Section 120(c)3 Update for Clarity

Please see attached document.

Additional submitted attachment is included below.

The proposed revision to Section 120.1(c)3 for the calculation of the minimum outdoor airflow rate to the zone is less concise and makes the code more difficult to interpret for design engineers and enforcement agencies. Proposed revisions to Table 120.1-A are also included to correspond to the proposed revisions in Section 120.1(c)3. The intent of the revisions is presumably to clarify the revision to this section that were made in the 2019 code cycle which incorporated the CBC egress occupancy rate into the R_a rate now described as the R_t rate in the proposed 2022 code revision.

Using R_t does not offer any tangible improvement over the 2016 code language for this section. Design engineers are capable of calculating the number of occupants required for ventilation purposes per CBC 1004.5 when required. The calculated minimum ventilation requirements remain exactly the same when using the procedure described in the 2016 code when compared to the proposed 2022 language (and 2019 language). The proposed 2022 language now offers an exception that mirrors the language in the 2016 code. The result is a section that is considerably lengthier than previous versions of the code with a variable, R_t, that design engineers and code officials are not familiar with.

Using an alternate revision for Section 120.1(c)3 along with Table 120.1A as shown below will simplify and clarify code interpretation allowing for more consistent enforcement and design. Revisions to the code are shown in strikethrough for deletions and underlines for additions. These revisions are shown using the 2022 proposed language as the baseline.

The alternate revision to Section 120.1(c)3 requires the designer to calculate both an area rate ($R_a \times A_z$) and the people rate $R_p \times P_z$ instead of using an exception. This procedure is consistent with the procedure in Title 24 2016. The procedure for determining the expected number of occupants is included in the definition of the variable P_z. The language is consistent with the intent of the proposed 2022 language but is more concise and does not require an exception.

The alternate revision to Section 120.1(d)4.E changes the reference to Table 120.1-A to determine the minimum airflow rate for DCV zones.

The alternate revision to Table 120.1-A removes Footnote 1 which no longer applies, because the variable R_t will not exist. The alternate revision deletes the proposed notes "G" and "H" which are unnecessary because Section 120.1(d)4.e already specifies the minimum airflow requirement for DCV zones. In the alternate revision, the Area Outdoor Air Rate, R_a, for many occupancy categories has been updated to be consistent with the area-based ventilation rate requirement of 0.15 cfm/ft^2 or 0.2 cfm/ft^2, which is consistent with the R_a values in the 2019 code and the proposed 2022 code.

Section 120.1(d)4.E will be required to be revised to reference the correct column in Table 120.1-A.

Delete Proposed Section 120.1(c)3:

~~Mechanical Ventilation. Occupiable spaces shall be ventilated with a mechanical ventilation system capable of providing an outdoor airflow rate to the zone (Vz) no less than Equation 120.1- as described below:~~

~~Vz = Rt × Az~~   ~~(Equation 120.1-F)~~

~~Where:~~

~~Rt = Total outdoor airflow rate required per unit area as determined from Table 120.1-A.~~

Az = Zone floor area, meaning the net occupiable floor area of the ventilation zone in square feet.

EXCEPTION 1 to Section 120.1(c)3: Designed Occupancy. For spaces designed for an expected number of occupants per the Exception to Section 1004.1.2 of the CBC, or spaces with fixed seating per Section 1004.4 of the CBC, the outdoor airflow rate to the zone (Vz) shall be determined in accordance with Equation 120.1-G;

Vz = The larger of Rp × Pz or Ra × Az   (Equation 120.1-G)

Where:

Rp = 15 cubic feet per minute of outdoor airflow per person

Pz = The expected number of occupants. The expected number of occupants shall be the expected number specified by the building designer. For spaces with fixed seating, the expected number of occupants shall be determined in accordance with the California Building Code.

Ra = The minimum ventilation rate allowed for DCV in Table 120.1-A.

Az = Zone floor area, meaning the net occupiable floor area of the ventilation zone in square feet.

Replace Section 120.1(c)3 with the following:

Mechanical Ventilation: Occupiable spaces shall be ventilated with a mechanical ventilation system capable of providing an outdoor airflow rate to the zone no less than V_z (the minimum outdoor airflow rate to the zone). V_z shall be calculated using Equation 120.1-F

$$V_z = \text{The larger of } R_p \times P_z \text{ or } R_a \times A_z \text{ (Equation 120.1-G)}$$

Where:

R_p = 15 cubic feet per minute of outdoor airflow per person

P_z = The expected number of occupants. For spaces without fixed seating, the expected number of occupants shall be either the expected number specified by the building designer or one half of the maximum occupant load assumed for egress purposes determined in accordance with CBC 1004.5, whichever is greater. For spaces with fixed seating, the expected number of occupants shall be determined in accordance with CBC 1004.6.

R_a = area-based ventilation rate from Table 120.1-A.

A_z = Zone floor area, meaning the net occupiable floor area of the ventilation zone in square feet.

Revise Section 120.1(d)4.E as follows:

When the system is operating during hours of expected occupancy, the controls shall maintain system outdoor air ventilation rates no less than the rate R_a listed in Table 120.1-A for DCV, times the conditioned floor area for spaces with CO_2 sensors, plus the rate required by Section 120.1(c)3 for other spaces served by the system, or the exhaust air rate whichever is greater.

Revise Table 120.1-A as follows:

Occupancy Category	Area Outdoor Air Rate[1] R_a cfm/ft²	Air Class	Notes
Educational Facilities			
Daycare (through age 4)	~~0.21~~0.15	2	~~G~~
Daycare sickroom	0.15	3	
Classrooms (ages 5-8)	~~0.38~~0.15	1	~~G~~
Classrooms (age 9 -18)	~~0.38~~0.15	1	~~G~~
Lecture/postsecondary classroom	0.15~~0.38~~	1	F,~~G~~
Lecture hall (fixed seats)	0.15~~-~~	1	F,~~G~~
Art classroom	0.15	2	
Science laboratories	0.15	2	
University/college laboratories	0.15	2	
Wood/metal shop	0.15	2	
Computer lab	0.15	1	
Media center	0.15	1	A
Music/theater/dance	0.15~~1.07~~	1	F,~~G~~
Multiuse assembly	0.15~~0.50~~	1	F,~~G~~
Food and Beverage Service			
Restaurant dining rooms	0.15~~0.50~~	2	~~G~~
Cafeteria/fast-food dining	0.15~~0.50~~	2	~~G~~
Bars, cocktail lounges	0.20~~0.50~~	2	~~H~~
Kitchen (cooking)	0.15	2	
General			
Break rooms	0.15~~0.50~~	1	F,~~G~~
Coffee Stations	0.15~~0.50~~	1	F,~~G~~
Conference/meeting	0.15~~0.50~~	1	F,~~G~~
Corridors	0.15	1	F

Occupancy Category	Area Outdoor Air Rate[1] R_a cfm/ft²	Air Class	Notes
Occupiable storage rooms for liquids or gels	0.15	2	B
Hotels, Motels, Resorts, Dormitories			
Bedroom/living room	0.15	1	F
Barracks sleeping areas	0.15	1	F
Laundry rooms, central	0.15	2	
Laundry rooms within dwelling units	0.15	1	
Lobbies/pre-function	0.15~~0.50~~	1	F~~, G~~
Multipurpose assembly	0.15~~0.50~~	1	F
Office Buildings			
Breakrooms	0.15 ~~0.50~~	1	~~G~~
Main entry lobbies	0.15 ~~0.50~~	1	F~~, G~~
Occupiable storage rooms for dry materials	0.15	1	
Office space	0.15	1	F
Reception areas	0.15	1	F
Telephone/data entry	0.15	1	F
Miscellaneous Spaces			
Bank vaults/safe deposit	0.15	2	F
Banks or bank lobbies	0.15	1	F
Computer (not printing)	0.15	1	F
Freezer and refrigerated spaces (<50°F)	-	2	E
General manufacturing (excludes heavy industrial and process using chemicals)	0.15	3	
Pharmacy (prep. Area)	0.15	2	
Photo studios	0.15	1	
Shipping/receiving	0.15	2	B

Occupancy Category	Area Outdoor Air Rate[1] R_a cfm/ft²	Air Class	Notes
Sorting, packing, light assembly	0.15	2	
Telephone closets	0.15	1	
Transportation waiting	0.15~~0.50~~	1	F,~~G~~
Warehouses	0.15	2	B
All others	0.15	2	
Public Assembly Spaces			
Auditorium seating area	0.15 ~~1.07~~	1	F,~~G~~
Places of religious worship	0.15 ~~1.07~~	1	F,~~G~~
Courtrooms	0.15 ~~0.19~~	1	F,~~G~~
Legislative chambers	0.15 ~~0.19~~	1	F,~~G~~
Libraries (reading rooms and stack areas)	0.15 ~~0.15~~	1	
Lobbies	0.15 ~~0.50~~	1	F,~~G~~
Museums (children's)	0.15 ~~0.25~~	1	~~G~~
Museums/galleries	0.15 ~~0.25~~	1	F,~~G~~
Common corridors	0.15	1	F
Retail			
Sales (except as below)	~~0.25~~0.20	2	~~H~~
Mall common areas	0.15~~0.25~~	1	F,~~G~~
Barbershop	0.40	2	
Beauty and nail salons	0.40	2	
Pet shops (animal areas)	0.15~~0.25~~	2	~~G~~
Supermarket	~~0.25~~0.20	1	F,~~H~~
Coin-operated laundries	0.30	2	
Sports and Entertainment			
Gym, sports arena (play area)	0.15 ~~0.50~~	2	E,~~G~~
Spectator areas	0.15 ~~0.50~~	1	F,~~G~~
Swimming (pool)	0.15	2	C
Swimming (deck)	0.15 ~~0.50~~	2	C,~~G~~

Occupancy Category	Area Outdoor Air Rate[1] R_a cfm/ft^2	Air Class	Notes
Disco/dance floors	0.15 ~~1.50~~	2	F~~, G~~
Health club/aerobics room	0.15	2	
Health club/weight rooms	0.15	2	
Bowling alley (seating)	0.15 ~~1.07~~	1	~~G~~
Gambling casinos	0.15 ~~0.68~~	1	~~G~~
Game arcades	0.15 ~~0.68~~	1	~~G~~
Stages, studios	0.15 ~~0.50~~	1	D, F~~, G~~

~~General:~~
~~[1] Ra is determined as being the larger of the area method and the default per person method. The occupant density used in the default per person method is one half of the maximum occupant load assumed for egress purposes in the CBC.~~

Specific Notes:
A – For high-school and college libraries, the values shown for "Public Assembly Spaces – Libraries" shall be used.
B – Rate may not be sufficient where stored materials include those having potentially harmful emissions.
C – Rate does not allow for humidity control. "Deck area" refers to the area surrounding the pool that is capable of being wetted during pool use or when the pool is occupied. Deck area that is not expected to be wetted shall be designated as an occupancy category. D – Rate does not include special exhaust for stage effects such as dry ice vapors and smoke.
E – Where combustion equipment is intended to be used on the playing surface or in the space, additional dilution ventilation, source control, or both shall be provided.
F – Ventilation air for this occupancy category shall be permitted to be reduced to zero when the space is in occupied-standby mode
~~G   DCV systems using CO$_2$ sensors shall not reduce ventilation below 0.15 cfm/ft2 during occupancy.~~
~~H~~G   DCV systems using CO$_2$ sensors shall not reduce ventilation below 0.15 cfm/ft2 during occupancy.