

**WAC 51-11C-407051 Table C407.5.1(1)—Specifications for the standard reference and proposed design.**

**Table C407.5.1(1)  
Specifications for the Standard Reference and Proposed Designs**

<b>Building Component Characteristics</b>	<b>Standard Reference Design</b>	<b>Proposed Design</b>
Space use classification	Same as proposed	The space use classification shall be chosen in accordance with Table C405.4.2 for all areas of the building covered by this permit. Where the space use classification for a building is not known, the building shall be categorized as an office building.
Roofs	Type: Insulation entirely above deck Gross area: Same as proposed <i>U</i> -factor: From Table C402.1.4 Solar absorptance: 0.75 Emittance: 0.90	As proposed As proposed As proposed As proposed As proposed
Walls, above-grade	Type: Mass wall if proposed wall is mass; otherwise steel-framed wall Gross area: Same as proposed <i>U</i> -factor: From Table C402.1.4 Solar absorptance: 0.75 Emittance: 0.90	As proposed As proposed As proposed As proposed
Walls, below-grade	Type: Mass wall Gross area: Same as proposed <i>U</i> -Factor: From Table C402.1.4 with insulation layer on interior side of walls	As proposed As proposed As proposed
Floors, above-grade	Type: Joist/framed floor Gross area: Same as proposed <i>U</i> -factor: From Table C402.1.4	As proposed As proposed As proposed
Floors, slab-on-grade	Type: Unheated <i>F</i> -factor: From Table C402.1.4	As proposed As proposed
Opaque Doors	Type: Swinging Area: Same as proposed <i>U</i> -factor: From Table C402.1.4	As proposed As proposed As proposed
Vertical Fenestration Other than opaque doors	Area  1. The proposed vertical fenestration area; where the proposed vertical fenestration area is less than 30 percent of above-grade wall area. 2. 30 percent of above-grade wall area; where the proposed vertical fenestration area is 30 percent or more of the above-grade wall area. <i>U</i> -factor: From Table C402.4 for the same framing material as proposed SHGC: From Table C402.4 except that for climates with no requirement (NR) SHGC = 0.40 shall be used External shading and PF: None	As proposed    As proposed As proposed As proposed
Skylights	Area	As proposed

Building Component Characteristics	Standard Reference Design	Proposed Design
	<p>1. The proposed skylight area; where the proposed skylight area is less than 3 percent of gross area of roof assembly.</p> <p>2. 3 percent of gross area of roof assembly; where the proposed skylight area is 3 percent or more of gross area of roof assembly.</p> <p><i>U</i>-factor: From Table C402.4</p> <p>SHGC: From Table C402.4 except that for climates with no requirement (NR) SHGC = 0.40 shall be used</p>	<p>As proposed</p> <p>As proposed</p>
Air leakage	<p>For infiltration, the air leakage rate as determined below shall be modeled at 100% when the building fan system is off, and at 25% when the building fan system is on, unless otherwise approved by the building official for unusually pressurized buildings. Per PNNL Report 18898, Infiltration Modeling Guidelines for Commercial Building Energy Analysis, the building air leakage rates as determined in accordance with Section C402.5.1.2 at 0.30 in. w.g. (75 Pa) shall be converted for modeling in annual energy analysis programs by being multiplied by 0.112 unless other multipliers are approved by the building official (e.g., a tested air leakage of 0.40 cfm/ft<sup>2</sup> of total building envelope area at 0.30 in. w.g. (75 Pa) would be calculated at 0.045 cfm/ft<sup>2</sup> of building envelope area). The calculated infiltration rate shall be normalized to the input required by the modeling software.</p>	<p>The Proposed Design air-leakage rate shall be the same as the Standard Design.</p>
Lighting, interior	<p>The interior lighting power shall be determined in accordance with Table C405.4.2. As proposed when the occupancy of the space is not known.</p> <p>Automatic lighting controls (e.g., programmable controls or automatic controls for daylight utilization) shall be modeled in <i>the standard reference design</i> as required by Section C405.</p>	<p>As proposed; where the occupancy of the space is not known, the lighting power density shall be based on the space classification as offices in Table C405.4.2(1).</p>
Lighting, exterior	<p>The lighting power shall be determined in accordance with Table C405.5.2(2). Areas and dimensions of tradable and nontradable surfaces shall be the same as proposed.</p>	<p>As proposed</p>
Internal gains	<p>Same as proposed</p>	<p>Receptacle, motor and process loads shall be modeled and estimated based on the space use classification. All end-use load components within and associated with the building shall be modeled to include, but not be limited to, the following: Exhaust fans, parking garage ventilation fans, exterior building lighting, swimming pool heaters and pumps, elevators, escalators, refrigeration equipment and cooking equipment.</p>

Building Component Characteristics	Standard Reference Design	Proposed Design
Schedules	Same as proposed	Operating schedules shall include hourly profiles for daily operation and shall account for variations between weekdays, weekends, holidays and any seasonal operation. Schedules shall model the time-dependent variations in occupancy, illumination, receptacle loads, thermostat settings, mechanical ventilation, HVAC equipment availability, service hot water usage and any process loads. The schedules shall be typical of the proposed building type as determined by the designer and approved by the jurisdiction.
Outdoor airflow rates	Same as proposed, or no higher than those allowed by Section C403.2.6 (without exception 1), whichever is less.  Demand control ventilation: Shall be modeled as required by Section C403.6 including reduction to the minimum ventilation rate when unoccupied.	As proposed, in accordance with Section C403.2.6.  As proposed
Heating systems	Fuel type: Same as proposed design  Equipment type <sup>a</sup> : From Tables C407.5.1(2), C407.5.1(3), and C407.5.1(4)  Efficiency: From Tables C403.2.3(2), C403.2.3(3), C403.2.3(4) and C403.2.3(5)  Preheat coils: For HVAC system numbers 1 through 4, a preheat coil shall be modeled controlled to a fixed setpoint 20°F less than the design room heating temperature setpoint.  Capacity <sup>b</sup> : Sized proportionally to the capacities in the proposed design based on sizing runs, i.e., the ratio between the capacities used in the annual simulations and the capacities determined by the sizing runs shall be the same for both the proposed design and <i>standard reference design</i> , and shall be established such that no smaller number of unmet heating load hours and no larger heating capacity safety factors are provided than in the proposed design.  Weather conditions used in sizing runs to determine <i>standard reference design</i> equipment capacities may be based either on hourly historical weather files containing typical peak conditions or on design days developed using 99.6% heating design temperatures and 1% dry-bulb and 1% wet-bulb cooling design temperatures.	As proposed  As proposed  As proposed  As proposed
Cooling systems	Fuel type: Same as proposed design  Equipment type <sup>c</sup> : From Tables C407.5.1(2), C407.5.1(3), and C407.5.1(4)  Efficiency: From Tables C403.2.3(1), C403.2.3(2) and C403.2.3(3). Chillers shall use Path A efficiency.	As proposed  As proposed  As proposed

Building Component Characteristics	Standard Reference Design	Proposed Design
	<p>Capacity<sup>b</sup>: Sized proportionally to the capacities in the proposed design based on sizing runs, i.e., the ratio between the capacities used in the annual simulations and the capacities determined by the sizing runs shall be the same for both the proposed design and <i>standard reference design</i>, and shall be established such that no smaller number of unmet cooling load hours and no larger cooling capacity safety factors are provided than in the proposed design.</p> <p>Economizer<sup>d</sup>: In accordance with Section C403.3. The high-limit shutoff shall be a dry-bulb switch with a setpoint as determined by Table C403.3.3.3.</p>	<p>As proposed</p> <p>As proposed</p>
Energy recovery	<i>Standard reference design</i> systems shall be modeled where required in Section C403.5.	As proposed
Fan systems	<p>Airflow rate: System design supply airflow rates for the <i>standard reference design</i> shall be based on a supply-air-to-room-air temperature difference of 20°F or the required ventilation air or makeup air, whichever is greater. If return or relief fans are specified in the proposed design, the <i>standard reference design</i> shall also be modeled with fans serving the same functions and sized for the <i>standard reference design</i> system supply fan air quantity less the minimum outdoor air, or 90% of the supply fan air quantity, whichever is larger.</p> <p>Motor brake horsepower: System fan electrical power for supply, return, exhaust, and relief (excluding power to fan-powered VAV boxes) shall be calculated using the following formulas:  For systems 5, 7, 8 and 10 in Table C407.5.1(4),  <math>P_{fan} = CFM_s \times 0.3</math>  For all other systems, including DOAS,  <math>P_{fan} = bhp \times 746 / \text{Fan Motor Efficiency}</math>  Where:  <math>P_{fan}</math> = Electric power to fan motor (watts)  <math>bhp</math> = Brake horsepower of <i>standard reference design</i> fan motor from Table C403.2.12.1(1) – Option 2  Fan motor = The efficiency from Tables C405.8(1) through C405.8(4) for the efficiency next motor size greater than the <math>bhp</math> using the enclosed motor at 1800 rpm  <math>CFM_s</math> = The <i>standard reference design</i> system maximum design supply fan airflow rate in cfm.</p>	<p>As proposed</p> <p>As proposed</p>
On-site renewable energy	No on-site renewable energy shall be modeled in the <i>standard reference design</i> .	As proposed
Shading from adjacent structures/terrain	Same as proposed.	For the <i>standard reference design</i> and the proposed building, shading by permanent structures and terrain shall be taken into account for computing energy consumption whether or not these features are located on the building site. A permanent fixture is one that is likely to remain for the life of the proposed design.
Service water heating	<p>Fuel type: Same as proposed</p> <p>Efficiency: From Table C404.2 and per Section C404.2.1</p> <p>Capacity: Same as proposed</p>	<p>As proposed</p> <p>As proposed</p>

