

SUBCHAPTER 5

NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL OCCUPANCIES—PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES FOR ACHIEVING ENERGY EFFICIENCY

SECTION 140 – CHOICE OF PERFORMANCE AND PRESCRIPTIVE APPROACHES

The envelope and the space-conditioning, lighting, and service water-heating systems of all nonresidential, high-rise residential, and hotel/motel buildings subject to Title 24, Part 6, shall be designed, constructed, and installed either:

- (a) **Performance Approach** — to use no more TDV energy from depletable sources than the energy budget, calculated according to Section 141; or
- (b) **Prescriptive Approach** — in accordance with all the applicable requirements of Sections 142 through 146.

SECTION 141 – PERFORMANCE APPROACH: ENERGY BUDGETS.

In order to meet the energy budget, a proposed building's use of TDV energy calculated under Subsection (b) must be no greater than the TDV energy budget calculated under Subsection (a).

- (a) **Energy Budget.** The energy budget for a proposed building is the sum of the space-conditioning, lighting, and service water-heating budgets in Subdivisions 1, 2, and 3 of this subsection, expressed in Btu per square foot of conditioned floor area per year.
 1. **Space-conditioning budget.** The space-conditioning budget is the TDV energy used for space conditioning in a standard building in the climate zone in which the proposed building is located, calculated with a method approved by the commission (expressed in TDV energy per square foot of conditioned floor area per year), and assuming that:
 - A. The standard building has space heating, space cooling, and ventilation systems that meet, but do not exceed, the minimum efficiency requirements of Sections 111 and 112, and the requirements of Section 144; and
 - B. The performance of the roof/ceiling, walls, floors and soffits, windows, and skylights is equal to an applicable value using the same assembly type from TABLE 143-B, TABLE 143-C, or TABLE 143-D, and for nonresidential buildings with low-sloped roofs, the roof initial solar reflectance and initial thermal emittance is equal to the values specified in Section 118 (i) 1; and
 - C. The zoning, the orientation of each building feature, and the gross envelope areas of the standard building are the same as in the proposed building; and
 - D. The window area of the west-facing wall is the greater of: 1) the window area of the proposed building excluding the window area in demising walls, or 40 percent of the gross exterior west-facing wall area of the standard building, whichever is less; or 2) six feet time the west-facing display perimeter; and the window area of the standard building is the greater of (1) or (2): (1) the window area of the proposed building excluding the window area in demising walls, or 40 percent of the gross exterior wall area of the standard building, whichever is less; or (2) six feet times the display perimeter; and
 - E. For buildings subject to Section 143 (c), the skylight area of the standard building shall be the minimum area required by Section 143 (c). For all other buildings, the skylight area of the standard building is the same as in the proposed building, or is five percent of the gross exterior roof/ceiling area of the standard building, whichever is less.
 2. **Lighting budget.** The lighting budget is the TDV energy used for lighting in a standard building calculated with a method approved by the commission (expressed in Btu per square foot of conditioned floor area per year), and assuming that:

- A. The lighting power density of the standard building, for areas where no lighting plans or specifications are submitted for permit and the occupancy of the building is known, is the maximum allowed lighting power density calculated according to Section 146 (b) 1; and
 - B. The lighting power density of the standard building, for areas where no lighting plans or specifications are submitted for permit, and the occupancy of the building is not known, is 1.2 watts per square foot; and
 - C. The lighting power density of the standard building, for areas where lighting plans and specifications are being submitted for permit, is the maximum allowed lighting power density calculated according to Section 146 (b) 1, 2, or 3; and
 - D. The lighting power density of the standard building is adjusted as described in the nonresidential ACM manual for an astronomical timeclock when required by Section 131 (c) 2.
3. **Service water-heating budget.** The service water-heating budget is the TDV energy used for service water heating in a standard building in the climate zone in which the proposed building is located, calculated with a method approved by the commission (expressed in Btu per square foot of conditioned floor area per year), and assuming that the standard building has a service water-heating system that meets, but does not exceed, the applicable requirements of Sections 111, 113, 123, and 145.
- (b) **TDV Energy Use of Proposed Building.** The TDV energy use of a proposed building is the sum of the space-conditioning, lighting, and service water-heating TDV energy use calculated in Subdivisions 1, 2, and 3 of this subsection, using the same ACM used to calculate the budget under Subsection (a), and expressed in Btu per square foot of conditioned floor area per year. If any feature of the proposed building, including, but not limited to, the envelope or the space-conditioning, lighting, or service water-heating system, is not included in the building permit application, the energy performance of the feature shall be assumed to be that of the corresponding feature calculated in Subsection (a).
1. **Space-conditioning TDV energy use.** The space-conditioning TDV energy use shall be calculated by:
 - A. Using a method approved by the commission; and
 - B. Using the proposed building's space heating, space cooling, lighting, and ventilation systems, roof and ceiling, walls, floors and soffits, opaque envelope areas, windows, skylights, zoning, and orientation, as shown on the plans and specifications submitted in the building permit application under Section 10-103 of Title 24, Part 1.
 2. **Lighting TDV energy use.** The lighting TDV energy use shall be calculated using a method approved by the commission, and using the actual lighting power density calculated under Section 146 (b), including reduction of wattage by the applicable lighting power adjustment factors specified in Section 146 (b) 4. The lighting power density shall also be adjusted as described in the nonresidential ACM manual for an astronomical timeclock when required by Section 131 (c) 2.
 3. **Service water-heating TDV energy use.** The service water-heating TDV energy use shall be calculated using a method approved by the commission, and using the proposed building's actual service water-heating system.
- (c) **Calculation of Budget and Energy Use.** When calculating the energy budget under Subsection (a) and the TDV energy use under Subsection (b), all of the following rules shall apply:
1. **Methodology.** The methodology, computer programs, inputs, and assumptions approved by the commission shall be used.
 2. **Energy included.** All energy, from depletable sources and recovered from space conditioning equipment, used for space conditioning, lighting, and service water heating shall be included.
 3. **Energy excluded.** The following energy shall be excluded:
 - A. Process loads; and
 - B. Loads of redundant or backup equipment, if the plans submitted under Section 10-103 of Title 24, Part 1, show controls that will allow the redundant or backup equipment to operate only when the primary equipment is not operating, and if such controls are installed; and
 - C. Recovered energy other than from space conditioning equipment; and

- D. Additional energy use caused solely by outside air filtration and treatment for the reduction and treatment of unusual outdoor contaminants with final pressure drops more than **245 pascals or one-inch water column**. Only the energy accounted for by the amount of the pressure drop that is over one inch may be excluded.
4. **U-factors.** U-factors shall be calculated as follows:
- A. All building components. The U-factor of all building components shall be calculated to three decimal places; the calculations shall assume still inside air and a 15 miles per hour outside air velocity, or other assumptions approved by the commission.
 - B. Wood-framed assemblies. U-factors for wood-framed assemblies shall be calculated using the parallel path method listed in ASHRAE Handbook, Fundamentals Volume, Chapter 23, with framing factors approved by the commission.
 - C. Metal-framed assemblies. U-factors for metal-framed assemblies shall be calculated using the zone method listed in ASHRAE Handbook, Fundamentals Volume, Chapter 23, or a method approved by the commission.
 - D. Fenestration. U-factors for fenestration shall be determined as specified in Section 116.
 - E. Masonry assemblies. U-factors for masonry assemblies shall be calculated using the transverse isothermal planes method listed in ASHRAE Handbook, Fundamentals Volume, Chapter 23, or a method approved by the commission.
 - F. Other. U-factors for components not listed in this subsection shall be calculated using a method approved by the commission.
5. **Solar heat gain coefficients.** Solar heat gain coefficients shall be determined using NFRC 200, or NFRC 100 as specified in Section 116, and shall not be adjusted for the effects of interior or exterior shading devices.
6. **Visible light transmittance.** Visible light transmittance shall be determined using the values listed in ASHRAE Handbook, Fundamentals Volume, Chapter 30, or manufacturers literature, and shall be adjusted for the effects of framing and interior or exterior shading devices.
- (d) **Relocatable Public School Buildings.** When the manufacturer/builder certifies the relocatable public school building for use in any climate zone, the energy budget shall be met in the most severe climate zones as specified in the Nonresidential ACM manual, assuming the prescriptive envelope criteria in TABLE 143-C. When the manufacturer/builder certifies that the relocatable building is manufactured for use in specific climate zones and that the relocatable building can not be lawfully used in other climate zones, the energy budget shall be met in each climate zone that the manufacturer/building certifies, assuming the prescriptive envelope criteria in TABLE 143-A, including the non-north window RSHG and skylight SHGC requirements for each climate zone. The energy budget and the energy use of the proposed building shall be determined using the multiple orientation approach specified in the Nonresidential ACM manual. The manufacturer/builder shall meet the requirements for identification labels specified in section 143 (a) 1. 8.

SECTION 142 – PRESCRIPTIVE APPROACH

In order to comply with the prescriptive approach under this section, a building shall be designed with and shall have constructed and installed:

- (a) A building envelope that complies with Section 143 (a) or 143 (b), and for applicable buildings Section 143 (c);
- (b) A space-conditioning system that complies with Section 144;
- (c) A service water-heating system that complies with Section 145; and
- (d) A lighting system that complies with Section 146.
- (e) An outdoor lighting system that complies with Section 147.
- (f) Interior and exterior signs that comply with Section 148.

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