Section 6.5.6.1.2 and Tables 6.5.6.1.2-1 and Table 6.5.6.1.2-2 See Addendum cd

Addendum p

3.2 Definitions

[. . .]

lighting power allowance (LPA), exterior: the maximum lighting power in watts allowed for the exterior of a building.

lighting power allowance (LPA), interior: the maximum lighting power in watts allowed for the interior of a building.

[. . .]

3.3 Abbreviations and Acronyms

[. . .]

LPA maximum lighting power allowed in watts (W)

[. . .]

9.1.2 Lighting Alterations. ~~For the alteration of any lighting system in an interior space, that space shall comply with the lighting power density (LPD) allowances of Section 9.5.1 or 9.6.1 and the control requirements of Section 9.4.1.1 (a), (b), (c), (d), (g), (h), and (i), as applicable to that space.~~

~~For the alteration of any lighting system for the exterior of a building application, that lighting system shall comply with the lighting power density (LPD) allowances of Section 9.4.2 applicable to the area illuminated by that lighting system and the applicable control requirements of Sections 9.4.1.4 and 9.4.2.~~

The alteration of a lighting system in an interior space shall comply with Section 9.1.2.1. The alteration of a lighting system in an exterior area shall comply with Section 9.1.2.2.

~~**Exceptions to 9.1.2:**~~

1. ~~Alterations that involve 20% or less of the connected lighting load in a space or area need not comply with these requirements, provided that such alterations do not increase the installed lighting power.~~
2. ~~Lighting alterations that only involve replacement of lamps plus ballasts/drivers or only involve one-for-one luminaire replacement need only comply with LPD requirement and Section 9.4.1.1(h) or 9.4.1.1(i).~~
3. ~~Routine maintenance or repair situations.~~

The maintenance of an existing lighting system to return it to working order shall not be considered an alteration. Retrofitting a luminaire for which the original lamps and ballast/driver are replaced with a new lamp/light source and driver/ballast that was not a component of the original luminaire shall be considered an alteration.

9.1.2.1 Lighting Alterations for Interior Building Spaces. The alteration of a lighting system in an interior space shall meet one of the following requirements;

a. The alteration shall comply with Section 9.2 when the total wattage of all new and retrofitted luminaires is greater than 2000 W.
b. When the total wattage of all new and retrofitted luminaires is 2000 W or less, each altered space shall comply with the LPA of Table 9.6.1 and Section 9.6.2, or the alteration shall result in a new wattage at least 50% below the original wattage of each altered lighting system. Additionally, the new and retrofitted lighting shall comply with the control requirements of Sections 9.4.1.1(a), 9.4.1.1(h), 9.4.1.1(i) as applicable to each altered space as shown in Table 9.6.1 and Section 9.6.2.

9.1.2.2 Lighting Alterations for Exterior Building Areas. The alteration of a lighting system for an exterior area shall use only the area-specific allowances in Table 9.4.2-2 and shall not use the base site allowances to determine the LPA. Additionally, the exterior alteration shall meet one of the following;

a. The alteration shall comply with Section 9.2 when the total number of new and retrofitted luminaires is greater than 10 or where the combined length of new and retrofitted linear luminaires is greater than 20 linear feet (6.1 linear metres).
b. Where the total number of new and retrofitted luminaires is not greater than 10 or where the combined length of new and retrofitted linear luminaires is not greater than 20 linear feet (6.1 linear metres) of linear luminaires, the total wattage of the alteration shall be no greater than the maximum LPA permitted by Table 9.4.2-2, or the total new wattage shall be at least 50% below the total original wattage of that lighting system. Additionally, the new and retrofitted lighting shall comply with the control requirements of Section 9.4.1.4(a).

[. . .]

9.1.4 Interior and Exterior Luminaire Wattage

[. . .]

f. The wattage of a retrofitted luminaire shall be the manufacturer's labeled input power of the new light source plus driver.

~~f~~g. The wattage of all other miscellaneous lighting equipment shall be the specified wattage of the lighting equipment.

Addendum q

Modify Table G3.7 as shown (I-P and SI units).

Table G3.7 Performance Rating Method Lighting Power Density Allowances and Occupancy Sensor Reductions Using the Space-by-Space Method (I-P)

Common Space Types [a]	Lighting Power Density, W/ft^2	Occupancy Sensor Reduction [b]
[. . .]		
Laboratory		
~~In or as a classroom~~	~~1.40~~	~~None~~
All ~~other~~ laboratory except in or as a classroom	1.40	10%
[. . .]		
[. . .]		

Addendum r

Modify Section 6.4.3.3.3 as shown (I-P and SI units).

6.4.3.3.3 Optimum Start Controls. Individual heating and cooling systems with setback controls and DDC shall have optimum start controls. The control algorithm shall, as a minimum, be a function of the difference between space temperature and occupied set point, the outdoor temperature, and the amount of time prior to scheduled occupancy. Mass radiant floor slab systems shall incorporate floor temperature into the optimum start algorithm.

Exception to 6.4.3.3.3: Residential spaces are not required to have optimum start controls.

Addendum s

Modify Section 3.2 as shown (I-P and SI units).

3.2 Definitions

[. . .]

north-oriented: facing within ~~45~~67.5 degrees of true north in the northern hemisphere; ~~(however~~, facing within 67.5 degrees of true south in the southern hemisphere.~~)~~

south-oriented: facing within 45 degrees of true south in the northern hemisphere; facing within 45 degrees of true north in the southern hemisphere.

east-oriented: facing within 45 degrees of true east to the south and within less than 22.5 degrees of true east to the north in the northern hemisphere; facing within 45 degrees of true east to the north and within less than 22.5 degrees of true east to the south in the southern hemisphere.

west-oriented: facing within 45 degrees of true west to the south and within less than 22.5 degrees of true west to the north in the northern hemisphere; facing within 45 degrees of true west to the north and within less than 22.5 degrees of true west to the south in the southern hemisphere.

~~**reflectance:** the ratio of the light reflected by a surface to the light incident upon it.~~

[. . .]

Modify Section 5.5.3.1.1 as shown (I-P and SI units).

5.5.3.1.1 Roof Solar Reflectance and Thermal Emittance. Roofs in Climate Zones 0 through 3 shall have one of the following: a. A minimum three-year-aged solar ~~reflectance~~ reflectance of 0.55 and a minimum three-yearaged thermal emittance of 0.75 when tested in accordance with CRRC S100. b. A minimum Solar Reflectance Index of 64 when determined in accordance with the Solar Reflectance Index method in ASTM E1980 using a convection coefficient of 2.1 Btu/h·ft2 ·°F (12 W/m2 ·K), based on three-year-aged solar ~~reflectance~~ reflectance and three-year-aged thermal emittance tested in accordance with CRRC S100. c. Increased roof insulation levels found in Table 5.5.3.1.1. The values for three-year-aged solar ~~reflectance~~ reflectance and three-year-aged thermal emittance shall be determined by a laboratory accredited by a nationally recognized accreditation organization and shall be labeled and certified by the manufacturer.

[. . .]

Modify Section 5.53.2 as shown (I-P and SI units).

5.5.3.2 Above-Grade Wall Insulation. All above-grade walls shall comply with the insulation values specified in Tables 5.5-0 through 5.5-8.

Exception to 5.5.3.2: Alternatively, for mass walls [. . .]

5.5.3.2.1 Walls That Are Both above and below Grade. When a wall consists of both above-grade and below-grade portions [. . .]

5.5.3.2.2 Wall Solar Reflectance and Thermal Emittance. ~~In addition, f~~ For Climate Zone 0, above-grade east-oriented, south-oriented, and west-oriented walls ~~above-grade walls~~ shall comply with ~~one of the following~~ subparagraph (a) or (b):

a. ~~For east and west walls, a~~ A minimum of 75% of the opaque wall area shall have a minimum ~~SRI of 29~~ area-weighted initial solar reflectance of 0.30 when tested in accordance with ASTM C1549 with AM1.5GV output, or ASTM E903 with the AM1.5GV output, or determined in accordance with generally accepted engineering standards, and a minimum emittance or emissivity of 0.75 when tested in accordance with ASTM C835, C1371, E408, or determined in accordance with generally accepted engineering standards. For the portion of the opaque wall that is glass spandrel area, a minimum solar ~~reflectance~~ reflectance of 0.29 determined in accordance with NFRC 300 or ISO 9050 shall be permitted. ~~Each wall is allowed to be considered separately.~~ Area-weighting is permitted only between the south-, east-, and west-oriented walls and only between walls of the same space conditioning category.
b. ~~For east and west walls, a~~ A minimum of 30% of the above-grade wall area shall be shaded through the use of ~~shade-providing plants~~, manmade structures, existing buildings, hillsides, permanent building projections, on-site renewable energy systems, or a combination of these. Shade coverage shall be calculated by projecting the shading surface downward on the wall at an angle of 45 degrees. ~~at 10 a.m. for the east-oriented walls and 3 p.m. for the west-oriented walls on the summer solstice. The building is allowed to be rotated up to 45 degrees to the nearest cardinal orientation for purposes of calculations and showing compliance.~~

Exception to 5.5.3.2.2: Exterior walls of semiheated spaces.

[. . .]

Modify Section 5.5.4.5 as shown (I-P and SI units).

5.5.4.5 Fenestration Orientation

[. . .]

where

A_w = west-oriented vertical fenestration area ~~(oriented within 45 degrees of true west to the south and within 22.5 degrees of true west to the north in the northern hemisphere; oriented within 45 degrees of true west to the north and within 22.5 degrees of true west to the south in the southern hemisphere)~~

A_e = east-oriented vertical fenestration area ~~(oriented within 45 degrees of true east to the south and within 22.5 degrees of true east to the north in the northern hemisphere; oriented within 45 degrees of true east to the north and within 22.5 degrees of true east to the south in the southern hemisphere)~~

[…]

Modify Table 11.5.1 as shown (I-P and SI units).

Table 11.5.1 Modeling Requirements for Calculating Design Energy Cost and Energy Cost Budget

Proposed Design (Column A) Design Energy Cost (DEC)	Budget Building Design (Column B) Energy Cost Budget (ECB)
5. Building Envelope	
All components of the building envelope in the proposed design shall be modeled as shown on architectural drawings or as built for existing building envelopes. **Exceptions:** The following building elements are permitted to differ from architectural drawings. 1. Any building envelope assembly that covers less than 5% of the total area of that assembly type (e.g., exterior walls) need not be separately described. If not separately described, the area of a building envelope assembly must be added to the area of the adjacent assembly of that same type. 2. Exterior surfaces whose azimuth orientation and tilt differ by less than 45 degrees and are otherwise the same shall be described as either a single surface or by using multipliers. **3.** The exterior roof surface shall be modeled using the aged solar	The budget building design shall have identical conditioned floor area and identical exterior dimensions and orientations as the proposed design, except as follows: a. Opaque assemblies, such as roof, floors, doors, and walls, shall be modeled as having the same heat capacity as the proposed design but with the minimum U-factor required in Section 5.5 for new buildings or additions and Section 5.1.3 for alterations. b. The exterior roof surfaces shall be modeled with a solar ~~reflectance~~ reflectance and thermal emittance as required in Section 5.5.3.1.1(a). All other roofs, including roofs exempted from the requirements in Section 5.5.3.1.1, shall be modeled the same as the proposed design. The above-grade wall surfaces of buildings shall be modeled with a solar reflectance and thermal emittance as required in Section 5.5.3.2.2 and 5.5.3.2.2(a). All other above-grade walls, including those exempt from the

~~reflectance~~ reflectance and thermal emittance determined in accordance with Section 5.5.3.1.1(a). Where aged test data are unavailable, the roof surface shall be modeled with a solar ~~reflectance~~ reflectance of 0.30 and a thermal emittance of 0.90. The above-grade wall surfaces of buildings shall be modeled with an initial solar reflectance and thermal emittance determined in accordance with the test methods identified in Section 5.5.3.2.2(a). Where initial test data are unavailable, the above-grade wall surfaces shall be modeled with a solar reflectance of 0.25 and a thermal emittance of 0.90.

4. Manually operated fenestration shading devices, such as blinds or shades, shall not be modeled. Permanent shading devices, such as fins, overhangs, and lightshelves, shall be modeled.

requirements in Section 5.5.3.2.2, shall be modeled the same as the proposed design.

c. No shading projections are to be modeled; fenestration shall be assumed to be flush with the wall or roof. If the fenestration area for new buildings or additions exceeds the maximum allowed by Section 5.5.4.2, the area shall be reduced proportionally along each exposure until the limit set in Section 5.5.4.2 is met. If the vertical fenestration area facing west or east of the proposed design exceeds the area limit set in Section 5.5.4.5 then the energy cost budget shall be generated by simulating the budget building design with its actual orientation and again after rotating the entire budget building design 90, 180, and 270 degrees and then averaging the results. Fenestration U-factor shall be equal to the criteria from Tables 5.5-0 through 5.5-8 for the appropriate climate, and the SHGC shall be equal to the criteria from Tables 5.5-0 through 5.5-8 for the appropriate climate. For portions of those tables where there are no SHGC requirements, the SHGC shall be equal to that determined in accordance with Section C3.6(c). The VT shall be equal to that determined in accordance with Section C3.6(c). The fenestration model for building envelope alterations shall reflect the limitations on area, U-factor, and SHGC as described in Section 5.1.3.

[. . .]

Addendum w

Modify Section G3.1.3.7 and Table G3.1.3.7 as shown (I-P and SI units)

G3.1.3.7 Type and Number of Chillers (Systems 7, 8, 11, 12, and 13). Electric chillers shall be used in the baseline building design regardless of the cooling energy source, e.g. direct-fired absorption or absorption from purchased steam. The baseline building design's chiller plant shall be modeled with chillers having the number and type as indicated in Table G3.1.3.7 ~~as a function of building~~ based on the peak coincident cooling load of baseline HVAC systems using chilled water.

> **Exception to G3.1.3.7:** Systems using purchased chilled water shall be modeled in accordance with Section G3.1.1.3.

Table G3.1.3.7 Type and Number of Chillers

~~Building~~ Peak Coincident Cooling Loads of Baseline HVAC Systems Using Chilled Water	Number and Type of Chillers
≤300 tons (1055 kW)	1 water-cooled screw chiller
>300 tons (1055 kW), <600 tons (2110 kW)	2 water-cooled screw chillers sized equally
≥600 tons (2110 kW)	2 water-cooled centrifugal chillers minimum with chillers added so that no chiller is larger than 800 tons (2813 kW), all sized equally

Addendum af

Revise Table G3.1 as shown (I-P and SI units).

No.	Proposed Building Performance	Baseline Building Performance
6. Lighting		
Lighting power in the proposed design shall be determined as follows: a. Where a complete lighting system exists, the actual lighting power for each thermal block shall be used in the model. b. Where a complete lighting system has been designed and submitted with design documents, lighting power shall be determined in accordance with Sections 9.1.3 and 9.1.4. c. Where lighting neither exists nor is submitted with design documents, lighting shall comply with but not exceed the requirements of Section 9. Where space types are known, lighting power shall be determined in accordance with the Space-by-Space Method. Where space types are not known, lighting ~~Lighting~~ power shall be determined in accordance with the Building Area Method. d. Lighting system power shall include all lighting system components shown or provided for on the plans (including lamps and ballasts and task and furniture-mounted fixtures). e. For dwelling units, hotel/motel guest rooms, and other spaces in which lighting systems are connected via receptacles and are not shown on design documents, lighting power used in the simulation shall be equal to the lighting power allowance in Table 9.6.1 for the appropriate space type or as designed, whichever is greater. For the dwelling units, lighting power used in the simulation shall be equal to 0.60 W/ft2 (6.5 W/m2) or as designed, whichever is greater. **Exception:** Lighting use can be reduced for the portion of the space illuminated by the specified fixtures provided that they maintain the same illuminance level as in the baseline. Such reduction shall be demonstrated by calculations. f. Exterior lighting power and lighting ~~Lighting~~ power for parking garages and building façades shall be modeled. g. For lighting controls, at a minimum, the proposed design shall contain the mandatory automatic lighting controls specified in Section 9.4.1 (e.g., automatic daylight responsive controls, occupancy sensors, programmable controls, etc.). These controls shall be modeled in accordance with (g) and (h). h. Automatic daylighting responsive controls shall be modeled directly in the proposed design or through schedule adjustments determined by a separate daylighting analysis approved by the rating authority. Modeling and schedule adjustments shall separately account for primary sidelighted areas, secondary sidelighted areas, and toplighted areas. **i.** Other automatic lighting controls included in the proposed design shall be modeled directly in the building simulation by reducing the lighting schedule each hour by the occupancy sensor reduction factors in Table G3.7 for the applicable space type. This reduction shall be taken only for lighting controlled by the occupancy sensors. Credit for other programmable lighting control in buildings less than 5000 ft2 (500 m2) can be taken by reducing the lighting schedule each hour by 10%.	Interior lighting power in the baseline building design shall be determined using the values in Table G3.7. However, where lighting neither exists nor is submitted with design documents, and the proposed design lighting power is determined in accordance with the Building Area Method, the baseline building design lighting power shall be determined in accordance with Table G3.8. Where retail display lighting is included in the proposed building design in accordance with Section 9.6.2(b), the baseline building design retail display lighting additional power shall be equal to the limits established by Section 9.6.2(b) or same as proposed, which ever less. Lighting shall be modeled having the automatic shutoff controls in buildings >5000 ft2 (500 m2) and occupancy sensors in employee lunch and break rooms, conference/meeting rooms, and classrooms (not including shop classrooms, laboratory classrooms, and preschool through 12th-grade classrooms). These controls shall be reflected in the baseline building design lighting schedules. No additional automatic lighting controls, e.g., automatic controls for daylight utilization and occupancy sensors in space types not listed above, shall be modeled in the baseline building design. Exterior lighting in areas that are designed to be illuminated and identified as "Tradable Surfaces" in Table G3.6 shall be modeled with the baseline lighting power shown in Table G3.6. Other exterior lighting shall be modeled the same in the baseline building design as in the proposed design.

Modify Table G3.6 as shown (I-P units).

Table G3.6 Performance Rating Method Lighting Power Densities for Building Exteriors

Tradable Surfaces **(Lighting power densities for uncovered parking areas, building grounds, building entrances, and exits, canopies and overhangs and outdoor sales areas may be traded.)**	Uncovered Parking Areas	
	Parking lots and drives	0.15 W/ft^2
	Building Grounds	
	Walkways less than 10 feet wide	1.0 W/linear foot
	Walkways 10 feet wide or greater Plaza area Special feature areas	0.2 W/ft^2
	Stairways	1.0 W/ft^2
	Building Entrances and Exits	
	Main Entries	30 W/linear foot of door width
	Other Doors	20 W/linear foot of door width
	Canopies and Overhangs	
	Canopies (freestanding and attached and overhangs)	1.25 W/ft^2
	Outdoor Sales	
	Open Areas (including vehicle sales lots)	0.5 W/ft^2
	Street frontage for vehicle sales lots in addition to open-area allowance	20 W/linear foot
~~**Nontradable Surfaces (Lighting power density calculations for he following applications can be used only for the specific application and cannot be traded between surfaces or with other exterior lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table.)**~~	~~Building Facades~~	~~0.2 W/ft² for each illuminated wall or surface or 0.15 W/linear foot for each illuminated wall or surface length.~~
	~~Automated Teller Machines (ATMs) and Night Depositories~~	~~270 W per location plus 90 W per additional ATM per location~~
	~~Entrances and Gatehouse Inspection Stations at Guarded Facilities~~	~~1.25 W/ft² of uncovered area (covered areas are included in the "Canopies and Overhangs" section of "Tradable Surfaces") or 0.15 W/linear foot for each illuminated wall or surface length.~~
	~~Loading Areas for Law Enforcement, Fire, Ambulance, and other Emergency Service Vehicles~~	~~0.5 W/ft² of uncovered area (covered areas are included in the "Canopies and Overhangs" section of "Tradable Surfaces")~~
	~~Drive up Windows at Fast Food Restaurants~~	~~400 W per drive through~~
	~~Parking near 24 Hour Retail Entrances~~	~~800 W per main entry~~

Addendum bc

Add new Section 6.5.4.8 (I-P and SI units).

6.5.4.8 Buildings with High-Capacity Space-Heating Gas Boiler Systems. New buildings with gas hot-water boiler systems for space heating with a total system input of at least 1,000,000 Btu/h (290 kW) but not more than 10,000,000 Btu/h (2900 kW) shall comply with Sections 6.5.4.8.1 and 6.5.4.8.2.

Exceptions to 6.5.4.8:

1. Where 25% of the annual space heating requirement is provided by on-site renewable energy, site-recovered energy, or heat recovery chillers.
2. Space heating boilers installed in individual dwelling units.
3. Where 50% or more of the design heating load is served using perimeter convective heating, radiant ceiling panels, or both.
4. Individual gas boilers with input capacity less than 300,000 Btu/h (87 kW) shall not be included in the calculations of the total system input or total system efficiency.

6.5.4.8.1 Boiler Efficiency. Gas hot-water boilers shall have a minimum thermal efficiency (Et) of 90% when rated in accordance with the test procedures in Table 6.8.1-6. Systems with multiple boilers are allowed to meet this requirement if the space heating input provided by equipment with thermal efficiency (Et) above and below 90% provides an input capacity weighted average thermal efficiency of at least 90%. For boilers rated only for combustion efficiency, the calculation for the input capacity-weighted average thermal efficiency shall use the combustion efficiency value.

6.5.4.8.2 Hot-Water Distribution System Design. The hot-water distribution system shall be designed to meet all of the following:

a. Coils and other heat exchangers shall be selected so that at design conditions the hot-water return temperature entering the boilers is 120°F (49°C) or less.

b. Under all operating conditions, the water temperature entering the boiler is 120°F (49°C) or less, or the flow rate of supply hot water that recirculates directly into the return system, such as by three-way valves or minimum flow bypass controls, shall be no greater than 20% of the design flow of the operating boilers.

Addendum cd

Modify Sections 6.5.6.1.2 as shown (I-P and SI).

6.5.6.1.2 Spaces Other than Nontransient Dwelling Units Each fan system serving spaces other than nontransient dwelling units shall have an energy recovery system where the design supply fan airflow rate exceeds the value listed in Tables 6.5.6.1.2-1 and 6.5.6.1.2-2, based on the climate zone and percentage of outdoor air at design airflow conditions. Table 6.5.6.1.2-1 shall be used for all ventilation systems that operate less than 8000 hours per year, and Table 6.5.6.1.2-1 shall be used for all ventilation systems that operate 8000 or more hours per year.

~~For spaces other than nontransient dwelling units, energy recovery systems shall result in an enthalpy recovery ratio of at least 50%. The energy recovery system shall provide the required enthalpy recovery ratio at both heating and cooling design conditions, unless one mode is not required for the climate zone by the exceptions below. Provision shall be made to bypass or control the energy recovery system to permit air economizer operation as required by Section 6.5.1.1.~~

Exceptions to 6.5.6.1.2:

1. Laboratory systems meeting Section 6.5.7.3.
2. Systems serving spaces that are not cooled and that are heated to less than 60°F.
3. Where more than 60% of the outdoor air heating energy is provided from site recovered energy or site-solar energy.
4. Enthalpy recovery ratio requirements at heating design condition in Climate Zones 0, 1, and 2.
5. Enthalpy recovery ratio requirements at cooling design condition in Climate Zones 3C, 4C, 5B, 5C, 6B, 7, and 8.
6. Where the sum of the airflow rates exhausted and relieved within 20 ft of each other is less than 75% of the design outdoor airflow rate, excluding exhaust air that is a. used for another energy recovery system, b. not allowed by ASHRAE Standard 170 for use in energy recovery systems with leakage potential, or c. of Class 4 as defined in ASHRAE Standard 62.1.
7. Systems in Climate Zones 0 through 4 requiring dehumidification that employ series energy recovery and have a minimum SERR of 0.40.
8. Systems expected to operate less than 20 hours per week at the outdoor air percentage covered by Table 6.5.6.1.2-1.
9. Indoor pool dehumidifiers meeting Section 6.5.6.4.

6.5.6.1.2.1 Minimum Enthalpy Recovery Ratio. Energy recovery systems required by this section shall result in an enthalpy recovery ratio of at least 50%. A 50% enthalpy recovery ratio shall mean a change in the enthalpy of the outdoor air supply equal to 50% of the difference between the outdoor air and entering exhaust air enthalpies at design conditions. The energy recovery system shall provide the required enthalpy recovery ratio at both heating and cooling design conditions unless one mode is not required for the climate zone by Exception 6.5.6.1.2.2.

6.5.6.1.2.2 Provision for Air Economizer or Bypass Operation. Provision shall be made for both outdoor air and exhaust air to bypass or control the energy recovery system to enable economizer operation as required by Section 6.5.1.1. The bypass or control shall meet the following criteria:

a. For energy recovery systems where the transfer of energy cannot be stopped, bypass provision shall prevent the total airflow rate of either outdoor air or exhaust air through the energy recovery exchanger from exceeding 10% of the full design airflow rate.
b. The pressure drop of the outdoor air through the energy recovery exchanger shall not exceed 0.4 in. of water (100 Pa); the pressure drop of the exhaust air through the energy recovery exchanger shall not exceed 0.4 in. of water (100 Pa).

Exception to 6.5.6.1.2.2: Energy recovery systems with 80% or more outdoor air at full design airflow rate and not exceeding 10,000 cfm (4.72 m3/s).

Table 6.5.6.1.2-1 Exhaust Air Energy Recovery Requirements for Ventilation Systems Operating Less than 8000 Hours per Year.

Climate Zone	% Outdoor Air at Full Design							
	≥ 10% And < 20%	≥ 20% And < 30%	≥ 30% And < 40%	≥ 40% And < 50%	≥ 50% And < 60%	≥ 60% And < 70%	≥ 70% And < 80%	≥ 80%
	Design Supply Fan Airflow Rate, cfm							
6	≥ 26,000	≥ 16,000	≥ 5,500	≥ 4,500	≥ 3,500	≥ 2,000	≥ 1,000	≥ 120
7	≥ 4,500	≥ 4,000	≥ 2,500	≥ 1,000	≥ 140	≥ 120	≥ 100	≥ 80

Table 6.5.6.1.2-2 Exhaust Air Energy Recovery Requirements for Ventilation Systems Operating Greater than or equal to 8000 Hours per Year.

Climate Zone	% Outdoor Air at Full Design							
	≥ 10% And < 20%	≥ 20% And < 30%	≥ 30% And < 40%	≥ 40% And < 50%	≥ 50% And < 60%	≥ 60% And < 70%	≥ 70% And < 80%	≥ 80%
	Design Supply Fan Airflow Rate, cfm							
6 & 7	≥ 200	≥ 130	≥ 100	≥ 80	≥ 70	≥ 60	≥ 50	≥ 40

Addendum db

Revise Table G3.1 as shown (I-P and SI units).

Add new Table G3.4-9 as shown (I-P and SI).

Table G3.1 Modeling Requirements for Calculating Proposed and Baseline Building Performance

No.	Proposed Building Performance	Baseline Building Performance
5. Building Envelope		
a. All components of the building envelope in the proposed design shall be modeled as shown on architectural drawings or as built for existing building envelopes. **Exceptions:** The following building elements are permitted to differ from architectural drawings: 1. All uninsulated assemblies (e.g., projecting balconies, perimeter edges of intermediate floor stabs, concrete floor beams over parking garages, roof parapet) shall be separately modeled using either of the following techniques: a. Separate model of each of these assemblies within the energy simulation model. b. Separate calculation of the U-factor for each of these assemblies. The U-factors of these assemblies are then averaged with larger adjacent surfaces using an area-weighted average method. This average U-factor is modeled within the energy simulation model. 2. Any other building envelope assembly that covers less than 5% of the total area of that assembly type (e.g., exterior walls) need not be separately described, provided that it is similar to an assembly being modeled. If not separately described, the area of a building envelope assembly shall be added to the area of an assembly of that same type with the same orientation and thermal properties. **3.** Exterior surfaces whose azimuth orientation and tilt differ by less than 45 degrees and are otherwise the same may be described as either a single surface or by using multipliers.	Equivalent dimensions shall be assumed for each building envelope component type as in the proposed design; i.e., the total gross area of walls shall be the same in the proposed design and baseline building design. The same shall be true for the areas of roofs, floors, and doors, and the exposed perimeters of concrete slabs on grade shall also be the same in the proposed design and baseline building design. The following additional requirements shall apply to the modeling of the baseline building design: a. **Orientation.** The baseline building performance shall be generated by simulating the building with its actual orientation and again after rotating the entire building 90, 180, and 270 degrees, then averaging the results. The building shall be modeled so that it does not shade itself. **Exceptions:** **1.** If it can be demonstrated to the satisfaction of the rating authority that the building orientation is dictated by site considerations. **2.** Buildings where the vertical fenestration area on each orientation varies by less than 5%. b. **b.** **Space Conditioning Categories.** Space conditioning categories used to determine applicability of the envelope requirements in Tables G3.4-1 through G3.4-8 shall be the same as in the proposed design. **Exception:** Envelope components, of the HVAC zones that are semiheated in the proposed design must meet conditioned envelope requirements in Tables G3.4-1 to G3.4-8 if, based on the sizing runs, these zones are served by a baseline system with sensible cooling output capacity ≥5 Btu/h·ft2 (15 W/m2) of floor area, or with heating output capacity greater than or equal to the criteria in Table G3.4-9, or that are indirectly conditioned spaces. **c.** **Opaque Assemblies.** Opaque assemblies used for new buildings, existing buildings, or additions shall conform with assemblies detailed in Normative Appendix A and shall match the appropriate assembly maximum U-factors in Tables G3.4-1 through G3.4-8:

	• Roofs—Insulation entirely above deck (A2.2). • Above-grade walls—Steel-framed (A3.3). • Below-grade walls—Concrete block (A4). • Floors—Steel-joist (A5.3). • Slab-on-grade floors shall match the F-factor for unheated slabs from the same tables (A6).

Add new Table G3.4-9 as shown (I-P and SI).

Table G3.4-9 Heated Space Criteria

Climate Zone	Heating Output, Btu/h•ft^2 (W/m^2)
0, 1, 2	>5 (15)
3	>10 (30)
4,5	>15 (45)
6,7	>20 (60)
8	>25 (75)

Addendum by

Modify Section 3.2 as shown (I-P and SI units).

3.2 Definitions

on-site renewable energy: energy generated from renewable energy resources produced harvested at the building site.

renewable energy resources: energy from solar, wind, biomass or hydro, or extracted from hot fluid or steam heated within the earth.

~~**site-solar energy:** thermal, chemical, or electrical energy derived from direct conversion of incident solar radiation at the building site and used to offset consumption of purchased fuel or electrical energy supplies. For the purposes of applying this standard, site-solar energy shall not include passive heat gain through fenestration systems.~~

Modify Section 6 as shown (I-P and SI units).

[. . .]

Exceptions to 6.5.2.1:

[. . .]

4. Zones where at least 75% of the energy for reheating or for providing warm air in mixing systems is provided from site-recovered energy (including condenser heat) or ~~site-solar energy~~ on-site renewable energy.

[. . .]

Exceptions to 6.5.2.3:

[. . .]

4. Systems serving spaces where specific humidity levels are required to satisfy process needs, such as a vivarium; museum; surgical suite; pharmacy; and buildings with refrigerating systems, such as supermarkets, refrigerated warehouses, and ice arenas, and where the building includes site-recovered energy or ~~site-solar energy~~ on-site renewable energy that provide energy equal to at least 75% of the annual energy for reheating or for providing warm air in mixing systems. This exception does not apply to computer rooms.
5. At least 90% of the annual energy for reheating or for providing warm air in mixing systems is provided from site-recovered energy (including condenser heat) or ~~site-solar energy~~ on-site renewable energy.

[. . .]

Exceptions to 6.5.3.5:

[. . .]

5. Systems in which at least 75% of the energy for reheating (on an annual basis) is from site recovered energy or ~~site-solar energy~~ on-site renewable energy.

[. . .]

Exceptions to 6.5.6.1.2:

[. . .]

3. Heating energy recovery where more than 60% of the outdoor air heating energy is provided from site-recovered energy or ~~site-solar energy~~ on-site renewable energy.

[. . .]

Exceptions to 6.5.6.2.2:

[. . .]

2. Facilities that provide 60% of their service water heating from ~~site-solar energy~~ on site renewable energy or site-recovered energy or from other sources

[. . .]

Modify Section 7 as shown (I-P and SI units).

Exception to 7.4.5.2: Pools deriving over 60% of the energy for heating from site-recovered energy or ~~site-solar energy~~ on-site renewable energy.

[. . .]

Exceptions to 7.5.3:

1. Where 25% of the annual service water-heating requirement is provided by ~~site-solar energy~~ on-site renewable energy or site-recovered energy.

[. . .]

Modify Section 10 as shown (I-P and SI units).

10. OTHER EQUIPMENT

10.1 General

10.1.1 Scope. This section applies only to the equipment described below.

[. . .]

10.2 Compliance Paths. Other equipment shall comply with Section 10.2.1 and Section 10.2.2. 10.2.1 Requirements for All Compliance Paths. Other equipment shall comply with Section 10.1, "General"; Section 10.4, "Mandatory Provisions"; Section 10.5, "Prescriptive Path" and Section 10.8, "Product Information."

[. . .]

10.5 Prescriptive Compliance Path ~~(Not Used)~~

10.5.1 Renewable Energy Resources. Buildings shall be served by renewable energy resources complying with Section 10.5.1.1.

10.5.1.1 On-Site Renewable Energy. The building site shall have equipment for on-site renewable energy with a rated capacity of not less than 0.25 W/ft² or 0.85 Btu/ft2 (2.7W/m2) multiplied by the sum of the gross conditioned floor area for all floors up to the three (3) largest floors.

Exceptions to 10.5.1.1:

1. Any building located where an unshaded flat plate collector oriented toward the equator and tilted at an angle from horizontal equal to the latitude receives an annual daily average incident solar radiation less than 3.5 kWh/m2·day (1.1 kBtu/ft2·day).
2. Any building where more than 80% of the roof area is covered by any combination of equipment other than for on-site renewable energy systems, planters, vegetated space, skylights, or occupied roof deck.
3. Any building where more than 50% of roof area is shaded from direct-beam sunlight by natural objects or by structures that are not part of the building for more than 2500 annual hours between 8:00 a.m. and 4:00 p.m.
4. New construction or additions in which the sum of the gross conditioned floor area of the three largest floors of the new construction or addition is less than 10,000 ft2 (1000 m2).
5. Alterations that do not include additions.

Addendum ck

Revise Section 11 as shown (I-P and SI units).

11.4 Simulation General Requirements

11.4.1 Simulation Program. The simulation program shall be a computer-based program for the analysis of energy consumption in buildings. For components that cannot be modeled by the simulation program, the exceptional calculation methods requirements in Section 11.4.5 shall be used.

Exception to 11.4.1: When approved by the adopting authority, a separate computer-based program shall be permitted to be used to calculate on-site renewable energy.

Informative Note: ASHRAE Standing Standard Project Committee 90.1 recommends that the simulation program implement the rules of Section 11 that control simulation inputs and outputs be adopted for the purposes of easier use and simpler compliance.

[. . .]

11.4.3 Renewable, Recovered, and Purchased Energy

11.4.3.1 On-Site Renewable Energy and Site-Recovered Energy. Site-recovered energy shall not be considered purchased energy and shall be subtracted from the proposed design energy consumption prior to calculating the design energy cost. On-site renewable energy shall be subtracted from the proposed design energy consumption prior to calculating the design energy cost provided that the building owner

a. owns the on-site renewable energy system,
b. has signed a lease agreement for the on-site renewable energy system for at least 15 years or
c. has signed a contractual agreement to purchase energy generated by the on-site renewable energy system for at least 15 years.

The reduction in design energy cost associated with on-site renewable energy that exceeds the on-site renewable energy required by Section 10.5.1.1 shall be no more than 5% of the calculated energy cost budget.

On-site renewable energy included in the budget building design shall be subtracted from the budget building design energy consumption prior to calculating the energy cost budget.

11.4.3.2 Annual Energy Costs. The design energy cost and energy cost budget shall be determined using rates for purchased energy (such as electricity, gas, oil, propane, steam, and chilled water) that are approved by the adopting authority. Where on-site renewable energy or site-recovered energy is ~~used~~ in excess of what is required in the budget building design by Table 11.5.1, the budget building design shall be based on the energy source used as the backup energy source, or electricity if no backup energy source has been specified. Where the proposed design includes on-site electricity generation systems other than on-site renewable energy systems, the baseline design shall include the same generation systems excluding its site-recovered energy.

Table 11.5.1 Modeling Requirements for Calculating Design Energy Cost and Energy Cost Budget

Proposed Design (Column A) Design Energy Cost (DEC)	Budget Building Design (Column B) Energy Cost Budget (ECB)
15. On-Site Renewable Energy	
On-site renewable energy in the proposed design shall be determined as follows: a. Where a complete system providing on-site renewable energy exists, the model shall reflect the actual system type using actual component capacities and efficiencies. b. Where a system providing on-site renewable energy has been designed, the system model shall be consistent with design documents. c. c. Where no system exists or is specified to provide on-site renewable energy, no system shall be modeled.	On-site renewable energy shall be included in the budget building design when required by Section 10.5.1, and shall be determined as follows: a. Where a system providing on-site renewable energy has been modeled in the proposed design, the same system shall be modeled identically in the budget building design, except the rated capacity shall meet the requirements of Section 10.5.1.1. Where more than one type of on-site renewable energy system is modeled, the total capacities shall be allocated in the same proportion as in the proposed design. b. Where no system exists or is specified to provide on-site renewable energy in the proposed design, on-site renewable energy shall be modeled as an unshaded photovoltaic system with the following physical characteristics: • Size: Rated capacity per Section 10.5.1.1 • Module Type: Crystalline silicon panel with a glass cover, 19.1% nominal efficiency and temperature coefficient of – 0.47%/°C; performance shall be based on a reference temperature of 77°F (25°C) and irradiance of 317 Btu/ft2 ·h (1000 W/m2). • Array Type: Rack-mounted array with installed nominal operating cell temperature (INOCT) of 103°F (45°C) • Total system losses (DC output to AC output): 11.3% • Tilt: 0-degrees (mounted horizontally) • Azimuth:180 degrees If the on-site renewable energy system cannot be modeled in the simulation program, Section 11.4.5 shall be used.

Addendum cp

Modify Section 4.2.1.1 as shown (I-P and SI units).

4.2.1.1 New Buildings. New buildings shall comply with Sections 4.2.2 through 4.2.5 and either the provisions of

a. Section 5, “Building Envelope”; Section 6, “Heating, Ventilating, and Air Conditioning”; Section 7, “Service Water Heating”; Section 8, “Power”; Section 9, “Lighting”; and Section 10, “Other Equipment,” or
b. Section 11, “Energy Cost Budget Method,” or
c. Normative Appendix G, “Performance Rating Method.”

When using Normative Appendix G, the Performance Cost Index (PCI) of new buildings, additions to existing buildings, and/or alterations to existing buildings shall be less than or equal to the Performance Cost Index target (PCIt) when calculated in accordance with the following:

$$PC_{It} = [BBUEC + (BPF \times BBREC) \underline{- PRE}]/BBP$$

Where

PCI = Performance Cost Index calculated in accordance with Section G1.2.

BBUEC = baseline building unregulated energy cost, the portion of the annual energy cost of a baseline building design that is due to unregulated energy use.

BBREC = baseline building regulated energy cost, the portion of the annual energy cost of a baseline building design that is due to regulated energy use.

BPF = building performance factor from Table 4.2.1.1. For building area types not listed in Table 4.2.1.1 use "All others." Where a building has multiple building area types, the required BPF shall be equal to the area-weighted average of the building area types.

BBP = baseline building performance.

PBP = proposed building performance, including the reduced, annual purchased energy cost associated with all on-site renewable energy generation systems.

$\underline{PBP_{nre}}$ = proposed building performance without any credit for reduced annual energy costs from on-site renewable energy generation systems.

$\underline{PBP_{pre}}$ = proposed building performance, excluding any renewable energy system in the proposed design and including an on-site renewable energy system that meets but does not exceed the requirements of Section 10.5.1.1 modeled following the requirements for a budget building design in Table 11.5.1.

$$\underline{PRE = PBP_{nre} - PBP_{pre}.}$$

When $\underline{(PBP_{pre} - PBP)/BBP > 0.05}$, new buildings, additions to existing buildings, and/or alterations to existing buildings shall comply with the following:

$$\underline{PCI + [(PBP_{pre} - PBP)/BBP] - 0.05 < PCI_t}$$

Informative Notes:

1. PBPnre = proposed building performance, no renewable energy
2. PBPpre = proposed building performance, prescriptive renewable energy
3. PRE = prescriptive renewable energy

Modify Section G2.2 as shown (I-P and SI units).

G2.2 Simulation Program. The simulation program shall be a computer-based program for the analysis of energy consumption in buildings (a program such as, but not limited to, DOE-2, BLAST, or EnergyPlus). The simulation program shall include calculation methodologies for the building components being modeled. For components that cannot be modeled by the simulation program, the exceptional calculation methods requirements in Section shall be used.

Exception to G2.2: When approved by the adopting authority, a separate computer-based program shall be permitted to be used to calculate on-site renewable energy.

Modify Table G3.1 as shown (I-P and SI units).

Table G3.1 Modeling Requirements for Calculating Proposed and Baseline Building Performance

No.	Proposed Building Performance	Baseline Building Performance
18. On-Site Renewable Energy		
	On-site renewable energy in the proposed building performance shall be determined as follows: a. Where a complete system providing on-site renewable energy exists, the model shall reflect the actual system type using actual component capacities and efficiencies. b. Where a system providing on-site renewable energy has been designed, the system model shall be consistent with design documents. c. c. Where no system exists or is specified to provide on-site renewable energy, no system shall be modeled.	On-site renewable energy shall not be included in the baseline building performance.

Addendum cr

Revise Section 11.2 as shown (I-P and SI units).

11.2 Compliance. The proposed building design shall comply with all of the following:

a. Sections 5.2.1, 6.2.1, 7.2.1., 8.2.1, 9.2.1, and 10.2.1.

b. The design energy cost, as calculated in Section 11.5, does not exceed the energy cost budget as calculated by the simulation program described in Section 11.4.

c. The energy efficiency level of installed components and systems that meets or exceeds the efficiency levels used to calculate the design energy cost.

d. For new buildings, one of the following is met:

1. The building envelope complies with Section 5.5, "Prescriptive Building Envelope Compliance Path."
2. Using Section 5.6, "Building Envelope Trade-Off Option," the proposed envelope performance factor shall not exceed the base envelope performance factor by more than 15% in multifamily residential, hotel/motel, and dormitory building area types. For all other building area types, the limit shall be 7%. For buildings with both residential and nonresidential occupancies, the limit shall be based on the area-weighted average of the gross conditioned floor area.

~~d~~e. Verification, testing, and commissioning requirements of Section 4.2.5 shall be met.

~~e~~f. Proposed building systems, controls, or building envelope documented in Section 11.7(b) that do not have criteria in Sections 5 through 10 shall have verification or testing to document proper installation and operation in accordance with Section 4.2.5.

Revise Section G1.2.1 as shown (I-P and SI units).

G1.2.1 Mandatory Provisions. The proposed building design shall comply with all of the following:

a. Sections 5.2.1, 6.2.1, 7.2.1., 8.2.1, 9.2.1, and 10.2.1.

b. The interior lighting power shall not exceed the interior lighting power allowance determined using either Tables G3.7 or G3.8 and the methodology described in Sections 9.5.1 and 9.6.1.

1. Table G3.7 and the methodology described in Section 9.6.1, or
2. Table G3.8 and the methodology described in Section 9.5.1.

c. For new buildings, one of the following is met:

1. The building envelope complies with Section 5.5, "Prescriptive Building Envelope Compliance Path."
2. Using Section 5.6, "Building Envelope Trade-Off Option," the proposed envelope performance factor shall not exceed the base envelope performance factor by more than 15% in multifamily residential, hotel/motel, and dormitory building area types. For all other building area types, the limit shall be 7%. For buildings with both residential and nonresidential occupancies, the limit shall be based on the area-weighted average of the gross conditioned floor area.

~~c~~d. Energy efficiency levels of installed components and systems that meet or exceed the efficiency levels used to calculate the proposed building performance.

~~d~~e. Verification, testing, and commissioning requirements of Section 4.2.5 shall be met.

~~e~~f. Proposed building systems, controls or building envelope documented in Section G1.3(c) that do not have criteria in Sections 5 through 10 shall have verification or testing to document proper installation and operation in accordance with Section 4.2.5.

Addendum da

Modify Section G1.3.2 as shown (I-P and SI units).

G1.3.2 Application Documentation. ~~Simulated performance shall be documented, and documentation shall be submitted to the rating authority. The information shall be submitted in a report and shall include the following:~~ The following documentation shall be submitted to the rating authority:

a. ~~A brief description of the project, the key energy efficiency improvements compared with the requirements in Sections 5 through 10, t~~ The simulation program used, the version of the simulation program, and the results of the energy analysis, including~~. This summary shall contain~~ the calculated values for the baseline building unregulated energy cost (BBUEC), baseline building regulated energy cost (BBREC), building performance factor (BPF), baseline building performance, proposed building

performance, ~~and the percentage improvement~~ Performance Cost Index (PCI), and Performance Cost Index Target (PCI_t).

b. An overview of the project that includes the number of stories (above and below grade), the typical floor size, the uses in the building (e.g., office, cafeteria, retail, parking, etc.), the gross area of each use, and whether each use is conditioned space.
c. A list of the energy-related features that are included in the design and on which the performance rating is based. This list shall document all energy features that differ between the models used in the baseline building performance and proposed building performance calculations.
d. A list showing compliance for the proposed design with all the requirements of Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4 (mandatory provisions).
e. A list identifying those aspects of the proposed design that are less stringent than the requirements of 5.5, 6.5, 7.5,9.5, and 9.6 (prescriptive provisions).
f. A list identifying those aspects of the proposed design that are more stringent than the requirements of Sections 5 through 10.

~~f~~g. A table with a summary by end use of the ~~energy cost savings in the~~ proposed building performance and baseline building performance, with each end use separated into regulated and unregulated components.

~~g~~h. A site plan showing all adjacent buildings and topography that may shade the proposed building (with estimated height or number of stories).

~~h~~i. Building elevations and floor plans (schematic is acceptable).

[. . .]

Modify Section G2 as shown (I-P and SI units).

G2.2 Simulation Program. The simulation program shall be a computer-based program for the analysis of energy consumption in buildings ~~(a program such as, but not limited to, DOE-2, BLAST, or EnergyPlus). The simulation program shall include calculation methodologies for the building components being modeled.~~ For components that cannot be modeled by the simulation program, the exceptional calculation methods requirements in Section G2.5 shall be used.

Exception to G2.2: When approved by the adopting authority, a separate computer-based program shall be permitted to be used to calculate on-site renewable energy.

Informative Note: For the ease of use and consistent application, the simulation program should automatically implement the requirements of this appendix to generate the baseline design and proposed design models based on the user model of the proposed design.

[. . .]

G2.2.2 The simulation program shall have the ability to either directly determine the proposed building performance and baseline building performance or produce hourly reports of energy use by an energy source suitable for determining the proposed building performance and baseline building performance using a separate calculation ~~engine~~.

G2.2.3 The simulation program shall be capable of performing design load calculations to determine required HVAC equipment capacities and air and water flow rates in accordance with ~~generally accepted engineering standards and handbooks (for example, ASHRAE Handbook—Fundamentals)~~ Section 6.4.2.1 for both the proposed design and baseline building design.

[. . .]

G2.3 Climatic Data. The simulation program shall perform the simulation using hourly values of climatic data, ~~such as~~ including temperature, ~~and~~ humidity, solar radiation, and wind speed and direction from representative climatic data, for the site in which the proposed design is to be located. ~~For cities or urban regions with several climatic data entries,~~ For locations for which several climatic data sources are available or ~~and for locations where~~ weather data are not available, the designer shall select available weather data that best represent the climate at the construction site. The selected weather data shall be approved by the rating authority.

[. . .]

G2.4.2 Annual Energy Costs. The design energy cost and baseline energy cost shall be determined using either actual rates for purchased energy or state average energy prices published by DOE's Energy Information Administration (EIA) for commercial building customers, but rates from different sources may not be mixed in the same project. Where on- site renewable energy or site-recovered energy is used, the baseline building design shall be based on the energy source used as the backup energy source, or the baseline system energy source in that category if no backup energy source has been specified~~.~~, except where the baseline energy source is prescribed in Tables G3.1.1-2 and G3.1.1-3.

[. . .]

G2.5 Exceptional Calculation Methods. When the simulation program does not model a design, material, or device of the proposed design, an exceptional calculation method shall be used as approved by the rating authority. Where there are multiple designs, materials, or devices that the simulation program does not model, each shall be calculated separately and exceptional savings determined for each. At no time shall the total exceptional savings constitute more than half of the difference between the baseline building performance and the proposed building performance. All applications for approval of an exceptional method shall include the following:

a. Theoretical and empirical information verifying the method's accuracy, and ~~S~~ step-by-step documentation of the exceptional calculation method performed, detailed enough to reproduce the results.
b. Copies of all spreadsheets used to perform the calculations.
c. A sensitivity analysis of energy consumption when each of the input parameters that are estimated is varied from half to double the value assumed.
d. The calculations shall be performed on a time-step basis consistent with the simulation program used.
e. The ~~performance rating~~ Performance Cost Index calculated with and without the exceptional calculation method.

[. . .]

Table G3.1 Modeling Requirements for Calculating Proposed and Baseline Building Performance

No.	Proposed Building Performance	Baseline Building Performance
[…]		
4. Schedule	Schedules capable of modeling hourly variations in occupancy, lighting power, miscellaneous equipment power, thermostat set points, and HVAC system operation shall be used. The schedules shall be typical of the proposed building type as determined by the designer and approved by the rating authority. **Temperature and Humidity Schedules**. Temperature and humidity control set points and schedules as well as temperature control throttling range shall be the same for proposed design and baseline building design. **HVAC Fan Schedules.** Schedules for HVAC fans that provide outdoor air for ventilation shall run continuously whenever spaces are occupied and shall be cycled ON and OFF to meet heating and cooling loads during unoccupied hours. **Exceptions:** 1. Where no heating and/or cooling system is to be installed, and a heating or cooling system is being simulated only to meet the requirements described in this table, heating and/ or cooling system fans shall not be simulated as running continuously during occupied hours but shall be cycled ON and OFF to meet heating and cooling loads during all hours. 2. HVAC fans shall remain on during occupied and unoccupied hours in spaces that have health- and safety-mandated minimum ventilation requirements during unoccupied hours. 3. HVAC fans shall remain on during occupied and unoccupied hours in systems primarily serving computer rooms. 4. <u>4. Dedicated outdoor air supply fans shall stay off during unoccupied hours.</u>	Same as proposed design. **Exceptions:** 1. Set points and schedules for HVAC systems that automatically provide occupant thermal comfort via means other than directly controlling the air dry-bulb and wet-bulb temperature may be allowed to differ, provided that equivalent levels of occupant thermal comfort are demonstrated via the methodology in ASHRAE Standard 55, Section 5.3.3, "Elevated Air Speed," or Standard 55, Appendix B, "Computer Program for Calculation of PMV-PPD." 2. Schedules may be allowed to differ between proposed design and baseline building design when necessary to model nonstandard efficiency measures, provided that the revised schedules have been approved by the rating authority. Measures that may warrant use of different schedules include but are not limited to automatic lighting controls, automatic natural ventilation controls, automatic demand control ventilation controls, and automatic controls that reduce service water-heating loads. In no case shall schedules differ where the controls are manual (e.g., manual operation of light switches or manual operation of windows). 3. 3. Fan schedules may be allowed to differ when Section G3.1.1(c) applies.
[…]		