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Comment Received From: Kasper HÃjmark Ravn
Submitted On: 3/3/2018
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Comment from WindowMaster on Natural Ventilation requirements Section 120.1(c)

Additional submitted attachment is included below.

Date: March 3rd, 2018

Submitted via: <https://efiling.energy.ca.gov/EComment/EComment.aspx?docketnumber=17-BSTD-02>

To

Mr. Andrew McAllister
Commissioner
California Energy Commission
1516 Ninth Street
Sacramento, California 95814

Re: Docket No. 17-BSTD-02 - WindowMaster Comments on 2019 Title 24 Part 6 BEES 45-Day Language on Natural Ventilation

Dear Commissioner McAllister,

Thank you for the opportunity to review and provide comments on the 2019 Title 24 Part 6. These comments are submitted on behalf of WindowMaster Inc.

WindowMaster, was founded in 1990 with a vision to create better buildings that have plenty of fresh air and excellent and safe indoor climates. The company employs around 140 people in Denmark, Germany, England, Switzerland, Norway and US and works with an extensive network of certified partners around the world. We supply sustainable indoor climate solutions for all types of buildings and our solutions are based on natural forces – natural ventilation. In addition, we have many years of experience in providing smoke ventilation solutions that comply with European EN standards and Danish regulatory standards.

Please find our detailed comments below. We look forward to working with you further on this important project. Please contact Kasper Højmark Ravn (khr.dk@windowmaster.com) if you have questions or would like more information on these comments.

Thanks again for your consideration.



Kasper Højmark Ravn
Building Performance Engineer
WindowMaster Inc.



Comments regarding Exception 1 to Section 120.1(c)2.

From our review of the proposed 45-lay language, we understand that the Section 120.1 is going to align more with ASHRAE 62.1 2016. However, some of the language being proposed in this section can be interpreted in several ways and is a potential cause of confusion, if not addressed.

EXCEPTION 1 to Section 120.1(c)2: The mechanical ventilation system shall not be required where natural ventilation openings complying with 120.1(c)2 are either permanently open or have controls that prevent the openings from being closed during periods of expected occupancy.

The intention of requiring controls of the windows is desirable for natural ventilation systems but requiring that the openings should be prevented from being closed in periods of occupancy, or having them be permanently open, do not make sense from an energy standpoint. A continuous air supply is not necessarily appropriate for naturally ventilated spaces, as the supply temperature can vary from 0 °F to 90 °F, which can lead to extreme discomfort to occupants and excessive energy use from the mechanical heating and cooling system trying to maintain a set indoor air temperature.

Window actuator control strategies such as “Pulsing”, can achieve sufficient air quality but still minimize heat loss. With this strategy, the windows will close and open multiple times per hour to vary the air flow rate and create a dynamic indoor environment without draft problems. However, the current wording of Exception 1 to Section 120.1(c)2 will not allow this well-documented strategy to be employed in buildings in California. An alternative formulation to the Exception 1 to Section 120.1(c)2 could be as follow:

EXCEPTION 1 to Section 120.1(c)2: The mechanical ventilation system shall not be required where natural ventilation openings complying with 120.1(c)2 ~~are either permanently open or~~ have controls that ~~prevent the openings from being closed~~ ensure sufficient ventilation rates to comply with the minimum requirements based on the average conditions over a time period determined by Equation 6.2.6.2-1 or Equation 6.2.6.2-2 during periods of expected occupancy.

$$T = 3 * v / V_{bz} \text{ (I-P) (6.2.6.2-1)}$$

$$T = 50 * v / V_{bz} \text{ (SI) (6.2.6.2-2)}$$

Where:

T = averaging time period, min

v = the volume of the ventilation zone where averaging is being applied, ft³ (m³)

V_{bz} = the breathing zone outdoor airflow calculated using Equation 6.2.2.1 and the design value of the zone population (Pz), cfm (L/s)

The above equations (6.2.6.2-1 and 6.2.6.2-2) are taken directly from section 6.2.6.2 in ASHRAE 62.1 and are therefore already approved by ASHRAE. To avoid confusion, it will be very important to define the exact minimum requirements that shall be met. These requirements could refer to Table 6.2.2.1 in ASHRAE 62.1. As the ventilation will be varied or interrupted for a short period of time it is important to emphasize that the minimum requirements should be based on the average conditions for a certain period of time. This code language will ensure that the code is clearly interpreted, and optimized systems for natural ventilation are not prevented from being used.



Finally, it should be noted that the ASHRAE's SSPC 62.1 Natural Ventilation Working Group is also working on addressing the issue identified here. We recommend that the California Energy Commission discuss the final proposed language for this exception with the ASHRAE Working Group to ensure that there is consistency between the two codes.

Comments regarding language in Section 120.1(c)2B

The language in a first sentence in Section 120.1(c)2B is hard to interpret and may need to be adjusted to convey the meaning of the code.

Section 120.1(c)2:

B. Location and Size of Openings. Spaces or portions of spaces to be naturally ventilated shall be permanently open to operable wall openings directly to the outdoors. The openable area shall be not less than 4 percent of the net occupiable floor area. Where openings are covered with louvers or otherwise obstructed, the openable area shall be based on the net free unobstructed area through the opening. Where interior rooms, or portions of rooms, without direct openings to the outdoors are ventilated through adjoining rooms, the opening between rooms shall be permanently unobstructed and have a free area of not less than 8 percent of the area of the interior room or less than 25 square feet. [ASHRAE 62.1:6.4.2]

It is unclear if the word “permanently open” refers to the “spaces” being permanently open to the “operable wall openings”, or if it refers to “spaces” having permanently open “wall openings”. These can mean two very different things. We believe the intent here is the former and not the latter interpretation. Our recommendation is as follows:

Section 120.1(c)2:

B. Location and Size of Openings. Spaces or portions of spaces to be naturally ventilated shall ~~be~~ have permanently open access to operable wall openings directly to the outdoors. The openable area shall be not less than 4 percent of the net occupiable floor area. Where openings are covered with louvers or otherwise obstructed, the openable area shall be based on the net free unobstructed area through the opening. Where interior rooms, or portions of rooms, without direct openings to the outdoors are ventilated through adjoining rooms, the opening between rooms shall be permanently unobstructed and have a free area of not less than 8 percent of the area of the interior room or less than 25 square feet. [ASHRAE 62.1:6.4.2]

Comments regarding modelling Natural Ventilation in CBECC-Com

Natural ventilation in buildings can be a cost-effective energy efficiency strategy leading to low energy use and greater indoor air quality and comfort for occupants. California Energy Commission recently published a study on “Natural Ventilation for Energy Savings in California Commercial Buildings” (Linden, Arens, & Daish, 2015) that quantifies savings from retrofitting older buildings with operable windows and found that installing operable windows in commercial buildings can be cost-effective, result in reduced sick building syndrome and improved occupant indoor environmental satisfaction. We believe that natural ventilation is an important strategy for achieving California’s goal of net-zero energy buildings through code by 2030.



However, natural ventilation is not currently addressed in a comprehensive manner in the performance approach. Currently a commercial building, for example, cannot be modeled for credit in compliance for using window actuators and pulse control strategy in CEBCC-Com.

We recommend that the California Energy Commission address this lack of modeling capability in Title-24. This will allow building designers and engineers in California to take advantage of natural ventilation as an energy efficiency strategy for net-zero buildings and develop healthier and more productive indoor environments.

References

Linden, P., Arens, E., & Daish, N. (2015). *Natural Ventilation for Energy Savings in California Commercial Buildings*. Sacramento, CA: California Energy Commission Publication Number: CEC-500-2016-039.

