29	0.33
	HC ≥ 5	71	0.19	0.24
	HC ≥ 10	71	0.24	0.31
	HC ≥ 15	71	0.29	0.33

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.17	HC ≥ 5	14	0.19	0.25
	HC ≥ 10	14	0.24	0.31
	HC ≥ 15	14	0.30	0.34
	HC ≥ 5	75	0.19	0.25
	HC ≥ 10	75	0.24	0.31
	HC ≥ 15	75	0.30	0.34

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.17	HC ≥ 5	12	0.19	0.25
	HC ≥ 10	12	0.24	0.31
	HC ≥ 15	12	0.30	0.34
	HC ≥ 5	72	0.19	0.25
	HC ≥ 10	72	0.25	0.32
	HC ≥ 15	72	0.31	0.35

	Min R-Value		
WALL BELOW GRADE:	0		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	0	0	0
Vertical	0	0	0

	Max Uo
ROOF:	0.049
WALL ADJACENT TO UNCOND SPACE:	0.25
FLOOR OVER UNCOND SPACE:	0.12

ALTERNATE COMPONENT PACKAGES FOR:

HCCSB = 1 - 1000
CCDES = 3251 - 4500
YSET = > 645
CLAB = 0 - 10000

Brownsville TX
Corpus Christi TX
Kingsville TX
Miami FL
Orlando FL

West Palm Beach FL

TABLE 5.4-12

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SC)	BASE CASE Uof 1.15 to 0.82	BASE CASE Uof 0.81 to 0	BASE CASE Uof N/A	PERIMETER DAYLIGHTING Uof 1.15 to 0.82	PERIMETER DAYLIGHTING Uof 0.81 to 0	PERIMETER DAYLIGHTING Uof 0.81 to 0 (VLT ≥ SC)
0 - 1.50	0.000 - 0.249	1.000 - 0.71	15	15		18	17	18
		0.700 - 0.60	20	19		22	22	23
		0.500 - 0.50	24	23		27	27	28
		0.400 - 0.30	29	29		34	33	34
		0.300 - 0.25	41	40		48	46	48
		0.249 - 0.00	74	70		86	80	83
	0.250 - 0.499	1.000 - 0.71	21	20		24	24	24
		0.700 - 0.60	27	26		31	30	31
		0.500 - 0.50	33	32		38	37	38
		0.400 - 0.30	41	40		48	46	47
		0.300 - 0.00	59	57		69	66	67
	0.500 +	1.000 - 0.71	28	27		32	31	32
		0.700 - 0.60	36	35		42	41	42
		0.500 - 0.50	44	43		52	50	51
		0.400 - 0.00	57	54		67	63	65
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	13	12		19	19	21
		0.700 - 0.60	16	16		25	24	26
		0.500 - 0.50	20	19		31	30	32
		0.400 - 0.30	24	24		38	37	40
		0.300 - 0.25	34	33		55	52	56
		0.249 - 0.00	61	58		97	90	95
	0.250 - 0.499	1.000 - 0.71	17	17		27	26	28
		0.700 - 0.60	22	22		35	34	36
		0.500 - 0.50	27	26		43	41	44
		0.400 - 0.30	34	33		55	52	55
		0.300 - 0.00	49	47		79	73	78
	0.500 +	1.000 - 0.71	23	22		36	35	37
		0.700 - 0.60	30	29		48	46	49
		0.500 - 0.50	37	36		60	57	60
		0.400 - 0.00	47	45		76	71	76
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	10	10		18	17	20
		0.700 - 0.60	13	13		23	22	25
		0.500 - 0.50	16	16		28	27	31
		0.400 - 0.30	19	19		35	34	38
		0.300 - 0.25	27	26		51	48	53
		0.249 - 0.00	48	45		89	81	90
	0.250 - 0.499	1.000 - 0.71	14	13		24	24	27
		0.700 - 0.60	17	17		32	31	34
		0.500 - 0.50	21	21		40	38	42
		0.400 - 0.30	27	26		51	48	53
		0.300 - 0.00	38	37		73	69	75
	0.500 +	1.000 - 0.71	18	18		33	32	36
		0.700 - 0.60	23	23		44	42	46
		0.500 - 0.50	29	28		56	52	57
		0.400 - 0.00	36	35		71	67	72

Daylight Sensing Controls

OPAQUE WALL Uow

LIGHT WEIGHT WALL	MASS WALL

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.40	HC ≥ 5	15	0.81	0.70
	HC ≥ 10	15	0.80	0.80
	HC ≥ 15	15	0.80	0.80
	HC ≥ 5	80	0.65	0.80
	HC ≥ 10	80	0.80	0.80
	HC ≥ 15	80	0.80	0.80

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.40	HC ≥ 5	13	0.81	0.70
	HC ≥ 10	13	0.80	0.80
	HC ≥ 15	13	0.80	0.80
	HC ≥ 5	80	0.67	0.80
	HC ≥ 10	80	0.80	0.80
	HC ≥ 15	80	0.80	0.80

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.40	HC ≥ 5	10	0.81	0.70
	HC ≥ 10	10	0.80	0.80
	HC ≥ 15	10	0.80	0.80
	HC ≥ 5	90	0.67	0.80
	HC ≥ 10	90	0.80	0.80
	HC ≥ 15	90	0.80	0.80

	Min R-Value
WALL BELOW GRADE:	0

UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	0	0	0
Vertical	0	0	0

	Max Uo
ROOF:	0.064
WALL ADJACENT TO UNCOND SPACE:	0.03
FLOOR OVER UNCOND SPACE:	0.20

ALTERNATE COMPONENT PACKAGES FOR:

HDD65 = 1 - 1000
CDD65 = 3250 - 4500
VSEF = > 845
CDH80 = > 13000

Laredo TX
Phoenix AZ
Yuma AZ

TABLE 5.4-13

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	BASE CASE Uef 1.15 to 0.92	BASE CASE Uef 0.91 to 0	BASE CASE Uef N/A	PERIMETER DAYLIGHTING Uef 1.15 to 0.92	PERIMETER DAYLIGHTING Uef 0.91 to 0	PERIMETER DAYLIGHTING Uef 0.91 to 0 (VLT ≥ SC)
0 - 1.50	0.500 - 0.249	1.000 - 0.71	15	15		17	17	17
		0.709 - 0.60	19	19		22	21	22
		0.599 - 0.50	23	23		27	26	27
		0.499 - 0.38	29	29		33	33	34
		0.379 - 0.25	41	48		47	46	48
		0.249 - 0.00	75	72		88	83	85
	0.250 - 0.499	1.000 - 0.71	28	28		23	23	24
		0.709 - 0.60	29	28		30	30	30
		0.599 - 0.50	32	31		37	36	37
		0.499 - 0.38	46	40		47	46	47
		0.379 - 0.00	59	57		69	66	68
	0.500 -	1.000 - 0.71	27	27		31	31	32
		0.709 - 0.60	35	35		41	40	41
		0.599 - 0.50	44	43		51	50	51
		0.499 - 0.00	56	55		67	64	66
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	12	12		19	19	20
		0.709 - 0.60	15	15		24	24	26
		0.599 - 0.50	19	19		30	29	32
		0.499 - 0.38	24	24		38	37	40
		0.379 - 0.25	34	33		55	53	57
		0.249 - 0.00	82	59		100	92	100
	0.250 - 0.499	1.000 - 0.71	17	17		26	26	28
		0.709 - 0.60	22	21		34	33	36
		0.599 - 0.50	27	25		42	41	44
		0.499 - 0.38	34	33		55	52	58
		0.379 - 0.00	49	47		80	75	81
	0.500 -	1.000 - 0.71	23	22		36	35	37
		0.709 - 0.60	29	29		47	46	49
		0.599 - 0.50	36	36		60	57	61
		0.499 - 0.00	47	46		77	73	78
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	10	10		17	17	19
		0.709 - 0.60	13	12		22	22	25
		0.599 - 0.50	16	16		27	27	30
		0.499 - 0.38	19	19		34	34	38
		0.379 - 0.25	27	26		51	49	54
		0.249 - 0.00	40	40		91	84	95
	0.250 - 0.499	1.000 - 0.71	13	13		24	23	26
		0.709 - 0.60	17	17		31	30	34
		0.599 - 0.50	21	21		39	38	42
		0.499 - 0.38	27	26		50	48	53
		0.379 - 0.00	38	37		74	70	77
	0.500 -	1.000 - 0.71	18	17		33	32	35
		0.709 - 0.60	23	23		43	42	46
		0.599 - 0.50	29	28		55	53	58
		0.499 - 0.00	37	36		72	68	74

Daylight Sensing Controls

OPAQUE WALL Uow	LIGHT WEIGHT WALL	MASS WALL
0.35		

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.35	HC ≥ 5	15	0.41	0.58
	HC ≥ 10	15	0.51	0.59
	HC ≥ 15	15	0.59	0.62
	HC ≥ 5	80	0.43	0.54
	HC ≥ 10	80	0.56	0.56
	HC ≥ 15	80	0.55	0.69

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.35	HC ≥ 5	12	0.41	0.60
	HC ≥ 10	12	0.51	0.59
	HC ≥ 15	12	0.59	0.62
	HC ≥ 5	92	0.43	0.54
	HC ≥ 10	92	0.56	0.66
	HC ≥ 15	92	0.66	0.70

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.35	HC ≥ 5	10	0.41	0.49
	HC ≥ 10	10	0.50	0.58
	HC ≥ 15	10	0.60	0.61
	HC ≥ 5	91	0.42	0.53
	HC ≥ 10	91	0.56	0.65
	HC ≥ 15	91	0.65	0.69

	Min R-Value		
WALL BELOW GRADE:	0		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	0	0	0
Vertical	0	0	0

	Max Uo
ROOF:	0.045
WALL ADJACENT TO UNCOND SPACE:	0.42
FLOOR OVER UNCOND SPACE:	0.20

ALTERNATE COMPONENT PACKAGES FOR:

ADOSH = 1881 - 1758
CDD66 = 0 - 500
HSEN = 568 - 845

Astoria OR
Olympia WA
Portland OR
Salem OR
Seattle WA

Whidbey Island WA

TABLE 5.4-14

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	BASE CASE Uwf: 0.81 to 0.46	BASE CASE Uwf: 0.46 to 0.39	BASE CASE Uwf: 0.38 to 0	PERIMETER DAYLIGHTING VLT ≥ SC: N/A	PERIMETER DAYLIGHTING VLT ≥ SC:
0 - 1.50	0.000 - 0.249	1.000 - 0.71	24	31	33		
		0.700 - 0.60	28	37	39		
		0.500 - 0.50	27	41	44		
		0.400 - 0.38	29	45	56		
		0.379 - 0.25	30	52	59		
		0.249 - 0.00	32	59	78		
	0.250 - 0.499	1.000 - 0.71	27	39	41		
		0.700 - 0.60	29	44	48		
		0.500 - 0.50	30	48	54		
		0.400 - 0.38	31	53	60		
		0.379 - 0.00	32	58	67		
	0.500 +	1.000 - 0.71	29	46	56		
		0.700 - 0.60	31	51	58		
		0.500 - 0.50	32	55	63		
		0.400 - 0.00	32	56	68		
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	22	27	28		
		0.700 - 0.60	25	32	34		
		0.500 - 0.50	27	37	39		
		0.400 - 0.38	29	42	46		
		0.379 - 0.25	32	49	54		
		0.249 - 0.00	35	60	69		
	0.250 - 0.499	1.000 - 0.71	28	34	36		
		0.700 - 0.60	29	40	43		
		0.500 - 0.50	30	45	49		
		0.400 - 0.38	32	50	55		
		0.379 - 0.00	34	57	65		
	0.500 +	1.000 - 0.71	29	42	45		
		0.700 - 0.60	32	46	52		
		0.500 - 0.50	33	52	58		
		0.400 - 0.00	34	57	64		
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	21	25	25		
		0.700 - 0.60	24	30	31		
		0.500 - 0.50	26	34	38		
		0.400 - 0.38	28	39	42		
		0.379 - 0.25	31	47	51		
		0.249 - 0.00	35	58	66		
	0.250 - 0.499	1.000 - 0.71	25	32	33		
		0.700 - 0.60	28	38	40		
		0.500 - 0.50	30	42	46		
		0.400 - 0.38	32	48	52		
		0.379 - 0.00	34	55	62		
	0.500 +	1.000 - 0.71	28	39	42		
		0.700 - 0.60	31	46	49		
		0.500 - 0.50	33	50	55		
		0.400 - 0.00	34	55	61		

OPAQUE WALL Uow

LIGHT WEIGHT WALL	MASS WALL

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.096	HC ≥ 5	24	0.10	0.15
	HC ≥ 10	24	0.11	0.19
	HC ≥ 15	24	0.12	0.24
	HC ≥ 5	70	0.10	0.14
	HC ≥ 10	70	0.11	0.19
	HC ≥ 15	70	0.12	0.23

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.096	HC ≥ 5	22	0.10	0.17
	HC ≥ 10	22	0.12	0.23
	HC ≥ 15	22	0.13	0.28
	HC ≥ 5	60	0.10	0.16
	HC ≥ 10	60	0.11	0.22
	HC ≥ 15	60	0.13	0.27

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.096	HC ≥ 5	21	0.10	0.17
	HC ≥ 10	21	0.12	0.24
	HC ≥ 15	21	0.14	0.30
	HC ≥ 5	66	0.10	0.17
	HC ≥ 10	66	0.11	0.23
	HC ≥ 15	66	0.13	0.29

Daylight Sensing Controls

	Min R-Value		
WALL BELOW GRADE:	0		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	16	13	10
Vertical	7	6	4

	Max Uo
ROOF:	0.064
WALL ADJACENT TO UNCOND SPACE:	0.14
FLOOR OVER UNCOND SPACE:	0.057

ALTERNATE COMPONENT PACKAGES FOR:

HCDSH = 1881 - 1758
CDDSC = 581 - 1188
YSEX = 328 - 846

Asheville NC
Moefore 3R

TABLE 5.4-15

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCs)	BASE CASE Uof 0.81 to 0.46	BASE CASE Uof 0.46 to 0.38	BASE CASE Uof 0.38 to 0	PERIMETER DAYLIGHTING Uof 0.81 to 0.46	PERIMETER DAYLIGHTING Uof 0.46 to 0.38	PERIMETER DAYLIGHTING Uof 0.38 to 0	OPAQUE WALL Uow LIGHT WEIGHT WALL	OPAQUE WALL Uow MASS WALL
0 - 1.50	0.800 - 0.249	1.000 - 0.71	28	24	25	22	28	27		
		0.799 - 0.60	24	29	30	25	31	33		
		0.599 - 0.50	26	34	35	27	36	38		
		0.499 - 0.38	29	39	41	30	41	44		
		0.379 - 0.25	33	47	51	33	50	55		
		0.249 - 0.00	38	61	69	38	63	72		
	0.250 - 0.499	1.000 - 0.71	25	31	32	26	33	35		
		0.799 - 0.60	28	37	39	29	40	42		
		0.599 - 0.50	31	42	45	31	45	49		
		0.499 - 0.38	33	48	52	34	50	55		
		0.379 - 0.00	36	57	63	37	59	67		
	0.500 -	1.000 - 0.71	29	39	41	30	41	45		
		0.799 - 0.60	32	48	49	33	48	53		
		0.599 - 0.50	34	51	56	35	53	60		
		0.499 - 0.00	36	57	63	37	59	67		
1.51 - 3.00	0.800 - 0.249	1.000 - 0.71	18	20	20	22	27	28		
		0.799 - 0.60	21	25	25	26	32	34		
		0.599 - 0.50	24	29	30	29	37	40		
		0.499 - 0.38	27	34	36	32	43	46		
		0.379 - 0.25	32	42	45	36	52	58		
		0.249 - 0.00	39	58	63	41	67	77		
	0.250 - 0.499	1.000 - 0.71	22	26	27	27	34	36		
		0.799 - 0.60	25	32	33	31	41	44		
		0.599 - 0.50	29	37	39	33	46	51		
		0.499 - 0.38	32	43	46	36	53	59		
		0.379 - 0.00	37	53	57	40	63	71		
	0.500 -	1.000 - 0.71	27	33	34	31	43	46		
		0.799 - 0.60	31	43	42	35	50	55		
		0.599 - 0.50	33	46	48	37	56	63		
		0.499 - 0.00	36	52	56	39	62	71		
3.01 - 3.50	0.800 - 0.249	1.000 - 0.71	16	18	18	22	26	27		
		0.799 - 0.60	19	22	22	25	31	33		
		0.599 - 0.50	22	25	26	28	36	39		
		0.499 - 0.38	25	30	31	31	42	46		
		0.379 - 0.25	29	38	40	35	51	57		
		0.249 - 0.00	36	52	57	40	65	75		
	0.250 - 0.499	1.000 - 0.71	20	23	23	26	33	35		
		0.799 - 0.60	24	28	29	30	40	43		
		0.599 - 0.50	28	33	34	32	46	50		
		0.499 - 0.38	29	38	40	35	51	58		
		0.379 - 0.00	34	47	51	39	61	70		
	0.500 -	1.000 - 0.71	24	29	30	31	41	45		
		0.799 - 0.60	28	35	37	34	48	54		
		0.599 - 0.50	31	41	43	38	54	61		
		0.499 - 0.00	34	47	50	38	60	70		

Daylight Sensing Controls

Uow (HC(5)	HC RANGE	PCT FEN	INT INS	EXT INS
0.10	HC ≥ 5	25	0.11	0.15
	HC ≥ 10	25	0.13	0.19
	HC ≥ 15	25	0.15	0.25
	HC ≥ 5	72	0.11	0.14
	HC ≥ 10	72	0.13	0.17
	HC ≥ 15	72	0.14	0.18

Uow (HC(5)	HC RANGE	PCT FEN	INT INS	EXT INS
0.10	HC ≥ 5	18	0.11	0.17
	HC ≥ 10	18	0.14	0.22
	HC ≥ 15	18	0.18	0.24
	HC ≥ 5	77	0.11	0.15
	HC ≥ 10	77	0.13	0.19
	HC ≥ 15	77	0.15	0.25

Uow (HC(5)	HC RANGE	PCT FEN	INT INS	EXT INS
0.10	HC ≥ 5	18	0.11	0.17
	HC ≥ 10	18	0.15	0.23
	HC ≥ 15	18	0.18	0.25
	HC ≥ 5	75	0.11	0.15
	HC ≥ 10	75	0.13	0.19
	HC ≥ 15	75	0.15	0.25

	Min R-Value		
WALL BELOW GRADE:	8		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	15	12	10
Vertical	7	5	4

	Max Uo
ROOF:	0.063
WALL ADJACENT TO UNCOND SPACE:	0.15
FLOOR OVER UNCOND SPACE:	0.064

ALTERNATE COMPONENT PACKAGES FOR:

[illegible] = 1201 - 1750
[illegible] = 1 - 1150
[illegible] = > 846

Prescott AZ
Sinaloa AZ
Yucca Flats NV

TABLE 5 4-18

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCs)	BASE CASE Uef 0.81 to 0.46	BASE CASE 0.46 to 0.30	BASE CASE 0.30 to 0	PERIMETER DAYLIGHTING 0.81 to 0.46	PERIMETER DAYLIGHTING 0.46 to 0	PERIMETER DAYLIGHTING 0.30 to 0 (VLT ≥ SC)
0 - 1.50	0.800 - 0.249	1.000 - 0.71	15	17	17	17	19	19
		0.799 - 0.60	18	21	21	20	23	24
		0.599 - 0.50	21	24	25	22	27	28
		0.499 - 0.38	24	29	30	25	31	33
		0.379 - 0.25	28	36	38	29	39	42
		0.249 - 0.00	35	50	54	36	53	58
	0.250 - 0.499	1.000 - 0.71	19	22	23	21	25	28
		0.799 - 0.60	23	27	28	24	30	31
		0.599 - 0.50	26	32	33	27	34	37
		0.499 - 0.38	28	37	39	30	40	43
		0.379 - 0.00	33	46	49	34	48	53
	0.500 -	1.000 - 0.71	24	29	30	26	31	33
		0.799 - 0.60	27	34	36	28	37	40
		0.599 - 0.50	30	39	42	31	42	46
		0.499 - 0.00	33	45	49	34	48	53
1.51 - 3.00	0.800 - 0.249	1.000 - 0.71	13	13	14	17	18	20
		0.799 - 0.60	15	17	17	20	23	25
		0.599 - 0.50	18	20	20	22	26	29
		0.499 - 0.38	20	23	24	25	31	34
		0.379 - 0.25	26	36	31	30	39	44
		0.249 - 0.00	33	43	46	37	53	62
	0.250 - 0.499	1.000 - 0.71	18	18	18	21	24	28
		0.799 - 0.60	19	22	22	24	29	32
		0.599 - 0.50	22	26	26	27	34	38
		0.499 - 0.38	25	30	31	30	40	44
		0.379 - 0.00	30	39	40	35	49	56
	0.500 -	1.000 - 0.71	20	23	24	25	31	34
		0.799 - 0.60	24	28	29	29	37	41
		0.599 - 0.50	27	33	34	32	42	48
		0.499 - 0.00	30	38	40	36	49	55
3.01 - 3.50	0.800 - 0.249	1.000 - 0.71	11	11	11	15	17	19
		0.799 - 0.60	13	14	14	18	21	24
		0.599 - 0.50	16	17	17	21	25	28
		0.499 - 0.38	18	20	20	24	29	33
		0.379 - 0.25	22	26	27	28	37	42
		0.249 - 0.00	29	37	39	35	50	59
	0.250 - 0.499	1.000 - 0.71	14	15	15	20	23	25
		0.799 - 0.60	17	19	19	23	28	31
		0.599 - 0.50	19	22	22	25	32	36
		0.499 - 0.38	22	26	27	28	37	43
		0.379 - 0.00	27	33	35	33	46	54
	0.500 -	1.000 - 0.71	17	19	20	24	29	33
		0.799 - 0.60	21	24	25	27	35	40
		0.599 - 0.50	23	28	29	30	40	46
		0.499 - 0.00	28	33	34	33	46	53

OPAQUE WALL Uow

LIGHT WEIGHT WALL	MASS WALL

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.11	HC ≥ 5	15	0.12	0.27
	HC ≥ 10	15	0.14	0.21
	HC ≥ 15	15	0.17	0.23
	HC ≥ 5	50	0.11	0.15
	HC ≥ 10	50	0.14	0.20
	HC ≥ 15	50	0.18	0.21

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.11	HC ≥ 5	13	0.12	0.19
	HC ≥ 10	13	0.18	0.25
	HC ≥ 15	13	0.20	0.27
	HC ≥ 5	82	0.12	0.17
	HC ≥ 10	82	0.15	0.22
	HC ≥ 15	82	0.18	0.23

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.11	HC ≥ 5	11	0.12	0.19
	HC ≥ 10	11	0.16	0.26
	HC ≥ 15	11	0.21	0.26
	HC ≥ 5	50	0.12	0.17
	HC ≥ 10	50	0.15	0.22
	HC ≥ 15	50	0.18	0.24

Daylight Sensing Controls

	Min R-Value
WALL BELOW GRADE:	8

UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	15	12	10
Vertical	7	5	4

	Max Uo
ROOF:	0.055
WALL ADJACENT TO UNCOND SPACE:	0.10
FLOOR OVER UNCOND SPACE:	0.065

ALTERNATE STANDARD PACKAGES FOR

HCDD = 1281 - 1753
CDD65 = 1151 - 2063
HDD = 567 - 845

Charlotte NC
Chattanooga TN
Greensboro NC
Knoxville TN
Nashville TN

Norfolk VA
Patuxent MD
Raleigh NC
Richmond VA
Roanoke VA

TABLE 5.4-17

Uof

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	EDGE CASE 0.81 to 0.46	EDGE CASE 0.45 to 0.39	EDGE CASE 0.38 to 0	PERIMETER DAYLIGHTING 0.31 to 0.46	PERIMETER DAYLIGHTING 0.45 to 0	PERIMETER DAYLIGHTING 0.28 to 0	OPAQUE WALL Uow: LIGHT WEIGHT WALL	OPAQUE WALL Uow: MASS WALL
0 - 1.50	0.000 - 0.240	1.000 - 0.71	16	18	18	18	20	20		
		0.799 - 0.66	20	22	22	21	24	25		
		0.599 - 0.50	23	25	28	24	28	30		
		0.499 - 0.38	25	30	31	28	33	35		
		0.379 - 0.25	32	39	46	34	43	46		
		0.249 - 0.00	41	56	59	43	60	66		
	0.250 - 0.499	1.000 - 0.71	21	23	24	23	26	27		
		0.799 - 0.60	25	28	29	27	31	33		
		0.599 - 0.50	28	33	34	30	37	39		
		0.499 - 0.38	32	39	41	34	43	46		
		0.379 - 0.00	38	50	52	40	54	58		
	0.500 -	1.000 - 0.71	26	30	30	28	33	34		
		0.799 - 0.60	30	36	37	32	40	42		
		0.599 - 0.50	34	42	44	36	46	49		
		0.499 - 0.00	38	49	51	40	53	58		
1.51 - 3.00	0.000 - 0.240	1.000 - 0.71	13	14	14	18	20	21		
		0.799 - 0.62	16	17	17	22	24	27		
		0.599 - 0.50	19	21	21	25	29	31		
		0.499 - 0.38	22	25	26	29	34	37		
		0.379 - 0.25	28	32	33	35	44	49		
		0.249 - 0.00	37	47	49	46	62	70		
	0.250 - 0.499	1.000 - 0.71	17	19	19	23	26	28		
		0.799 - 0.62	21	23	23	27	32	35		
		0.599 - 0.50	24	27	27	31	37	41		
		0.499 - 0.38	28	32	33	35	44	49		
		0.379 - 0.00	34	41	43	41	55	63		
	0.500 -	1.000 - 0.71	21	24	24	28	33	36		
		0.799 - 0.60	26	29	30	33	40	45		
		0.599 - 0.50	29	34	36	37	47	52		
		0.499 - 0.00	33	41	42	41	55	61		
3.01 - 3.50	0.000 - 0.240	1.000 - 0.71	11	12	12	17	18	20		
		0.799 - 0.60	14	14	15	20	23	25		
		0.599 - 0.50	16	17	17	23	27	30		
		0.499 - 0.38	19	21	21	27	32	36		
		0.379 - 0.25	24	27	28	33	41	47		
		0.249 - 0.00	32	40	42	42	56	68		
	0.250 - 0.499	1.000 - 0.71	14	15	15	22	24	27		
		0.799 - 0.60	18	19	19	25	30	34		
		0.599 - 0.50	20	23	23	29	35	39		
		0.499 - 0.38	24	27	28	33	41	47		
		0.379 - 0.00	29	35	36	39	52	60		
	0.500 -	1.000 - 0.71	18	20	20	26	31	35		
		0.799 - 0.60	22	24	25	31	38	43		
		0.599 - 0.50	25	29	29	34	44	50		
		0.499 - 0.00	29	34	35	38	51	59		

VLT ≥ SC

Daylight Sensing Controls

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.12	HC ≥ 5	18	0.14	0.18
	HC ≥ 10	13	0.17	0.22
	HC ≥ 15	10	0.19	0.24
	HC ≥ 5	60	0.14	0.19
	HC ≥ 10	65	0.16	0.21
	HC ≥ 15	66	0.19	0.22

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.12	HC ≥ 5	13	0.14	0.29
	HC ≥ 10	13	0.18	0.26
	HC ≥ 15	13	0.23	0.29
	HC ≥ 5	70	0.14	0.18
	HC ≥ 10	70	0.17	0.23
	HC ≥ 15	70	0.20	0.25

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.12	HC ≥ 5	11	0.14	0.29
	HC ≥ 10	11	0.19	0.27
	HC ≥ 15	11	0.24	0.38
	HC ≥ 5	68	0.14	0.19
	HC ≥ 10	68	0.17	0.23
	HC ≥ 15	68	0.20	0.25

	Min R-Value		
WALL BELOW GRADE:	8		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	13	11	9
Vertical	6	5	4

	Max Uo
ROOF:	0.066
WALL ADJACENT TO UNCOND SPACE:	0.17
FLOOR OVER UNCOND SPACE:	0.074

ALTERNATE COMPONENT PACKAGES FOR:

[illegible] = 1001 - 1750
[illegible] 1151 - 2000
[illegible] > 846

Albuquerque NM
Amarillo TX
Lubbock TX
Oklahoma City OK
Roswell NM

Truth or Consequences NM
Tucumcari NM

TABLE 6.4-18

Uof

INTERNAL LOAD DENSITY (BTU/SF) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCs)	BASE CASE 0.81 to 0.46	BASE CASE 0.46 to 0.38	BASE CASE 0.38 to 0	PERIMETER DAYLIGHTING 0.81 to 0.46	PERIMETER DAYLIGHTING 0.46 to 0	PERIMETER DAYLIGHTING 0.38 to 0
								VLT ≥ SC
0 - 1.50	0.000 - 0.249	1.000 - 0.71	14	15	16	16	17	17
		0.709 - 0.60	17	19	19	18	21	22
		0.599 - 0.50	19	22	23	20	24	25
		0.499 - 0.38	22	26	27	23	28	30
		0.379 - 0.25	27	33	35	28	38	38
		0.249 - 0.00	33	47	50	35	49	54
	0.250 - 0.499	1.000 - 0.71	18	20	21	19	22	23
		0.709 - 0.60	21	25	26	22	27	28
		0.599 - 0.50	24	29	30	25	31	33
		0.499 - 0.38	27	34	35	28	36	39
		0.379 - 0.00	31	42	45	32	45	49
	0.500 -	1.000 - 0.71	22	26	27	23	28	30
		0.709 - 0.60	25	31	33	27	34	36
		0.599 - 0.50	28	36	38	29	39	42
		0.499 - 0.00	31	42	45	32	45	49
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	11	12	12	15	16	18
		0.709 - 0.60	14	15	15	18	20	22
		0.599 - 0.50	16	18	18	20	23	26
		0.499 - 0.38	19	21	22	23	28	31
		0.379 - 0.25	23	27	28	28	35	40
		0.249 - 0.00	31	39	42	35	49	57
	0.250 - 0.499	1.000 - 0.71	15	16	16	19	22	24
		0.709 - 0.60	18	20	20	22	26	29
		0.599 - 0.50	20	23	24	25	30	34
		0.499 - 0.38	23	27	28	28	36	40
		0.379 - 0.00	28	35	37	33	45	51
	0.500 -	1.000 - 0.71	18	21	21	23	28	31
		0.709 - 0.60	22	25	26	27	33	37
		0.599 - 0.50	24	29	30	29	38	43
		0.499 - 0.00	28	35	36	33	44	51
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	10	10	10	14	15	17
		0.709 - 0.60	12	13	13	16	18	21
		0.599 - 0.50	14	15	15	19	22	25
		0.499 - 0.38	18	18	18	21	26	29
		0.379 - 0.25	20	23	24	26	33	38
		0.249 - 0.00	27	34	35	33	46	54
	0.250 - 0.499	1.000 - 0.71	12	13	14	17	20	22
		0.709 - 0.60	15	17	17	20	24	28
		0.599 - 0.50	17	20	20	23	28	33
		0.499 - 0.38	20	23	24	28	33	38
		0.379 - 0.00	24	30	31	30	41	49
	0.500 -	1.000 - 0.71	16	17	18	21	25	29
		0.709 - 0.60	19	21	22	25	31	36
		0.599 - 0.50	21	25	26	27	35	41
		0.499 - 0.00	24	29	31	30	41	48

Daylight Sensing Controls

OPAQUE WALL Uow			
LIGHT WEIGHT WALL	MASS WALL		
Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.11	HC ≥ 5	14	0.12	0.18
	HC ≥ 10	14	0.14	0.21
	HC ≥ 15	14	0.17	0.22
	HC ≥ 5	54	0.11	0.16
	HC ≥ 10	54	0.14	0.19
	HC ≥ 15	54	0.16	0.21

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.11	HC ≥ 5	11	0.12	0.18
	HC ≥ 10	11	0.15	0.23
	HC ≥ 15	11	0.19	0.26
	HC ≥ 5	57	0.12	0.17
	HC ≥ 10	57	0.15	0.21
	HC ≥ 15	57	0.17	0.23

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.11	HC ≥ 5	10	0.12	0.18
	HC ≥ 10	10	0.16	0.24
	HC ≥ 15	10	0.20	0.26
	HC ≥ 5	54	0.12	0.17
	HC ≥ 10	54	0.15	0.22
	HC ≥ 15	54	0.18	0.23

	Min R-Value		
WALL BELOW GRADE:	8		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	14	11	9
Vertical	7	5	4

	Max Uo
ROOF:	0.050
WALL ADJACENT TO UNCOND SPACE:	0.17
FLOOR OVER UNCOND SPACE:	0.070

ALTERNATE COMPONENT PACKAGES FOR:

HCDD6 = 1001 - 1750
CDD65 = 2001 - 3250
VSEW = 560 - 245

Fort Smith AR
Memphis TN
Tulsa OK

TABLE 5.4-19

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	BASE CASE Uwf 0.81 to 0.46	BASE CASE Uwf 0.45 to 0.39	BASE CASE Uwf 0.38 to 0	PERIMETER DAYLIGHTING Uwf 0.81 to 0.46	PERIMETER DAYLIGHTING Uwf 0.45 to 0	PERIMETER DAYLIGHTING Uwf 0.38 to 0 (VLT ≥ SC)
0 - 1.50	0.000 - 0.249	1.000 - 0.71	14	15	15	16	17	17
		0.799 - 0.60	17	19	19	19	21	22
		0.599 - 0.50	20	22	22	22	25	26
		0.499 - 0.38	24	26	27	26	29	31
		0.379 - 0.25	30	35	36	32	38	41
		0.249 - 0.00	41	52	54	43	57	62
	0.250 - 0.499	1.000 - 0.71	18	20	20	20	22	23
		0.799 - 0.60	22	25	25	24	27	29
		0.599 - 0.50	26	29	30	25	32	34
		0.499 - 0.38	30	35	36	32	39	41
		0.379 - 0.00	37	45	47	40	50	53
	0.500 -	1.000 - 0.71	23	26	26	25	29	30
		0.799 - 0.60	28	32	32	30	35	37
		0.599 - 0.50	32	37	38	34	41	44
		0.499 - 0.00	36	44	46	39	49	52
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	11	11	11	15	16	18
		0.799 - 0.60	13	14	14	19	20	22
		0.599 - 0.50	16	17	17	22	24	27
		0.499 - 0.38	19	20	20	25	29	32
		0.379 - 0.25	24	27	27	32	38	43
		0.249 - 0.00	34	41	42	43	56	65
	0.250 - 0.499	1.000 - 0.71	14	15	15	20	21	24
		0.799 - 0.60	17	19	19	24	27	30
		0.599 - 0.50	20	22	22	28	32	35
		0.499 - 0.38	24	27	27	32	38	43
		0.379 - 0.00	28	36	36	39	49	56
	0.500 -	1.000 - 0.71	18	19	19	25	28	31
		0.799 - 0.60	22	24	24	30	34	39
		0.599 - 0.50	26	29	29	34	40	46
		0.499 - 0.00	30	34	35	39	48	55
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	9	9	9	14	14	17
		0.799 - 0.60	11	11	11	17	18	21
		0.599 - 0.50	13	14	14	20	21	25
		0.499 - 0.38	15	16	17	23	26	30
		0.379 - 0.25	20	22	22	29	34	40
		0.249 - 0.00	28	33	34	39	51	61
	0.250 - 0.499	1.000 - 0.71	12	12	12	18	19	22
		0.799 - 0.60	14	15	15	22	24	28
		0.599 - 0.50	17	18	18	25	28	33
		0.499 - 0.38	20	22	22	29	34	40
		0.379 - 0.00	25	29	29	35	44	52
	0.500 -	1.000 - 0.71	15	16	16	22	25	29
		0.799 - 0.60	18	19	20	27	31	36
		0.599 - 0.50	21	23	23	30	36	43
		0.499 - 0.00	24	28	28	35	43	52

Daylight Sensing Controls

OPAQUE WALL Uow	LIGHT WEIGHT WALL	MASS WALL
0.13		

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.13	HC ≥ 5	14	0.14	0.20
	HC ≥ 10	14	0.18	0.25
	HC ≥ 15	14	0.22	0.27
	HC ≥ 5	62	0.14	0.20
	HC ≥ 10	62	0.18	0.24
	HC ≥ 15	62	0.21	0.28

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.13	HC ≥ 5	11	0.15	0.21
	HC ≥ 10	11	0.19	0.27
	HC ≥ 15	11	0.24	0.30
	HC ≥ 5	65	0.14	0.20
	HC ≥ 10	65	0.18	0.25
	HC ≥ 15	65	0.23	0.28

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.13	HC ≥ 5	9	0.15	0.22
	HC ≥ 10	9	0.19	0.28
	HC ≥ 15	9	0.24	0.31
	HC ≥ 5	61	0.15	0.21
	HC ≥ 10	61	0.18	0.26
	HC ≥ 15	61	0.23	0.29

	Min R-Value		
WALL BELOW GRADE:	7		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	12	10	8
Vertical	6	5	4

	Max Uo
ROOF:	0.054
WALL ADJACENT TO UNCOND SPACE:	0.19
FLOOR OVER UNCOND SPACE:	0.083

ALTERNATE COMPONENT PACKAGES FOR:

HDD65 = 1751 - 2888
CDD65 = 0 - 1158
YCEF = 588 - 846

Baltimore MD
Boston MA
Charleston WV
Columbus OH
Covington KY

Dayton OH
Harrisburg PA
Lewiston ID
Newark NJ
New York NY

New York (LAG) NY
Philadelphia PA
Seattle OR
Washington DC
Yakima WA

TABLE 5.4-28

Uw/

BASE CASE		
0.58 to 0.46	0.45 to 0.39	0.38 to 0

PERIMETER DAYLIGHTING		
0.58 to 0.46	0.45 to 0	0.38 to 0

VLT ≥ SC

OPAQUE WALL Uow	
LIGHT WEIGHT WALL	MASS WALL

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)						
0 - 1.50	0.000 - 0.249	1.000 - 0.71	22	28	27	23	27	29
		0.709 - 0.60	25	30	32	26	32	34
		0.599 - 0.50	27	34	37	28	36	39
		0.499 - 0.38	30	39	42	30	40	44
		0.379 - 0.25	33	46	51	33	46	52
		0.249 - 0.00	38	54	63	38	54	63
	0.250 - 0.499	1.000 - 0.71	26	33	35	27	34	37
		0.709 - 0.60	29	38	41	30	39	43
		0.599 - 0.50	31	42	46	31	43	46
		0.499 - 0.38	33	48	52	33	47	53
		0.379 - 0.00	38	52	60	35	52	61
	0.500 +	1.000 - 0.71	30	39	43	30	41	45
		0.709 - 0.60	33	45	49	33	46	52
		0.599 - 0.50	34	49	55	34	49	56
		0.499 - 0.00	36	52	60	35	53	61
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	20	22	22	24	28	29
		0.709 - 0.60	23	26	27	27	33	35
		0.599 - 0.50	25	30	32	29	37	40
		0.499 - 0.38	28	35	37	32	41	46
		0.379 - 0.25	32	42	46	35	48	55
		0.249 - 0.00	38	53	60	39	58	68
	0.250 - 0.499	1.000 - 0.71	24	28	29	28	36	37
		0.709 - 0.60	27	33	35	31	40	44
		0.599 - 0.50	30	38	40	33	44	50
		0.499 - 0.38	33	42	46	35	49	56
		0.379 - 0.00	36	50	55	38	55	65
	0.500 +	1.000 - 0.71	28	35	37	32	42	47
		0.709 - 0.60	32	40	43	34	47	54
		0.599 - 0.50	34	45	49	36	51	59
		0.499 - 0.00	36	50	55	38	55	65
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	18	19	20	23	27	28
		0.709 - 0.60	21	23	24	28	32	34
		0.599 - 0.50	23	27	28	29	36	39
		0.499 - 0.38	26	31	33	31	41	45
		0.379 - 0.25	30	38	41	34	47	54
		0.249 - 0.00	36	49	55	39	57	67
	0.250 - 0.499	1.000 - 0.71	22	25	26	27	34	37
		0.709 - 0.60	25	30	31	30	39	44
		0.599 - 0.50	28	34	36	33	43	49
		0.499 - 0.38	30	39	42	35	48	55
		0.379 - 0.00	34	46	51	38	54	64
	0.500 +	1.000 - 0.71	26	31	33	31	41	46
		0.709 - 0.60	29	36	39	34	46	53
		0.599 - 0.50	32	41	44	36	50	59
		0.499 - 0.00	34	48	56	38	54	64

Daylight Sensing Controls

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.080	HC ≥ 5	22	0.096	0.12
	HC ≥ 10	22	0.11	0.15
	HC ≥ 15	22	0.12	0.16
	HC ≥ 5	53	0.093	0.11
	HC ≥ 10	63	0.10	0.13
	HC ≥ 15	63	0.11	0.14

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.080	HC ≥ 5	28	0.097	0.14
	HC ≥ 10	28	0.11	0.17
	HC ≥ 15	28	0.13	0.18
	HC ≥ 5	68	0.096	0.12
	HC ≥ 10	68	0.10	0.14
	HC ≥ 15	68	0.11	0.15

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.080	HC ≥ 5	18	0.098	0.14
	HC ≥ 10	18	0.11	0.16
	HC ≥ 15	18	0.13	0.19
	HC ≥ 5	67	0.095	0.12
	HC ≥ 10	67	0.10	0.14
	HC ≥ 15	67	0.11	0.15

	Min R-Value		
WALL BELOW GRADE:	9		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	17	14	11
Vertical	8	6	4

	Max Uo
ROOF:	0.056
WALL ADJACENT TO UNCOND SPACE:	0.13
FLOOR OVER UNCOND SPACE:	0.048

ALTERNATE COMPONENT PACKAGES FOR:

HCDSB = 2581 - 3286
CDD65 = 0 - 1158
VSEW = 589 - 846

Akron OH
Allentown PA
Burlington IA
Chicago IL
Detroit MI

Erie PA
Hartford CT
Indianapolis IN
Omaha NE
Pittsburgh PA

Providence RI
South Bend IN
Spokane WA
Toledo OH
Youngstown OH

TABLE 6.4-21

Uof

BASE CASE		
0.88 to 0.46	0.46 to 0.39	0.38 to 0

PERIMETER DAYLIGHTING		
0.88 to 0.46	0.46 to 0	0.38 to 0

OPAQUE WALL Uow	
LIGHT WEIGHT WALL	MASS WALL

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	BASE CASE			PERIMETER DAYLIGHTING (VLT ≥ SC)		
0 - 1.50	0.000 - 0.249	1.000 - 0.71	21	26	28	21	27	29
		0.799 - 0.60	24	30	33	23	31	34
		0.599 - 0.50	25	34	37	25	34	38
		0.499 - 0.38	26	37	41	26	37	42
		0.379 - 0.25	28	41	47	27	40	47
		0.249 - 0.00	29	46	54	28	44	53
	0.250 - 0.499	1.000 - 0.71	25	32	35	24	33	37
		0.799 - 0.60	26	36	41	26	37	41
		0.599 - 0.50	27	39	44	27	39	45
		0.499 - 0.38	28	42	48	27	41	48
		0.379 - 0.00	29	46	53	25	44	52
	0.500 -	1.000 - 0.71	27	38	42	26	38	43
		0.799 - 0.60	28	41	47	27	41	48
		0.599 - 0.50	29	44	51	28	43	50
		0.499 - 0.00	30	46	54	29	44	53
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	19	23	23	22	27	29
		0.799 - 0.60	22	27	28	24	32	34
		0.599 - 0.50	24	30	32	25	35	39
		0.499 - 0.38	26	34	37	28	38	43
		0.379 - 0.25	29	40	44	30	43	49
		0.249 - 0.00	32	47	54	32	49	57
	0.250 - 0.499	1.000 - 0.71	23	28	30	25	33	37
		0.799 - 0.60	26	33	36	27	38	43
		0.599 - 0.50	28	36	40	29	40	47
		0.499 - 0.38	29	40	45	30	43	50
		0.379 - 0.00	31	45	52	32	47	55
	0.500 -	1.000 - 0.71	26	34	37	28	39	46
		0.799 - 0.50	29	39	43	29	42	50
		0.599 - 0.50	30	42	47	30	45	53
		0.499 - 0.00	32	46	52	32	47	56
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	18	20	21	22	27	29
		0.799 - 0.60	20	24	25	24	31	34
		0.599 - 0.50	23	28	29	26	34	38
		0.499 - 0.38	25	31	34	27	38	43
		0.379 - 0.25	28	37	41	30	43	49
		0.249 - 0.00	31	45	51	32	48	57
	0.250 - 0.499	1.000 - 0.71	21	26	27	25	33	36
		0.799 - 0.60	24	30	32	27	37	42
		0.599 - 0.50	26	34	37	28	40	46
		0.499 - 0.38	28	37	41	30	43	50
		0.379 - 0.00	30	43	48	32	47	55
	0.500 -	1.000 - 0.71	25	31	34	28	38	44
		0.799 - 0.60	27	36	39	29	42	49
		0.599 - 0.50	29	39	44	30	44	53
		0.499 - 0.00	30	43	48	31	47	56

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.080	HC ≥ 5	21	0.084	0.10
	HC ≥ 10	21	0.092	0.12
	HC ≥ 15	21	0.099	0.12
	HC ≥ 5	54	0.083	0.10
	HC ≥ 10	54	0.090	0.11
	HC ≥ 15	54	0.095	0.12

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.080	HC ≥ 5	19	0.086	0.11
	HC ≥ 10	19	0.095	0.13
	HC ≥ 15	19	0.10	0.14
	HC ≥ 5	57	0.083	0.10
	HC ≥ 10	57	0.089	0.11
	HC ≥ 15	57	0.095	0.12

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.080	HC ≥ 5	18	0.086	0.11
	HC ≥ 10	18	0.097	0.14
	HC ≥ 15	18	0.10	0.15
	HC ≥ 5	57	0.083	0.10
	HC ≥ 10	57	0.090	0.12
	HC ≥ 15	57	0.096	0.12

Daylight Sensing Controls

	Min R-Value		
WALL BELOW GRADE:	10		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	17	14	11
Vertical	8	6	4

	Max Uo
ROOF:	0.064
WALL ADJACENT TO UNCONDO SPACE:	0.13
FLOOR OVER UNCONDO SPACE:	0.047

ALTERNATE EQUIPMENT PACKAGES FOR:

HDD65 = 1751 - 3200
CDD65 = 0 - 1150
WSEF = > 846

Boise ID
Cedar UT
Clayton NM
Colorado Springs CO
Denver CO

Goodland KS
Lovelock NV
Mount Shasta CA
Pueblo CO
Reno NV

Salt Lake City UT
Tonopah NV
Winnemucca NV

TABLE 5.4-22

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	BASE CASE Uof 0.60 to 0.46	BASE CASE 0.45 to 0.39	BASE CASE 0.38 to 0	PERIMETER DAYLIGHTING 0.60 to 0.46	PERIMETER DAYLIGHTING 0.45 to 0	PERIMETER DAYLIGHTING 0.38 to 0 (VLT ≥ SC)
0 - 1.50	0.000 - 0.249	1.000 - 0.71	22	24	25	23	26	27
		0.799 - 0.60	25	29	31	26	31	33
		0.599 - 0.50	27	33	35	28	35	38
		0.499 - 0.38	30	38	41	30	39	43
		0.379 - 0.25	33	45	49	33	46	52
		0.249 - 0.00	37	54	62	37	55	63
	0.250 - 0.499	1.000 - 0.71	25	31	33	27	33	36
		0.799 - 0.60	29	37	39	30	39	42
		0.599 - 0.50	32	41	45	32	43	47
		0.499 - 0.38	34	46	50	34	47	53
		0.379 - 0.00	37	52	59	36	53	61
	0.500 -	1.000 - 0.71	31	39	41	31	40	44
		0.799 - 0.60	33	44	48	33	46	51
		0.599 - 0.50	35	48	54	35	49	55
		0.499 - 0.00	37	53	60	37	53	62
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	19	20	21	23	26	28
		0.799 - 0.60	22	25	25	26	31	33
		0.599 - 0.50	25	29	30	29	36	39
		0.499 - 0.38	25	33	35	32	41	45
		0.379 - 0.25	32	41	44	38	48	54
		0.249 - 0.00	39	52	58	40	55	60
	0.250 - 0.499	1.000 - 0.71	23	28	27	26	34	38
		0.799 - 0.60	27	32	33	31	39	43
		0.599 - 0.50	30	38	38	34	44	49
		0.499 - 0.38	33	41	44	36	48	55
		0.379 - 0.00	37	49	54	39	55	64
	0.500 -	1.000 - 0.71	28	33	35	32	41	45
		0.799 - 0.60	32	39	41	35	47	53
		0.599 - 0.50	34	44	47	37	51	59
		0.499 - 0.00	37	49	54	39	55	65
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	17	18	18	22	26	27
		0.799 - 0.60	20	22	23	28	31	33
		0.599 - 0.50	22	25	26	28	35	38
		0.499 - 0.38	25	30	31	31	39	44
		0.379 - 0.25	30	37	39	35	47	53
		0.249 - 0.00	36	48	53	40	57	67
	0.250 - 0.499	1.000 - 0.71	21	23	24	27	33	35
		0.799 - 0.60	24	28	29	30	38	42
		0.599 - 0.50	27	32	34	33	43	48
		0.499 - 0.38	30	37	40	35	47	54
		0.379 - 0.00	35	45	49	38	54	63
	0.500 -	1.000 - 0.71	25	30	31	31	40	44
		0.799 - 0.60	29	35	37	34	46	52
		0.599 - 0.50	32	39	42	36	50	58
		0.499 - 0.00	35	44	48	38	54	64

OPAQUE WALL Uow

LIGHT WEIGHT WALL	MASS WALL

Uow (HC(5))	HC RANGE	PCT FEN	INT INS	EXT INS
0.092	HC ≥ 5	22	0.10	0.13
	HC ≥ 10	22	0.11	0.15
	HC ≥ 15	22	0.12	0.18
	HC ≥ 5	63	0.090	0.12
	HC ≥ 10	63	0.10	0.13
	HC ≥ 15	63	0.11	0.14

Uow (HC(5))	HC RANGE	PCT FEN	INT INS	EXT INS
0.092	HC ≥ 5	19	0.10	0.14
	HC ≥ 10	19	0.12	0.18
	HC ≥ 15	19	0.14	0.19
	HC ≥ 5	68	0.090	0.12
	HC ≥ 10	68	0.11	0.14
	HC ≥ 15	68	0.12	0.15

Uow (HC(5))	HC RANGE	PCT FEN	INT INS	EXT INS
0.092	HC ≥ 5	17	0.10	0.15
	HC ≥ 10	17	0.12	0.19
	HC ≥ 15	17	0.14	0.20
	HC ≥ 5	67	0.090	0.13
	HC ≥ 10	67	0.11	0.15
	HC ≥ 15	67	0.12	0.16

Daylight Sensing Controls

	Min R-Value		
WALL BELOW GRADE.	0		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	16	14	10
Vertical	7	6	4

	Max Uo
ROOF:	0.052
WALL ADJACENT TO UNCOND SPACE:	0.13
FLOOR OVER UNCOND SPACE:	0.049

ALTERNATE COMPONENT PACKAGES FOR:

HDDSB = 1731 - 3288
CDDSB = 1151 - 2888
VGEN = 158 - 846

Columbia MO
Evansville IN
Lexington KY
Louisville KY
Saint Louis MO

Springfield IL
Topeka KS

TABLE 5.4-23

Uof

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCs)	BASE CASE			PERIMETER DAYLIGHTING			OPAQUE WALL Uow	
			0.81 to 0.48	0.46 to 0.39	0.38 to 0	0.81 to 0.46	0.45 to 0	0.38 to 0	LIGHT WEIGHT WALL	MASS WALL
								YLT ≥ SC		
0 - 1.53	0.800 - 0.249	1.000 - 0.71	17	19	19	13	20	21		
		0.799 - 0.60	20	23	23	21	25	28		
		0.599 - 0.50	22	28	27	24	29	31		
		0.499 - 0.38	25	31	32	27	34	35		
		0.379 - 0.25	30	39	41	31	42	46		
		0.249 - 0.00	37	54	58	38	57	63		
	0.250 - 0.499	1.000 - 0.71	21	24	25	22	27	28		
		0.799 - 0.60	24	29	30	26	32	34		
		0.599 - 0.50	27	34	36	28	37	40		
		0.499 - 0.38	30	40	42	31	43	48		
		0.379 - 0.00	35	49	52	36	52	57		
	0.500 -	1.000 - 0.71	25	31	32	27	33	38		
		0.799 - 0.60	29	37	39	30	40	43		
		0.599 - 0.50	31	42	45	33	45	49		
		0.499 - 0.00	34	48	52	36	52	57		
1.51 - 3.00	0.800 - 0.249	1.000 - 0.71	14	15	15	18	21	22		
		0.799 - 0.60	17	19	19	22	25	27		
		0.599 - 0.50	19	22	22	25	30	32		
		0.499 - 0.38	22	28	27	28	35	39		
		0.379 - 0.25	27	33	35	33	44	49		
		0.249 - 0.00	35	47	50	40	59	68		
	0.250 - 0.499	1.000 - 0.71	18	20	22	23	27	29		
		0.799 - 0.60	21	24	25	27	33	36		
		0.599 - 0.50	24	28	29	30	38	42		
		0.499 - 0.38	27	33	35	33	44	49		
		0.379 - 0.00	32	42	44	38	54	62		
	0.500 -	1.000 - 0.71	22	25	26	27	34	37		
		0.799 - 0.60	25	31	32	31	41	45		
		0.599 - 0.50	28	38	37	34	47	52		
		0.499 - 0.00	32	41	44	37	53	61		
3.01 - 3.50	0.800 - 0.249	1.000 - 0.71	12	13	13	17	19	21		
		0.799 - 0.60	14	16	16	20	24	25		
		0.599 - 0.50	17	19	19	23	28	31		
		0.499 - 0.38	19	22	23	26	33	37		
		0.379 - 0.25	24	29	30	31	41	47		
		0.249 - 0.00	31	41	43	38	56	66		
	0.250 - 0.499	1.000 - 0.71	15	17	17	22	25	28		
		0.799 - 0.60	18	21	21	25	31	35		
		0.599 - 0.50	21	24	25	28	36	40		
		0.499 - 0.38	24	29	30	31	41	47		
		0.379 - 0.00	29	38	38	35	51	59		
	0.500 -	1.000 - 0.71	19	21	22	26	32	36		
		0.799 - 0.60	22	28	27	29	38	44		
		0.599 - 0.50	25	30	32	32	44	51		
		0.499 - 0.00	28	36	37	35	50	59		

Daylight Sensing Controls

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.11	HC ≥ 5	17	0.11	0.15
	HC ≥ 10	17	0.13	0.18
	HC ≥ 15	17	0.15	0.19
	HC ≥ 5	63	0.11	0.14
	HC ≥ 10	63	0.13	0.17
	HC ≥ 15	63	0.14	0.18

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.11	HC ≥ 5	14	0.11	0.16
	HC ≥ 10	14	0.14	0.20
	HC ≥ 15	14	0.17	0.22
	HC ≥ 5	68	0.11	0.15
	HC ≥ 10	68	0.13	0.18
	HC ≥ 15	68	0.15	0.19

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.11	HC ≥ 5	12	0.11	0.16
	HC ≥ 10	12	0.14	0.21
	HC ≥ 15	12	0.17	0.23
	HC ≥ 5	66	0.11	0.15
	HC ≥ 10	66	0.13	0.18
	HC ≥ 15	66	0.15	0.19

	Min R-Value		
WALL BELOW GRADE:	9		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	15	13	10
Vertical	7	6	4

	Max Uo
ROOF:	0.058
WALL ADJACENT TO UNCOND SPACE:	0.15
FLOOR OVER UNCOND SPACE:	0.058

ALTERNATE COMPONENT PACKAGES FOR:

HCDD65 = 1751 - 3200
CDD65 = 1151 - 2000
YSCF = > 846

Dodge City KS
Grand Junction CO

TABLE 5.4-24

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	BASE CASE Uof 0.31 to 0.46	BASE CASE 0.46 to 0.39	BASE CASE 0.38 to 0	PERIMETER DAYLIGHTING 0.01 to 0.46	PERIMETER DAYLIGHTING 0.46 to 0	PERIMETER DAYLIGHTING 0.38 to 0 (VLT ≥ SC)
0 - 1.50	0.000 - 0.249	1.000 - 0.71	15	17	17	16	19	19
		0.799 - 0.60	18	21	21	19	23	24
		0.599 - 0.50	20	24	25	21	28	28
		0.499 - 0.38	22	29	30	23	30	32
		0.379 - 0.25	28	35	38	27	37	41
		0.249 - 0.00	31	47	52	32	48	50
	0.250 - 0.499	1.000 - 0.71	19	22	23	20	24	25
		0.799 - 0.60	22	27	28	23	29	31
		0.599 - 0.50	24	31	33	25	33	36
		0.499 - 0.38	26	36	38	27	38	41
		0.379 - 0.00	30	44	47	31	48	51
	0.500 -	1.000 - 0.71	22	28	29	23	30	32
		0.799 - 0.60	25	34	35	26	36	39
		0.599 - 0.50	28	38	41	28	40	44
		0.499 - 0.00	30	43	47	31	46	51
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	12	13	14	16	18	20
		0.799 - 0.60	15	17	17	19	22	24
		0.599 - 0.50	17	20	20	21	26	28
		0.499 - 0.38	19	23	24	23	30	34
		0.379 - 0.25	23	29	31	27	37	42
		0.249 - 0.00	30	41	44	33	50	50
	0.250 - 0.499	1.000 - 0.71	18	18	18	20	24	26
		0.799 - 0.60	18	22	22	23	28	32
		0.599 - 0.50	21	25	26	25	33	37
		0.499 - 0.35	23	30	31	27	38	43
		0.379 - 0.00	28	37	39	31	46	53
	0.500 -	1.000 - 0.71	19	23	23	23	30	33
		0.799 - 0.60	22	27	29	26	35	40
		0.599 - 0.50	25	32	35	29	40	46
		0.499 - 0.00	27	37	39	31	45	53
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	11	11	12	15	17	19
		0.799 - 0.60	13	14	14	17	21	23
		0.599 - 0.50	15	17	17	20	24	27
		0.499 - 0.38	17	20	20	22	28	32
		0.379 - 0.25	21	25	27	26	35	41
		0.249 - 0.00	27	36	38	31	47	56
	0.250 - 0.499	1.000 - 0.71	14	15	15	18	22	25
		0.799 - 0.60	16	19	19	21	27	30
		0.599 - 0.50	18	22	22	23	31	35
		0.499 - 0.38	21	26	27	26	35	41
		0.379 - 0.00	25	32	34	29	43	51
	0.500 -	1.000 - 0.71	17	19	20	22	28	32
		0.799 - 0.60	19	24	24	25	33	38
		0.599 - 0.50	22	27	28	27	36	44
		0.499 - 0.00	24	32	33	29	43	50

OPAQUE WALL Uow

LIGHT WEIGHT WALL	MASS WALL

Uow (HC(5))	HC RANGE	PCT FEN	INT INS	EXT INS
0.097	HC ≥ 5	15	0.10	0.14
	HC ≥ 10	15	0.12	0.16
	HC ≥ 15	15	0.13	0.17
	HC ≥ 5	50	0.10	0.13
	HC ≥ 10	50	0.11	0.15
	HC ≥ 15	50	0.13	0.18

Uow (HC(5))	HC RANGE	PCT FEN	INT INS	EXT INS
0.097	HC ≥ 5	12	0.10	0.14
	HC ≥ 10	12	0.12	0.18
	HC ≥ 15	12	0.14	0.19
	HC ≥ 5	50	0.10	0.14
	HC ≥ 10	50	0.12	0.16
	HC ≥ 15	50	0.13	0.17

Uow (HC(5))	HC RANGE	PCT FEN	INT INS	EXT INS
0.097	HC ≥ 5	11	0.10	0.15
	HC ≥ 10	11	0.12	0.18
	HC ≥ 15	11	0.15	0.20
	HC ≥ 5	50	0.10	0.14
	HC ≥ 10	50	0.12	0.17
	HC ≥ 15	50	0.14	0.18

Daylight Sensing Controls

	Min R-Value		
WALL BELOW GRADE:	0		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	10	13	16
Vertical	7	6	4

	Max Uo
ROOF:	0.053
WALL ADJACENT TO UNCOND SPACE:	0.14
FLOOR OVER UNCOND SPACE:	0.055

ALTERNATE COMPONENT PACKAGES FOR:

HDD65 = 3281 - 4000
CDD65 = 0 - 1150
VSEF = 500 - 845

Albany NY
Buffalo NY
Concord NH
Des Moines IA
Grand Island NE

Grand Rapids MI
Great Falls MT
Milwaukee WI
Missoula MT
Portland ME

Rapid City SD
Rochester MN
Sheridan WY
Sioux City IA
Syracuse NY

TABLE 5.4-25

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	BASE CASE Uwf 0.58 to 0.46	0.45 to 0.29	0.28 to 0	PERIMETER DAYLIGHTING N/A		SPACIOUS WALL Uow LIGHT WEIGHT WALL	MASS WALL
							VLT ≥ 20		
0 - 1.50	0.000 - 0.249	1.000 - 0.71	28	27	32				
		0.709 - 0.59	21	30	38				
		0.599 - 0.50	21	31	44				
		0.499 - 0.38	21	33	49				
		0.379 - 0.25	22	35	57				
		0.249 - 0.00	22	36	64				
	0.250 - 0.499	1.000 - 0.71	21	31	41				
		0.709 - 0.60	22	34	48				
		0.599 - 0.50	22	35	54				
		0.499 - 0.38	22	36	58				
		0.379 - 0.00	22	38	64				
	0.500 -	1.000 - 0.71	22	35	51				
		0.709 - 0.60	23	38	57				
		0.599 - 0.50	22	37	62				
		0.499 - 0.00	22	37	65				
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	19	24	27				
		0.709 - 0.60	21	27	33				
		0.599 - 0.50	22	30	38				
		0.499 - 0.38	23	32	43				
		0.379 - 0.25	24	38	52				
		0.249 - 0.00	26	40	64				
	0.250 - 0.499	1.000 - 0.71	22	29	35				
		0.709 - 0.60	23	32	42				
		0.599 - 0.50	24	34	47				
		0.499 - 0.38	25	37	53				
		0.379 - 0.00	26	39	61				
	0.500 -	1.000 - 0.71	23	33	44				
		0.709 - 0.60	25	36	51				
		0.599 - 0.50	25	38	56				
		0.499 - 0.00	26	40	62				
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	18	22	24				
		0.709 - 0.60	20	25	30				
		0.599 - 0.50	21	28	34				
		0.499 - 0.38	22	31	40				
		0.379 - 0.25	24	35	49				
		0.249 - 0.00	26	39	61				
	0.250 - 0.499	1.000 - 0.71	21	27	32				
		0.709 - 0.60	22	30	38				
		0.599 - 0.50	23	33	43				
		0.499 - 0.38	24	35	49				
		0.379 - 0.00	25	38	56				
	0.500 -	1.000 - 0.71	23	31	46				
		0.709 - 0.60	24	34	47				
		0.599 - 0.50	25	36	52				
		0.499 - 0.00	26	39	56				

Daylight Sensing Controls

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.074	HC ≥ 5	20	0.076	0.096
	HC ≥ 10	20	0.082	0.10
	HC ≥ 15	20	0.087	0.11
	HC ≥ 5	65	0.077	0.093
	HC ≥ 10	65	0.084	0.11
	HC ≥ 15	65	0.089	0.11

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.074	HC ≥ 5	19	0.077	0.10
	HC ≥ 10	19	0.084	0.12
	HC ≥ 15	19	0.091	0.12
	HC ≥ 5	64	0.077	0.10
	HC ≥ 10	64	0.084	0.11
	HC ≥ 15	64	0.091	0.12

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.074	HC ≥ 5	18	0.077	0.10
	HC ≥ 10	18	0.086	0.12
	HC ≥ 15	18	0.093	0.13
	HC ≥ 5	61	0.077	0.10
	HC ≥ 10	61	0.085	0.12
	HC ≥ 15	61	0.092	0.12

	Min R-Value
WALL BELOW GRADE:	10

UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	10	15	11
Vertical	8	6	4

	Max Uo
ROOF:	0.049
WALL ADJACENT TO UNCOND SPACE:	0.12
FLOOR OVER UNCOND SPACE:	0.041

ALTERNATE COMPONENT PACKAGES FOR:

MODEL = 4001 - 5000
CDD65 = 0 - 1150
VEEF = 500 - 845

Alpena MI
Bangor ME
Burlington VT
Cutbank MT
Eau Claire WI

Greenbay WI
Huron SD
Madison WI
Mason City IA
Massena NY

Miles City MT
Minneapolis MN
Pierre SD
Rochester NY
Sioux Falls SD

TABLE 6.4-28

Uef

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)	BASE CASE 0.60 to 0.46	BASE CASE 0.45 to 0.29	BASE CASE 0.28 to 0	PERIMETER DAYLIGHTING N/A	PERIMETER DAYLIGHTING VLT ≥ SC
0 - 1.50	0.000 - 0.249	1.000 - 0.71	19	26	31		
		0.799 - 0.65	21	29	37		
		0.599 - 0.50	21	31	42		
		0.499 - 0.38	22	33	48		
		0.379 - 0.25	22	35	55		
		0.249 - 0.00	22	36	62		
	0.250 - 0.499	1.000 - 0.71	21	31	46		
		0.799 - 0.65	22	33	47		
		0.599 - 0.50	22	34	52		
		0.499 - 0.38	22	35	56		
		0.379 - 0.00	23	36	62		
	0.500 -	1.000 - 0.71	22	34	49		
		0.799 - 0.60	23	36	55		
		0.599 - 0.50	23	36	59		
		0.499 - 0.00	23	37	63		
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	18	23	26		
		0.799 - 0.60	20	26	31		
		0.599 - 0.50	21	29	36		
		0.499 - 0.38	22	31	42		
		0.379 - 0.25	24	35	50		
		0.249 - 0.00	25	39	61		
	0.250 - 0.499	1.000 - 0.71	21	28	33		
		0.799 - 0.60	22	31	40		
		0.599 - 0.50	23	33	45		
		0.499 - 0.38	24	35	50		
		0.379 - 0.00	25	38	58		
	0.500 -	1.000 - 0.71	23	32	41		
		0.799 - 0.60	24	35	46		
		0.599 - 0.50	25	36	53		
		0.499 - 0.00	25	38	58		
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	17	21	23		
		0.799 - 0.60	19	24	29		
		0.599 - 0.50	20	27	33		
		0.499 - 0.38	22	30	38		
		0.379 - 0.25	24	33	46		
		0.249 - 0.00	26	38	58		
	0.250 - 0.499	1.000 - 0.71	20	26	30		
		0.799 - 0.60	22	29	37		
		0.599 - 0.50	23	31	41		
		0.499 - 0.38	24	34	47		
		0.379 - 0.00	25	37	55		
	0.500 -	1.000 - 0.71	22	30	38		
		0.799 - 0.60	23	33	44		
		0.599 - 0.50	24	35	50		
		0.499 - 0.00	25	37	55		

OPAQUE WALL Uow: LIGHT WEIGHT WALL | MASS WALL

Daylight Sensing Controls

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.069	HC ≥ 5	19	0.070	0.055
	HC ≥ 10	19	0.074	0.094
	HC ≥ 15	19	0.078	0.096
	HC ≥ 5	63	0.071	0.067
	HC ≥ 10	63	0.075	0.096
	HC ≥ 15	63	0.079	0.099

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.069	HC ≥ 5	18	0.071	0.096
	HC ≥ 10	18	0.076	0.10
	HC ≥ 15	18	0.080	0.10
	HC ≥ 5	61	0.070	0.089
	HC ≥ 10	61	0.075	0.10
	HC ≥ 15	61	0.079	0.10

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.069	HC ≥ 5	17	0.071	0.092
	HC ≥ 10	17	0.077	0.10
	HC ≥ 15	17	0.082	0.10
	HC ≥ 5	58	0.070	0.091
	HC ≥ 10	58	0.076	0.10
	HC ≥ 15	58	0.080	0.10

	Min R-Value
WALL BELOW GRADE:	11

UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	18	15	11
Vertical	8	6	4

	Max Uo
ROOF:	0.045
WALL ADJACENT TO UNCOND SPACE:	0.11
FLOOR OVER UNCOND SPACE:	0.040

ALTERNATE COMPONENT PACKAGES FOR:

[illegible] = 3281 - 4600
[illegible] = 0 - 1150
[illegible] = > 646

Casper WY
Cheyenne WY
Elko NV
Ely NV
North Platte NE

Pocatello ID
Scottsbluff NE

TABLE 5.4-27

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCs)	BASE CASE Uef 0.68 to 0.46	BASE CASE 0.46 to 0.29	BASE CASE 0.23 to 0	PERIMETER DAYLIGHTING Uef 0.68 to 0.46	PERIMETER DAYLIGHTING 0.45 to 0	PERIMETER DAYLIGHTING 0.23 to 0	OPAQUE WALL Uew LIGHT WEIGHT WALL	OPAQUE WALL Uew MASS WALL
0 - 1.50	0.000 - 0.249	1.000 - 0.71	19	26	30	19	26	32		
		0.799 - 0.60	20	28	36	19	29	38		
		0.599 - 0.50	20	30	41	19	30	43		
		0.499 - 0.38	20	32	46	19	31	48		
		0.379 - 0.25	20	33	53	19	32	54		
		0.249 - 0.00	20	33	60	19	32	57		
	0.250 - 0.499	1.000 - 0.71	21	31	39	20	31	42		
		0.799 - 0.60	21	33	46	20	32	49		
		0.599 - 0.50	21	34	51	20	33	53		
		0.499 - 0.38	21	34	56	20	33	57		
		0.379 - 0.00	21	34	61	20	33	60		
	0.500 -	1.000 - 0.71	22	34	49	21	34	52		
		0.799 - 0.60	22	35	55	20	34	58		
		0.599 - 0.50	21	36	60	20	34	61		
		0.499 - 0.00	21	36	63	20	34	62		
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	18	22	24	20	27	32		
		0.799 - 0.60	20	25	30	21	30	38		
		0.599 - 0.50	21	28	34	22	32	44		
		0.499 - 0.38	22	31	40	23	34	49		
		0.379 - 0.25	23	34	48	23	36	57		
		0.249 - 0.00	25	36	59	24	38	64		
	0.250 - 0.499	1.000 - 0.71	21	27	32	22	32	42		
		0.799 - 0.60	22	30	38	23	34	49		
		0.599 - 0.50	23	33	43	23	36	55		
		0.499 - 0.38	24	35	49	24	37	60		
		0.379 - 0.00	25	38	57	24	38	65		
	0.500 -	1.000 - 0.71	23	32	40	23	36	52		
		0.799 - 0.60	24	35	47	24	37	59		
		0.599 - 0.50	25	36	52	24	38	64		
		0.499 - 0.00	25	38	55	24	39	67		
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	18	19	21	20	20	31		
		0.799 - 0.60	18	23	28	21	30	38		
		0.599 - 0.50	20	26	30	22	32	43		
		0.499 - 0.38	21	28	35	23	34	49		
		0.379 - 0.25	23	32	43	24	36	57		
		0.249 - 0.00	25	38	55	25	38	64		
	0.250 - 0.499	1.000 - 0.71	19	24	28	22	31	41		
		0.799 - 0.60	21	28	34	23	34	48		
		0.599 - 0.50	22	30	39	23	35	54		
		0.499 - 0.38	23	33	44	24	37	59		
		0.379 - 0.00	24	36	52	25	38	65		
	0.500 -	1.000 - 0.71	21	29	36	23	35	51		
		0.799 - 0.60	23	32	42	24	37	58		
		0.599 - 0.50	24	34	47	24	38	63		
		0.499 - 0.00	24	36	53	25	39	66		

Uew (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.873	HC ≥ 5	19	0.878	0.10
	HC ≥ 10	19	0.886	0.12
	HC ≥ 15	19	0.892	0.12
	HC ≥ 5	63	0.878	0.10
	HC ≥ 10	63	0.886	0.12
	HC ≥ 15	63	0.896	0.13

Uew (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.873	HC ≥ 5	18	0.877	0.11
	HC ≥ 10	18	0.884	0.13
	HC ≥ 15	18	0.890	0.14
	HC ≥ 5	67	0.878	0.10
	HC ≥ 10	67	0.887	0.12
	HC ≥ 15	67	0.896	0.13

Uew (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.873	HC ≥ 5	18	0.877	0.11
	HC ≥ 10	18	0.889	0.14
	HC ≥ 15	18	0.10	0.15
	HC ≥ 5	66	0.877	0.10
	HC ≥ 10	66	0.886	0.12
	HC ≥ 15	66	0.895	0.13

Daylight Sensing Controls

	Min R-Value
WALL BELOW GRADE:	10

UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	18	15	11
Vertical	6	6	4

	Max Uo
ROOF:	0.049
WALL ADJACENT TO UNCOND SPACE:	0.12
FLOOR OVER UNCOND SPACE:	0.042

ALTERNATE COMPONENT PACKAGES FOR:

HDD65 = 4001 - 5000
CDD65 = 0 - 1150
VEET = 0 - 845

Bryce UT
Eagle CO
Rock Springs WY

TABLE 5.4-28

Uwf	BASE CASE			PERIMETER DAYLIGHTING		OPAQUE WALL Uow	
	0.58 to 0.46	0.45 to 0.29	0.28 to 0	N/A		LIGHT WEIGHT WALL	MASS WALL
INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCx)			VLT ≥ SC		
0 - 1.50	0.090 - 0.240	1.000 - 0.71	15	26	46		
		0.700 - 0.58	14	29	47		
		0.590 - 0.50	13	27	51		
		0.490 - 0.38	11	24	53		
		0.370 - 0.25	10	23	51		
		0.240 - 0.00	8	15	48		
	0.250 - 0.490	1.000 - 0.71	15	31	51		
		0.700 - 0.60	13	28	56		
		0.500 - 0.50	11	25	57		
		0.490 - 0.38	10	22	58		
		0.370 - 0.00	9	18	48		
	0.500 -	1.000 - 0.71	13	30	50		
		0.700 - 0.60	11	25	60		
		0.500 - 0.50	10	22	58		
		0.490 - 0.00	9	19	63		
1.51 - 3.00	0.000 - 0.240	1.000 - 0.71	17	26	32		
		0.700 - 0.58	17	27	38		
		0.590 - 0.50	17	28	42		
		0.490 - 0.38	17	29	46		
		0.370 - 0.25	16	27	49		
		0.240 - 0.00	15	26	49		
	0.250 - 0.490	1.000 - 0.71	18	29	41		
		0.700 - 0.60	17	29	46		
		0.590 - 0.50	17	29	49		
		0.490 - 0.36	16	28	51		
		0.370 - 0.00	15	27	52		
	0.500 -	1.000 - 0.71	18	30	49		
		0.700 - 0.60	17	30	52		
		0.590 - 0.50	17	29	54		
		0.490 - 0.00	15	25	54		
3.01 - 3.50	0.000 - 0.240	1.000 - 0.71	17	24	29		
		0.700 - 0.60	17	25	34		
		0.590 - 0.50	17	28	38		
		0.490 - 0.38	17	27	42		
		0.370 - 0.25	17	27	46		
		0.240 - 0.00	16	27	49		
	0.250 - 0.490	1.000 - 0.71	18	27	37		
		0.700 - 0.60	18	28	42		
		0.590 - 0.50	17	28	45		
		0.490 - 0.38	17	28	48		
		0.370 - 0.00	17	28	50		
	0.500 -	1.000 - 0.71	18	29	44		
		0.700 - 0.60	18	29	48		
		0.590 - 0.50	17	29	51		
		0.490 - 0.00	17	29	52		

Uow (HC(5)	HC RANGE	PCT FEN	INT INS	EXT INS
0.064	HC ≥ 5	16	0.066	0.096
	HC ≥ 10	19	0.078	0.10
	HC ≥ 15	16	0.075	0.10
	HC ≥ 5	68	0.066	0.10
	HC ≥ 10	69	0.074	0.12
	HC ≥ 15	66	0.083	0.13

Uow (HC(5)	HC RANGE	PCT FEN	INT INS	EXT INS
0.064	HC ≥ 5	17	0.066	0.093
	HC ≥ 10	17	0.072	0.11
	HC ≥ 15	17	0.079	0.12
	HC ≥ 5	54	0.066	0.094
	HC ≥ 10	54	0.073	0.11
	HC ≥ 15	54	0.080	0.12

Uow (HC(5)	HC RANGE	PCT FEN	INT INS	EXT INS
0.064	HC ≥ 5	17	0.066	0.095
	HC ≥ 10	17	0.073	0.11
	HC ≥ 15	17	0.080	0.12
	HC ≥ 5	52	0.066	0.096
	HC ≥ 10	52	0.073	0.11
	HC ≥ 15	52	0.080	0.12

Daylight Sensing Controls

	Min R-Value
WALL BELOW GRADE:	11

UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	18	15	11
Vertical	8	6	4

	Max Uo
ROOF:	0.045
WALL ADJACENT TO UNCOND SPACE:	0.11
FLOOR OVER UNCOND SPACE:	0.048

ALTERNATE COMPONENT PACKAGES FOR:

HDD18 = 6881 - 8588
CDD65 = 0 - 1174
VSEM = 523 - 844

Sisseretx ND
Caribou ME
Duluth MN
Fargo ND
Glasgow MT

International Falls MN
Minot ND
Sault Sainte Marie MI

TABLE 5.4-29

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCs)	BASE CASE Uof 0.58 to 0.48	BASE CASE Uof 0.46 to 0.29	BASE CASE Uof 0.28 to 0	PERIMETER DAYLIGHTING N/A	PERIMETER DAYLIGHTING VLT ≥ SC
0 - 1.50	0.000 - 0.240	1.000 - 0.71	19	28	37		
		0.799 - 0.60	19	30	43		
		0.599 - 0.50	19	31	47		
		0.499 - 0.38	19	31	51		
		0.379 - 0.25	18	31	56		
		0.249 - 0.00	18	30	57		
	0.250 - 0.499	1.000 - 0.71	20	31	48		
		0.799 - 0.60	19	32	51		
		0.599 - 0.50	19	32	55		
		0.499 - 0.38	19	32	57		
		0.379 - 0.00	18	31	59		
	0.500 -	1.000 - 0.71	20	33	53		
		0.799 - 0.60	19	33	58		
		0.599 - 0.50	19	32	60		
		0.499 - 0.00	19	32	60		
1.51 - 3.00	0.000 - 0.240	1.000 - 0.71	18	25	31		
		0.799 - 0.60	19	28	36		
		0.599 - 0.50	20	29	41		
		0.499 - 0.38	20	31	46		
		0.379 - 0.25	21	33	52		
		0.249 - 0.00	21	34	58		
	0.250 - 0.499	1.000 - 0.71	20	29	39		
		0.799 - 0.60	21	31	45		
		0.599 - 0.50	21	32	49		
		0.499 - 0.38	21	33	53		
		0.379 - 0.00	21	34	58		
	0.500 -	1.000 - 0.71	21	32	48		
		0.799 - 0.60	21	33	52		
		0.599 - 0.50	21	34	56		
		0.499 - 0.00	22	34	60		
3.01 - 3.50	0.000 - 0.240	1.000 - 0.71	18	24	28		
		0.799 - 0.60	19	27	34		
		0.599 - 0.50	20	29	39		
		0.499 - 0.38	21	30	44		
		0.379 - 0.25	21	33	50		
		0.249 - 0.00	22	35	58		
	0.250 - 0.499	1.000 - 0.71	20	28	38		
		0.799 - 0.60	21	30	42		
		0.599 - 0.50	21	32	47		
		0.499 - 0.38	22	33	51		
		0.379 - 0.00	22	35	57		
	0.500 -	1.000 - 0.71	21	31	44		
		0.799 - 0.60	22	33	50		
		0.599 - 0.50	22	34	53		
		0.499 - 0.00	22	35	57		

OPAQUE WALL Uow

LIGHT WEIGHT WALL	MASS WALL

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.064	HC ≥ 5	19	0.836	0.877
	HC ≥ 10	19	0.868	0.883
	HC ≥ 15	19	0.878	0.886
	HC ≥ 5	60	0.865	0.878
	HC ≥ 10	60	0.868	0.885
	HC ≥ 15	60	0.878	0.887

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.064	HC ≥ 5	18	0.866	0.881
	HC ≥ 10	18	0.869	0.890
	HC ≥ 15	18	0.872	0.893
	HC ≥ 5	58	0.866	0.881
	HC ≥ 10	58	0.868	0.889
	HC ≥ 15	58	0.872	0.892

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.064	HC ≥ 5	18	0.865	0.883
	HC ≥ 10	18	0.869	0.892
	HC ≥ 15	18	0.873	0.896
	HC ≥ 5	58	0.865	0.882
	HC ≥ 10	58	0.869	0.891
	HC ≥ 15	58	0.872	0.894

Daylight Sensing Controls

	Min R-Value		
WALL BELOW GRADE:	12		
UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	18	15	11
Vertical	8	6	4

	Max Uo
ROOF:	0.041
WALL ADJACENT TO UNCOND SPACE:	0.18
FLOOR OVER UNCOND SPACE:	0.040

ALTERNATE COMPONENT PACKAGES FOR:

HDD65 = 1 - 8500
CDD65 = < 180
YSEV = < 500

Adak AK
Anchorage AK
Annette AK
Juneau AK
Kodiak AK

Yakutat AK

TABLE 5.4-10

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCs)	BASE CASE Uef 0.08 to 0.46	BASE CASE Uef 0.46 to 0.29	BASE CASE Uef 0.29 to 0	PERIMETER DAYLIGHTING N/A	PERIMETER DAYLIGHTING VLT ≥ SC
0 - 1.50	0.000 - 0.249	1.000 - 0.71	17	29	45		
		0.709 - 0.60	16	29	50		
		0.599 - 0.50	15	28	53		
		0.499 - 0.38	14	27	55		
		0.379 - 0.25	13	25	53		
		0.249 - 0.00	12	22	48		
	0.250 - 0.499	1.000 - 0.71	16	30	53		
		0.709 - 0.60	15	28	56		
		0.599 - 0.50	14	27	57		
		0.499 - 0.38	14	25	56		
		0.379 - 0.00	13	23	52		
	0.500 +	1.000 - 0.71	15	29	58		
		0.709 - 0.60	14	27	58		
		0.599 - 0.50	14	25	57		
		0.499 - 0.00	13	24	54		
1.51 - 3.00	0.000 - 0.249	1.000 - 0.71	17	27	38		
		0.709 - 0.60	17	28	44		
		0.599 - 0.50	17	28	48		
		0.499 - 0.38	16	28	50		
		0.379 - 0.25	16	27	52		
		0.249 - 0.00	16	28	51		
	0.250 - 0.499	1.000 - 0.71	17	29	47		
		0.709 - 0.60	17	29	51		
		0.599 - 0.50	16	28	53		
		0.499 - 0.38	16	28	54		
		0.379 - 0.00	15	27	53		
	0.500 +	1.000 - 0.71	17	29	53		
		0.709 - 0.60	16	29	55		
		0.599 - 0.50	16	28	55		
		0.499 - 0.00	16	27	55		
3.01 - 3.50	0.000 - 0.249	1.000 - 0.71	28	38	41		
		0.709 - 0.60	20	31	47		
		0.599 - 0.50	19	32	51		
		0.499 - 0.38	19	32	55		
		0.379 - 0.25	19	32	58		
		0.249 - 0.00	18	31	58		
	0.250 - 0.499	1.000 - 0.71	29	32	58		
		0.709 - 0.60	20	33	55		
		0.599 - 0.50	19	33	58		
		0.499 - 0.38	19	32	60		
		0.379 - 0.00	19	32	61		
	0.500 +	1.000 - 0.71	20	33	57		
		0.709 - 0.60	19	33	60		
		0.599 - 0.50	19	33	62		
		0.499 - 0.00	19	32	62		

OPAQUE WALL Uow

LIGHT WEIGHT WALL	MASS WALL

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.060	HC ≥ 5	17	0.866	0.871
	HC ≥ 10	17	0.869	0.875
	HC ≥ 15	17	0.871	0.876
	HC ≥ 5	50	0.867	0.873
	HC ≥ 10	50	0.869	0.878
	HC ≥ 15	50	0.872	0.886

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.060	HC ≥ 5	17	0.868	0.874
	HC ≥ 10	17	0.870	0.882
	HC ≥ 15	17	0.873	0.884
	HC ≥ 5	55	0.866	0.875
	HC ≥ 10	55	0.870	0.882
	HC ≥ 15	55	0.873	0.884

Uow (HC(S)	HC RANGE	PCT FEN	INT INS	EXT INS
0.060	HC ≥ 5	25	0.866	0.870
	HC ≥ 10	25	0.870	0.884
	HC ≥ 15	25	0.873	0.887
	HC ≥ 5	62	0.866	0.876
	HC ≥ 10	62	0.870	0.884
	HC ≥ 15	62	0.874	0.887

Daylight Sensing Controls

	Min R-Value
WALL BELOW GRADE:	12

UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	10	15	11
Vertical	0	0	4

	Max Uo
ROOF:	0.041
WALL ADJACENT TO UNCOND SPACE:	0.18
FLOOR OVER UNCOND SPACE:	0.046

ALTERNATE COMPONENT PACKAGES FOR:

[illegible] = > 8548
[illegible] = < 188
[illegible] = < 548

Bethel AK
Big Delta AK
Fairbanks AK
Galena AK
Nome Saloon AK

McGrath AK
Nome AK
Sweetit AK

TABLE 5 4-31

Uef

BASE CASE		
0.35 to 0.46	0.46 to 0.29	0.28 to 0

PERIMETER DAYLIGHTING	
N/A	

OPAQUE WALL Uow	
LIGHT WEIGHT WALL	MASS WALL

INTERNAL LOAD DENSITY (ILD) RANGE	PROJECTION FACTOR (PF)	SHADING COEFF RANGE (SCs)	BASE CASE			PERIMETER DAYLIGHTING	VLT ≥ SC
0 - 1.50	0.360 - 0.249	1.000 - 0.71	13	28	49		
		0.799 - 0.60	15	29	53		
		0.599 - 0.50	14	27	54		
		0.499 - 0.38	13	25	54		
		0.379 - 0.25	12	23	53		
		0.249 - 0.00	11	20	43		
	0.259 - 0.499	1.000 - 0.71	15	29	55		
		0.799 - 0.60	14	27	56		
		0.599 - 0.50	13	25	55		
		0.499 - 0.38	12	23	52		
		0.379 - 0.00	12	21	47		
	0.500 -	1.000 - 0.71	14	27	57		
		0.799 - 0.60	13	25	56		
		0.599 - 0.50	12	23	52		
		0.499 - 0.00	12	22	48		
1.51 - 3.00	0.360 - 0.249	1.000 - 0.71	17	27	41		
		0.799 - 0.60	16	27	46		
		0.599 - 0.50	16	27	46		
		0.499 - 0.38	15	26	49		
		0.379 - 0.25	15	25	49		
		0.249 - 0.00	14	24	46		
	0.250 - 0.499	1.000 - 0.71	16	28	48		
		0.799 - 0.60	16	27	50		
		0.599 - 0.50	15	26	51		
		0.499 - 0.38	15	26	50		
		0.379 - 0.00	14	24	48		
	0.500 -	1.000 - 0.71	18	27	51		
		0.799 - 0.60	15	26	52		
		0.599 - 0.50	15	26	51		
		0.499 - 0.00	14	25	50		
3.01 - 3.50	0.360 - 0.249	1.000 - 0.71	18	29	42		
		0.799 - 0.60	18	30	48		
		0.599 - 0.50	18	30	51		
		0.499 - 0.38	17	29	53		
		0.379 - 0.25	17	29	54		
		0.249 - 0.00	16	28	52		
	0.250 - 0.499	1.000 - 0.71	18	30	50		
		0.799 - 0.60	18	30	53		
		0.599 - 0.50	18	30	55		
		0.499 - 0.38	17	29	55		
		0.379 - 0.00	17	28	54		
	0.500 -	1.000 - 0.71	18	30	54		
		0.799 - 0.60	18	30	56		
		0.599 - 0.50	17	29	56		
		0.499 - 0.00	17	29	55		

Daylight Sensing Controls

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.053	HC ≥ 5	18	0.053	0.065
	HC ≥ 10	18	0.055	0.068
	HC ≥ 15	18	0.058	0.257
	HC ≥ 5	57	0.053	0.269
	HC ≥ 10	57	0.056	0.274
	HC ≥ 15	57	0.058	0.574

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.058	HC ≥ 5	17	0.053	0.068
	HC ≥ 10	17	0.055	0.072
	HC ≥ 15	17	0.057	0.072
	HC ≥ 5	52	0.053	0.069
	HC ≥ 10	52	0.056	0.074
	HC ≥ 15	52	0.057	0.073

Uow (HC(S))	HC RANGE	PCT FEN	INT INS	EXT INS
0.053	HC ≥ 5	18	0.053	0.069
	HC ≥ 10	18	0.055	0.074
	HC ≥ 15	18	0.057	0.074
	HC ≥ 5	56	0.054	0.069
	HC ≥ 10	56	0.055	0.073
	HC ≥ 15	56	0.057	0.072

	Min R-Value
WALL BELOW GRADE:	16

UNHEATED SLAB ON GRADE:	24"	36"	48"
Horizontal	18	15	11
Vertical	8	6	4

	Max Uo
ROOF:	0.031
WALL ADJACENT TO UNCOND SPACE:	0.087
FLOOR OVER UNCOND SPACE:	0.046

Table 5.4-32
Climate Data Used for ACP Tables

ACP TABLE	Exterior Facades									Roof			Wall, Floor, Slab
	HDD50	HDD65	VSN	VSEW	VSS	CDD50	CDD65	CDH80	DR	HDD65	CDD65	CDH80	HDD65
5.4-2	0	0	557	817	805	8494	3019	1112	11.0	0	4150	4537	0
5.4-3	0	0	609	1082	977	10869	5394	10167	9.7	0	6160	16217	0
5.4-4	582	5020	407	724	926	1038	1	0	8.9	5020	1	0	5020
5.4-5	157	2922	453	909	1102	2792	82	23	16.4	3238	73	204	3238
5.4-6	3	1494	482	962	1146	4456	472	136	14.1	1577	834	2391	1577
5.4-7	569	2556	461	826	996	5277	1788	3614	15.2	2882	1825	6272	3220
5.4-8	381	2753	444	987	1185	4274	1171	7315	34.6	2884	1930	14404	2834
5.4-9	435	2194	467	796	925	5722	2005	5249	16.4	3091	2055	8450	3091
5.4-10	699	2708	476	862	996	5844	2378	12065	20.2	3049	2299	14487	3049
5.4-11	409	2444	468	1091	1312	6222	2782	26739	27.4	2444	2782	26739	2573
5.4-12	33	532	511	881	974	8288	3312	9757	17.1	874	3652	15512	889
5.4-13	65	842	532	900	936	8827	4130	25225	21.4	782	4186	37892	1382
5.4-14	1080	5226	350	588	782	1357	29	145	12.3	5550	79	466	5550
5.4-15	1531	4893	405	814	1005	2681	568	4081	32.9	4893	568	4081	4893
5.4-16	1477	4462	473	1090	1334	3385	895	3973	24.0	4802	1041	11568	4802
5.4-17	1261	3760	449	810	994	4274	1298	3642	17.4	4192	1183	3306	4192
5.4-18	1633	4423	469	1105	1361	3942	1257	5705	25.3	3825	1834	8878	4423
5.4-19	1034	3259	460	806	935	5319	2069	7807	19.2	3732	2072	10065	3732
5.4-20	2323	5877	373	790	1091	2370	449	3285	31.2	6665	225	2390	6665
5.4-21	2983	6727	363	758	1064	2094	363	1595	25.3	6514	698	1794	6727
5.4-22	1947	5583	419	909	1153	2395	556	2073	16.2	6471	486	6366	6471
5.4-23	1839	4509	446	812	982	4115	1311	4170	20.4	5201	1388	5212	5448
5.4-24	2280	5131	450	942	1196	4008	1384	7186	26.0	5701	1221	6147	5701
5.4-25	3492	7560	363	704	957	1629	221	1513	30.8	7817	328	1771	7817
5.4-26	4583	8397	380	708	942	2026	365	913	20.9	8351	774	3739	8941
5.4-27	3683	7666	432	1014	1350	1650	157	1317	30.1	7617	495	2699	7666
5.4-28	4709	9288	445	1063	1386	899	4	69	30.0	9288	4	69	9288
5.4-29	5087	9282	359	640	858	1399	119	246	21.0	10535	119	167	10535
5.4-30	3562	8913	280	434	652	124	0	0	9.9	10540	0	0	10540
5.4-31	6843	11992	270	499	860	330	4	6	15.4	14868	3	0	14868

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(b) From the list of cities in Appendix 5A, "List of Cities and Climate Data", which contains data for 234 cities, select the closest city climatologically to the building site. If the site is not one of the cities listed or if the climate at the site differs significantly from a listed adjacent city, obtain the information from the weather bureau or other reliable source and use (a) above. The column designated "ACP Table No." contains the table number of the appropriate ACP Table.

(c) For information purposes only, the climate data used to develop the ACP tables for the above-grade wall section are shown in Table 5.4–32. The criteria for all other envelope sections was based on the most stringent level for the cities listed in the ACP Table.

5.4.3.2.2 Determination of Maximum Allowable Percent Fenestration.

(a) Using the appropriate ACP Table, determine the maximum allowable percent fenestration. The maximum allowable percent fenestration is the total area of fenestration assemblies divided by the total gross exterior wall area, considering all elevations of the building. Determining the maximum allowable percent fenestration requires the following five steps:

(1) Based on the Internal Load Density (ILD) for the proposed design, select one of the three Internal Load Ranges as the point of entry to the tables. Note for ILD's greater than 3.5 W/ft² use the 3.5 W/ft² range. For shell buildings, see procedures in Section 5.3.8. Determine the ILD of the proposed design, based on the sum of the Internal Lighting Power Allowance (ILPA), the Equipment Power Density (EPD) and Occupant Load Adjustment (OLA), as shown in Equation 5.4–1.

$$ILD = ILPA + EPD + OLA$$

Equation 5.4–1

Where:

The Internal Lighting Power Allowance (ILPA) shall be:

1. The building average Internal Lighting Power Allowance (ILPA) of the design building in W/ft² as determined in Section 3.4 or 3.5;

2. The average of the Lighting Power Budgets (LPB) for all activity areas within 15 ft of each exterior wall based on the procedures specified by the Systems Performance Criteria of Section 3.5.3, or

3. The actual lighting power density of the proposed design in W/ft², either the building average or the average of the lighting power within 15 ft of each exterior wall.

Note.—The lighting prescriptive path, Section 3.4, does not provide lighting values for health, assembly, multi-family high rise, and hotel/motel buildings type occupancies. Use the 1.51 to 3.0 range of Internal Load Density for health and assembly buildings; and the 0 to 1.5 range for multi-family high rise and hotel/motel buildings.

The Equipment Power Density (EPD) shall be either:

1. The building average receptacle power density selected from Table 5.4–33 in W/ft²; or

Table 5.4-33

Average Receptacle Power Densities

BUILDING TYPE	W/ft²
1. Assembly	0.25
2. Office	0.75
3. Retail	0.25
4. Warehouse	0.10
5. School	0.50
6. Motel/Hotel	0.25
7. Restaurant	0.10
8. Health	1.00
9. Multi-Family	0.75

2. The actual average receptacle power density for all activity areas within 15 ft of each exterior wall in W/ft², considering diversity. For determining compliance in Tables 5.4–2 through 5.4–31, the actual average receptacle power densities calculated by this method that exceed 1.0 W/ft² shall be limited to 1.0 W/ft² in Equation 5.4–1.

The Occupant Load Adjustment (OLA) shall be either:

1. 0.0 W/ft². This recognizes the assumed occupant sensible load of 0.6 W/ft² that is built into the ACP tables; or

2. A positive or negative difference between the actual occupant load and 0.6 W/ft² if the design building has a larger or smaller occupant load.

(2) *Select external shading projection factor (PF).* If no external shading projections are used in the proposed design, select the column designated Projection Factor = 0.000 – 0.249. If external shading projections are used, determine the average area weighted projection factor on the window in accordance with Equation 5.4–2. Then select the appropriate column in the ACP Table.

$$PF = P_e/H$$

Equation 5.4–2

Where:

PF = Average area weighted projection factor

P_e = External horizontal shading projection depth, in. or ft

H = Sum of height of the fenestration and the distance from the top of the fenestration to the bottom of external shading projection in units consistent with P_e.

(3) Select the Shading Coefficient of the fenestration (SC_x) including internal, integral, and external shading devices, but excluding the effect of external shading projections (PF). This includes curtains, shades, or blinds. Reference *ASHRAE Handbook, 1985 Fundamentals Volume*, Chapter 27.

(4) Select one of the daylighting options, either:

1. Base Case, no daylighting; or

2. Perimeter Daylighting (automatic daylight controls for lighting system must be used). This option is not available in some locations.

(5) Select appropriate fenestration type. For most options, this is determined by the thermal transmittance value (U_{nf}) of the fenestration assembly. For some fenestration options, the visible light transmittance (VLT) of the fenestration should not be less than the shading coefficient of the glazed portion of the fenestration assembly, not considering any shading devices. The ranges generally correspond to single glazing, double glazing, triple glazing and high performance glazing incorporating low emissivity coatings/films or more than two glazing layers. Each ACP table includes at most, three ranges of glazing U-value.

5.4.4.2.3 *Determine the Maximum U_{ow} for the Opaque Wall Assembly.* In the appropriate ACP Table the Maximum U_{ow} for the opaque wall assembly is determined using the following steps:

(a) For a lightweight wall assembly, heat capacity (HC) less than 5 Btu/ft²·°F, use the value indicated. This U_{ow} is constant over all internal load ranges.

(b) To use the mass wall adjustment, the following additional steps are necessary:

(1) Select the same internal load range as that used in determining the

maximum allowable percent fenestration.

(2) Select the mass wall heat capacity (HC) and insulation position. If the wall insulation is positioned internal to or integral with the wall mass, use the column headed Interior/Integral Insulation. If the wall insulation is positioned external to the wall mass use the column headed Exterior Insulation. For HC less than 5 Btu/ft²·°F this adjustment table cannot be used. At this step you will have two choices of U_{ow} that are keyed to a small or large percent fenestration. This represents the full range of U_{ow} values allowed.

(3) Select or interpolate the appropriate maximum U_{ow} for the opaque wall based on the maximum allowable percent fenestration determined in Section 5.4.4.2.2 or the actual building percent fenestration whichever value is lower. The U_{ow} shall be determined by straight line interpolation for fenestration percentages between the smallest and largest values listed. If the design building percentage fenestration is less than the smallest value listed, select the U_{ow} for the largest percentage fenestration listed.

5.4.4.2.4 *Determine Other Envelope Criteria.* In each ACP table, the criteria for roof, wall adjacent to unconditioned space, wall below grade (first story only), floor over unconditioned space, and slab-on-grade floors, shall be met. For heated slabs on grade, the R-value shall be the R-value for the unheated slab-on-grade plus 2.0. For skylights, the daylight credit procedure presented in Section 5.3.10 shall be used.

5.5 Building Envelope—System Performance Compliance Alternative

5.5.1 Roof Thermal Transmittance Criteria

5.5.1.1 Any building that is heated and/or mechanically cooled shall have an overall thermal transmittance value (U_{or}) for the gross area of the roof assembly not greater than the value determined by Equation 5.5–1. The provisions of Section 5.3 shall be followed in determining acceptable combinations of materials that will meet the required U_{or} values of Equation 5.5–1.

$$U_o = 1/(5.3 + 1.8 \times 10^{-3} \times HDD65 + 1.3 \times 10^{-3} \times CDD65 + 2.6 \times 10^{-4} \times CDH80)$$

Equation 5.5–1

5.5.1.2 Equation 5.5–1 applies only for climate locations with HDD65 less than or equal to 15,000. For climate locations with HDD65 greater than 15,000, see subsection 5.3.9, Table 5.3–5.

5.5.1.2.1 *Exceptions to Section 5.5.1.2:*

(a) any building that is only heated shall have an overall thermal transmittance value (U_{or}) for the gross area of the roof assembly less than or equal to the value determined by Equation 5.5–1 with CDD65 and CDH80 set equal to zero; and

(b) any building that is only mechanically cooled shall have an overall thermal transmittance value (U_{or}) for the gross area of the roof assembly less than or equal to the value determined by Equation 5.5–1 with HDD65 set equal to zero.

5.5.2 Floor Thermal Transmittance Criteria

5.5.2.1 The floors of any building that is heated and/or mechanically cooled shall meet the following thermal criteria:

5.5.2.1.1 Floors of conditioned spaces over unconditioned spaces shall have a thermal transmittance (U_{of}) not greater than that specified in Figure 5.5–1.

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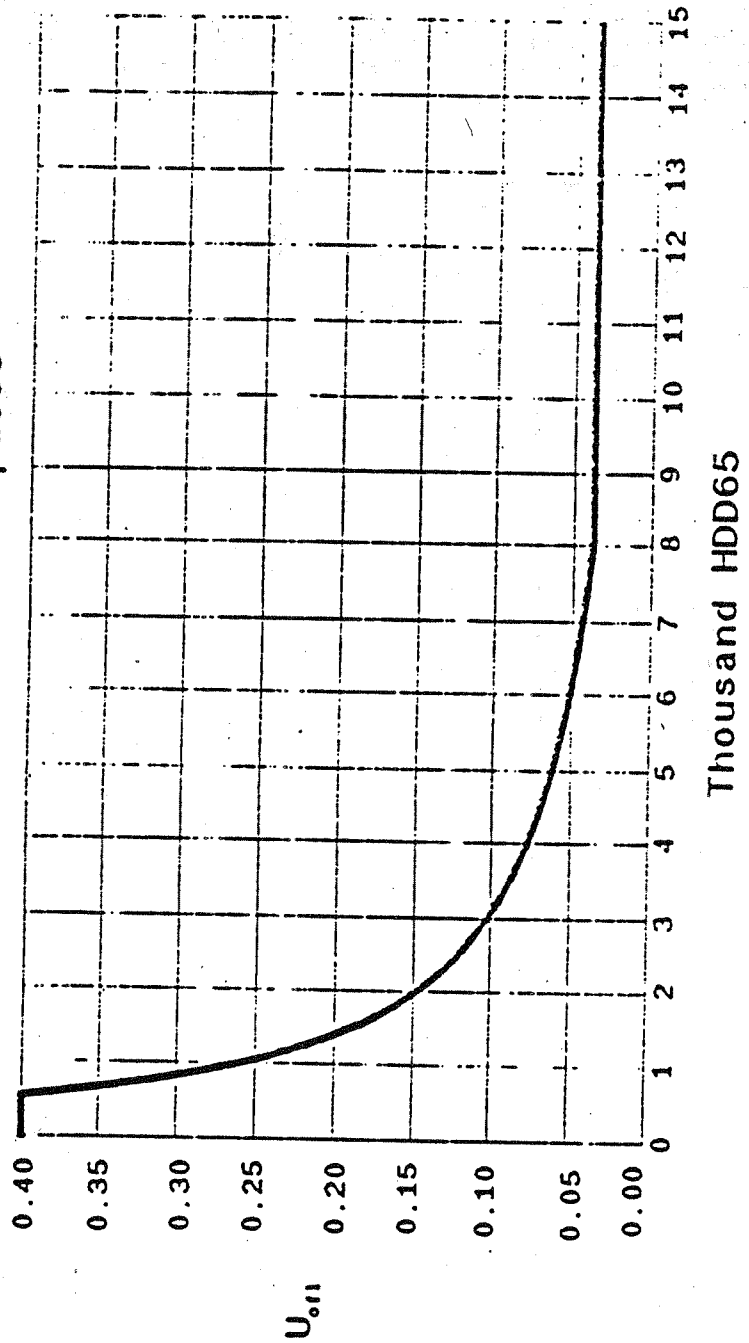
Figure 5.5-1
Maximum Overall Thermal Transmittance for Floors of Conditioned Spaces Over Unconditioned Spaces



Note:
for HDD65 ≤ 550, U_{oll} = 0.40
for 550 < HDD65 ≤ 8000, U_{oll} = 1/[0.840 + 0.00302 × HDD65]
for 8000 < HDD65 < 15000, U_{oll} = 0.04
for HDD65 ≥ 15000, see Table 5.3-5

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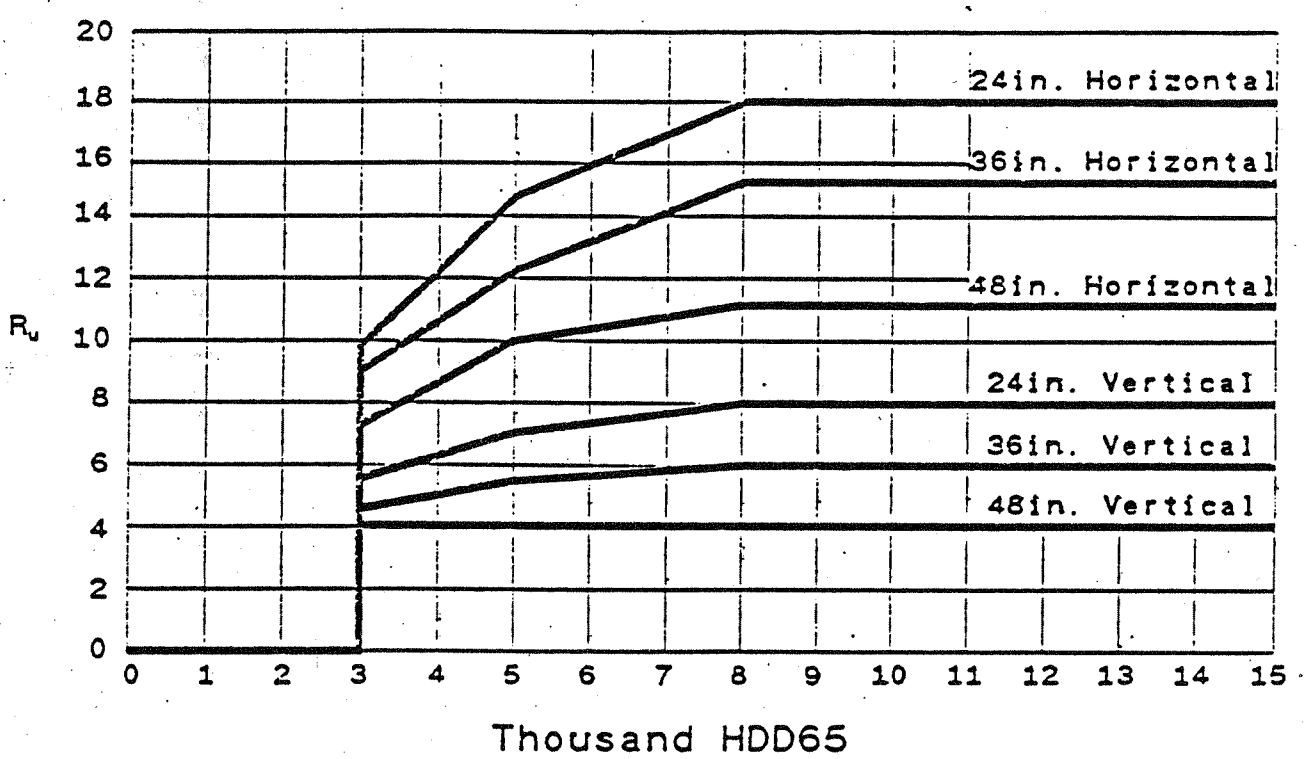
5.5.2.1.2 Slab-on-grade floors shall have insulation around the perimeter of the floor with the thermal resistance (R_u) of the insulation as specified in Figure 5.5–2. The insulation specified in Figure 5.5–2 shall extend either in a vertical plane downward from the top of the slab for the minimum distance shown or downward to the bottom of the slab for the minimum distance shown then in a horizontal plane beneath the slab. The horizontal length, or vertical depth, of insulation required varies from 24 in. to 48 in. depending upon the R-value selected. For heated slabs, an R of 2 shall be added to the thermal resistance required in Figure 5.5–2.

Figure 5.5-2
Thermal Resistance for Unheated Slab on Grade



Note: for HDD65 ≤ 3000, R_u = 0
for 3000 > HDD65 > 15000, see graph above
for HDD65 ≥ 15000, see Table 5.3-5

R values for heated slab-on-grade = R unheated + 2

$$R_h = R_u + 2$$

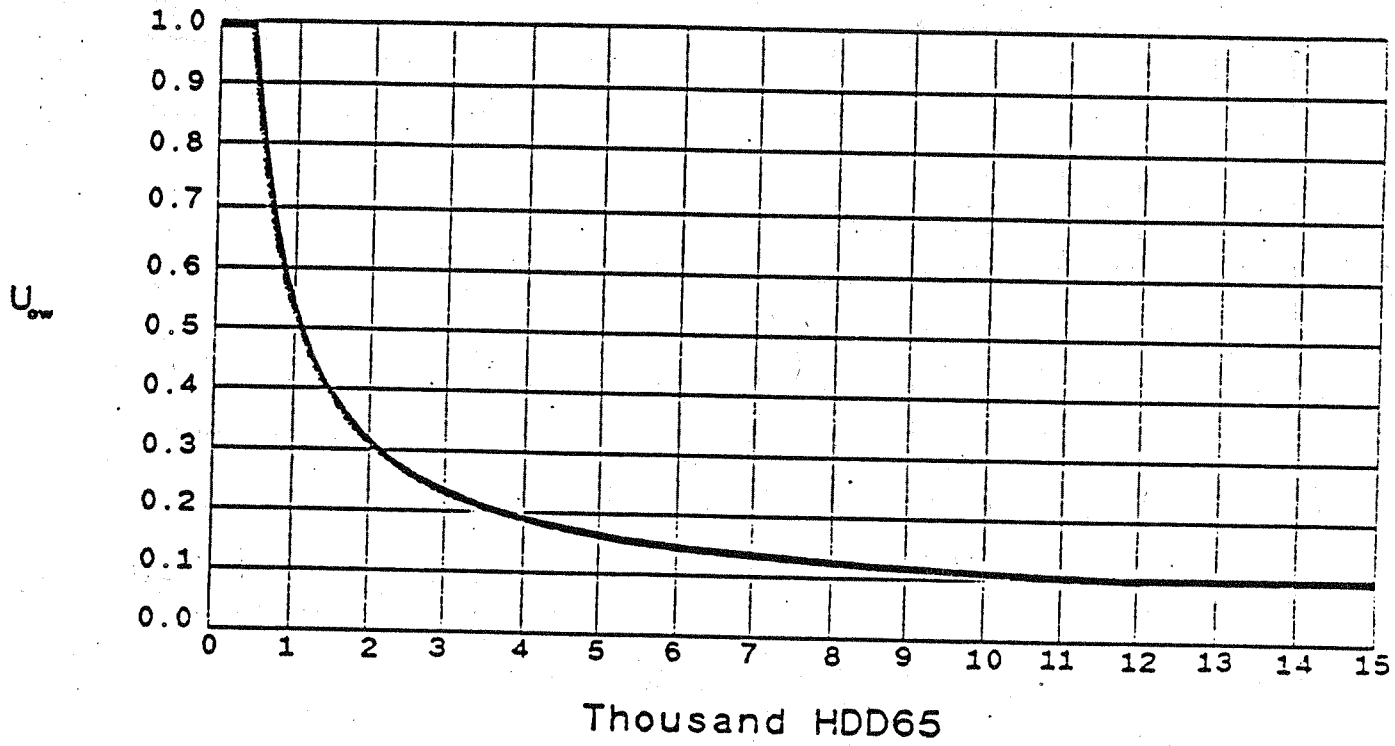
(e) Vertical insulation is not required to extend below the foundation footing. There are no insulation requirements for slabs in locations having less than 3,000 HDD65 for footings extending less than 18 in. below grade.

5.5.3 Thermal Transmittance Criteria For Opaque Walls Enclosing Conditioned Spaces Exposed to Interior Unconditioned Spaces

5.5.3.1 All opaque walls enclosing conditioned spaces exposed to interior unconditioned spaces shall have an overall thermal transmittance (U_{ow}) not greater than the value specified in Figure 5.5–3.

Figure 5.5-3

Maximum Overall Thermal Transmittance of Opaque Wall Sections With HC < 7



Note: for HDD65 ≤ 540, U_{ow} = 1.0

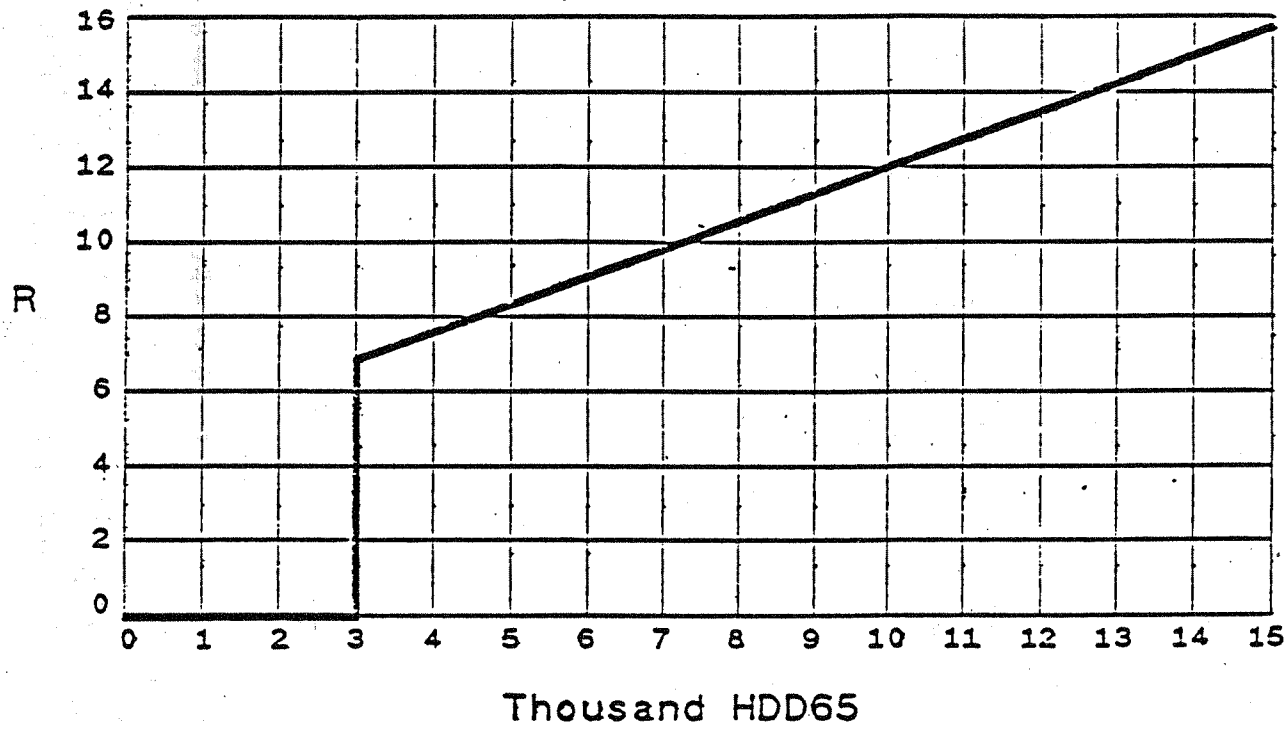
for 540 < HDD65 < 15000, U_{ow} = 0.0528 + 510.9/HDD65

for HDD65 ≥ 15000, see Table 5.3-5

5.3.4 Thermal Resistance Criteria for Exterior Wall Insulation Below Grade

5.3.4.1 The thermal resistance (R) of the wall assembly shall be greater than, or equal to the insulation level specified in Figure 5.5—4, or the heat loss calculated in accordance with Chapter 25 of the *ASHRAE Handbook, 1985 Fundamentals Volume* shall be less than, or equal to that of a wall below grade having a thermal resistance equal to that specified in Figure 5.5—4. No insulation is required for climate locations with less than 3,000 HDD65 for those portions of walls more than one story below grade.

Figure 5.5-4
Thermal Resistance of Wall
First Story Below Grade



Note: for HDD65 ≤ 3000, R = 0
for 3000 < HDD65 < 15000, R = 4.5 + 0.00075 x HDD65
for HDD65 ≥ 15000, see Table 5.3-5