****

**International Energy Conservation Code**

**E4C-HVACR Subcommittee**

 **Meeting Agenda**

April 14, 2022

11:00 AM EDT to 2:00 PM EDT

[Webex](https://nam02.safelinks.protection.outlook.com/?url=https%3A%2F%2Ficcsafe.webex.com%2Ficcsafe%2Fj.php%3FMTID%3Dmef07fe48e46d3f71376e59a2b3fb0a8f&data=04%7C01%7Cjohnbade%402050partners.com%7C8f5979ef42ce429a5eb308d9ece22ae1%7C22b1750a3e784e6ab5765f144276bd19%7C1%7C0%7C637801278573835294%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000&sdata=kwZEnXtXYmVaotPC8%2FiNM9TXRYnpIJdoR85laJVD3QM%3D&reserved=0) Link

**Committee Chair:** John Bade, representing the California Investor Owned Utilities

**Committee Vice Chair:** Blake Shelide, Oregon Department of Energy

1. **Call to order**-Chair or vice-chair

2**. Meeting Conduct**. Staff

a. Identification of Representation/Conflict of Interest

b. ICC [Council Policy 7](https://www.iccsafe.org/wp-content/uploads/CP07-04.pdf) Committees: Section 5.1.10 Representation of Interests

c. ICC [Code of Ethics](https://www.iccsafe.org/wp-content/uploads/CodeOfEthics.pdf): ICC advocates commitment to a standard of professional behavior that exemplifies the highest ideals and principles of ethical conduct which include integrity, honesty, and fairness. As part of this commitment, it is expected that participants shall act with courtesy, competence and respect for others.

3. **Roll Call** – Establish Quorum- John Bade

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **First Name** | **Last Name** | **Category** | **Company** |
|[ ]  Christopher | Arnold | Consumer | Grand forks Public Schools |
|[ ]  John | Bade | Utility | 2050 Partners |
|[ ]  Ellen | Eggerton | Gov. Regulator | City of Alexandria |
|[ ]  Drake | Erbe | Standards Promulgator | ASHRAE |
|[ ]  Henry | Ernst | Manufacturer | Daiken |
|[ ]  Mark | Heizer | Gov. Regulator | Oregon Bldg Codes Div |
|[ ]  Adrian | Jones | Gov. Regulator | City of Lawrence |
|[ ]  Gary | Klein | User | Self |
|[ ]  Jeff | Kleiss | Manufacturer | Lochinvar (AO Smith) |
|[ ]  Benjamin | Levie | Consumer | UCSF |
|[ ]  Dick | Lord | Manufacturer | Carrier |
|[ ]  Frank | Morrison | Manufacturer | Baltimore Aircoil |
|[ ]  Christopher | Perry | Gov. Regulator | US DOE |
|[ ]  Daniel | Nall | Gov. Regulator | Dan Nall Consultant/ AIA |
|[ ]  Laura | Petrillo-Groh | Manufacturer | AHRI |
|[ ]  Kevin | Rose | Public Segment | NEEA |
|[ ]  Thomas | Schultz | Utility | Spire and American Gas Assoc. |
|[ ]  **Blake** | **Shelide** | Gov. Regulator | **Oregon Dept of Energy** |
|[ ]  Amin | Tohmaz | Gov. Regulator | City of San Antonio |
|[ ]  Doug | Tucker | Manufacturer | Mitsubishi |
|[ ]  Jeremy | Williams | Gov. Regulator | US DOE |
|[ ]  James | Yeoman | Gov. Regulator | City of Orem |

4. **Approval of Minutes** Approval of March 10, 2022 Minutes.

5. **Approval of Agenda**

6. **Old Business**

 a. Items forwarded to other committees for review or completion.

7. **Action Items**. (We will hear as many of these as possible. Any proposal not heard in this meeting will be moved to the next meeting’s agenda)

1. CEPI-111, Parking Garage Ventilation, Emily Toto (returned from E4C, tabled from 2/24 to fix definition)
2. CEPI-117, ERV other spaces, Glory O’Brien
3. CEPI-65, Operable Opening Interlocking, Lisa Rosenow
4. CEPI-64, HVAC operable Opening Exception, Glory O’Brien
5. CEPI-103, Economizer Exception, John Bade
6. CEPI-104, Economizer Exception, Glory O’Brien
7. CEPI-116, Exhaust Air Recovery, Emily Toto
8. CEPI-115, Enthalpy Recovery, Glory O’Brien
9. CEPI-74, Roof Curbs for Mechanical Equipment, Justin Koscher
10. CEPI-81, Equipment Curbs, Glory O’Brien
11. CEPI-118, Elevator Dampers, Emily Toto
12. CEPI-123, Bathroom Intermittent Exhaust Control, Glory O’Brien
13. CEPI-119, Fan Power Limits, John Bade. Will include a presentation.
14. CEPI-99 Grid Integrated Thermostat Controls, Kim Cheslak (tabled from 2/24) Note: may not be ready.

9. **Other business**.

1. Discuss order for hearing proposals for next meeting
2. Identify and schedule discussion dates for proposals that were sent to us from other subcommittees, if applicable.
	1. CEPI-169, Lighting Guest Room Controls, Michael Jouaneh - As Modified from Electrical Power, Lighting, and Renewables subcommittee

11. **Upcoming meetings**.

 a. Second and fourth Thursday of each month, 11:00am – 2:00pm Eastern Time

 Next meeting is April 28, 2022.

12. **Adjourn**.

FOR FURTHER INFORMATION BE SURE TO VISIT THE ICC WEBSITE:

[ICC Energy webpage](https://www.iccsafe.org/products-and-services/codes-standards/energy/)

[Code Change Monograph](https://www.iccsafe.org/wp-content/uploads/2021-Public-Input-Complete-Monograph.pdf)

FOR ADDITIONAL INFORMATION, PLEASE CONTACT EITHER

* John Bade, Subcommittee Chair at johnbade@2050partners.com.
* Blake Shelide, Subcommittee Vice-Chair at blake.shelide@energy.oregon.gov

CEPI-64-21

# IECC®: C402.5.11

**Proponents:**

Glory O'Brien, representing Western Mechanical Solutions (glory.obrien@westernmechanicalsolutions.com)

**2021 International Energy Conservation Code**

# Revise as follows:

C402.5.11 Operable openings interlocking.

Where occupancies utilize operable openings to the outdoors that are larger than 40 square feet (3.7 m2) in area,

such openings shall be interlocked with the heating and cooling system so as to raise the cooling setpoint to 90°F (32°C) and lower the heating setpoint to 55°F (13°C) whenever the operable opening is open. The change in heating and cooling setpoints shall occur within 10 minutes of opening the operable opening.

# Exceptions:

1. Separately zoned areas associated with the preparation of food that contain appliances that contribute to the HVAC loads of a restaurant or similar type of occupancy.
2. Warehouses that utilize overhead doors for the function of the occupancy, where approved by the code official.
3. The first entrance doors where located in the exterior wall and are part of a vestibule system.
4. Systems utilizing evaporative cooling do not need to reset the cooling setpoint and are allowed to operate using evaporative cooling only. Other forms of mechanical cooling are not allowed when operable openings are open.

# Reason Statement:

As evaporative cooling is 100% OA the space will be positively pressurized and will prevent the infiltration of unconditioned OA when operable openings are open. This allows the space to continue to operate in a normal cooling mode and maintains healthier indoor space conditions for all occupants. This gives the owner/occupant an option to be energy efficient as well as have the choice to have doors and windows open.

# Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

Improved air quality for a healthy indoor space and reduced energy consumption while not impacting the cost of construction.

The cost may increase or decrease the cost of construction depending on the building. If an additional system is needed the cost will go up, however the energy cost will decrease by using only evaporative cooling.

CEPI-64-21

**2021 PUBLIC INPUT TO THE 2021 IECC, IRC CH. 11, AND ICCPC CH. 15 CE178**

CEPI-65-21 as modified

# IECC®: C402.5.11, C402.5.11.1, C403.14

**Proponents:**

Lisa Rosenow, representing Self (lrosenow@evergreen-tech.net); Kevin Rose, representing Northwest Energy Efficiency Alliance (NEEA) (krose@neea.org); Glory O'Brien, representing Western Mechanical Solutions (glory.obrien@westernmechanicalsolutions.com)

**2021 International Energy Conservation Code**

# Delete without substitution:

# ~~C402.5.11 Operable openings interlocking.~~

# ~~Where occupancies utilize operable openings to the outdoors that are larger than 40 square feet (3.7 m2) in area, such openings shall be interlocked with the heating and cooling system so as to raise the cooling setpoint to 90°F (32°C) and lower the heating setpoint to 55°F (13°C) whenever the operable opening is open. The change in heating and cooling setpoints shall occur within 10 minutes of opening the operable opening.~~

# ~~Exceptions:~~

1. ~~Separately zoned areas associated with the preparation of food that contain appliances that contribute to the HVAC loads of a restaurant or similar type of occupancy.~~
2. ~~Warehouses that utilize overhead doors for the function of the occupancy, where approved by the code official.~~
3. ~~The first entrance doors where located in the exterior wall and are part of a vestibule system.~~

**~~C403.14 Operable opening interlocking controls~~**

~~The heating and cooling systems shall have controls that will interlock these mechanical systems to the set temperatures of 90QF~~ ~~(32QC) for cooling and 55QF (12.7QC) for heating when the conditions of Section C402.5.11 exist. The controls shall configure to shut off~~ ~~the systems entirely when the outdoor temperatures are below 90QF (32QC) or above 55QF (12.7QC).~~

# Add new text as follows:

**C403.4.6 HVAC system controls for operable openings to the outdoors**

All doors from a *conditioned space* to the outdoors and all other operable openings from a *conditioned space* to the outdoors that are larger than 40 square feet (3.7 m2) when fully open, shall have *automatic* controls interlocked with the heating and cooling system. The controls shall be configured to do the following within 5 minutes of opening:

1. Disable mechanical heating to the *zone* or reset the space heating temperature setpoint to 55°F (12.7°C) or less.
2. Disable mechanical cooling to the *zone* or reset the space cooling temperature setpoint to 90°F (32°C) or more. Mechanical cooling can remain enabled if the outdoor air temperature is below the space temperature.

**Exceptions:**

1. *Building entrances* with *automatic* closing devices
2. Emergency exits with an *automatic* alarm that sounds when open
3. Operable openings and doors serving *enclosed spaces* without a *thermostat* or HVAC temperature sensor
4. Separately zoned areas associated with the preparation of food that contain appliances that contribute to the HVAC loads of a restaurant or similar type of occupancy
5. Warehouses that utilize overhead doors for the function of the occupancy where approved by the code official
6. The first entrance doors where located in the exterior wall and are part of a vestibule system
7. Operable openings into spaces served by ~~hydronic~~ radiant heating and cooling systems
8. *Alterations* where walls would have to be opened solely for the purpose of adding the controls and where approved.

# Revise as follows:

**TABLE C407.2**

**REQUIREMENTS FOR TOTAL BUILDING PERFORMANCE**

|  |  |
| --- | --- |
| **SECTION**a | **TITLE** |
| **Envelope** |
| [C402.5](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC402.5/2218) | Air leakage—thermal envelope |
| **Mechanical** |
| [C403.1.1](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.1.1/2218) | Calculation of heating and cooling loads |
| [C403.1.2](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.1.2/2218) | Data centers |
| [C403.2](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.2/2218) | System design |
| [C403.3](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.3/2218) | Heating and cooling equipment efficiencies |
| [C403.4](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.4/2218).1~~, except~~[~~C403.4.3~~](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.4.3/2218)~~,~~[~~C403.4.4~~](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.4.4/2218)~~and~~[~~C403.4.5~~](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.4.5/2218) | ~~Heating and cooling system~~ Thermostatic controls |
| C403.4.2 | Off-hour controls |
| C403.4.6 | HVAC system controls for operable openings to the outdoors |
| [C403.5.5](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.5.5/2218) | Economizer fault detection and diagnostics |
| [C403.7](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.7/2218), except [C403.7.4.1](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.7.4.1/2218) | Ventilation and exhaust systems |
| [C403.8](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.8/2218), except [C403.8.6](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.8.5/2218) | Fan and fan controls |
| [C403.9](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.9/2218) | Large-diameter ceiling fans |
| [C403.11](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.11/2218), except [C403.11.3](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.11.3/2218) | Refrigeration equipment performance |
| [C403.12](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.12/2218) | Construction of HVAC system elements |
| [C403.13](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC403.13/2218) | Mechanical systems located outside of the building thermal envelope |
| [C404](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC404/2218) | Service water heating |
| [C405](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC405/2218), except [C405.3](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC405.3/2218) | Electrical power and lighting systems |
| [C408](https://codes.iccsafe.org/lookup/IECC2021P2_CE_Ch04_SecC408/2218) | Maintenance information and system commisioning |

1. Reference to a code section includes all the relative subsections except as indicated in the table.

# Reason Statement:

The proposal moves the requirements for shutting off heating and cooling when operable openings are open from Section C402 *Building Envelope Requirements* to Section 403 *Building Mechanical Systems.* Mechanical designers are responsible for meeting the requirements of the section, so there is no reason for it to be in C402. Since these are HVAC controls that fall under C403.4 *Heating and cooling system controls*, the existing reference to C402 in C403.14 has been deleted and all the text now appears in C404.3

The new text allows the option to either disable mechanical heating or cooling or to raise the cooling setpoint and lower the heating setpoint. The existing language only allows the setpoint change.

Stringency is increased by reducing the threshold for the area of the opening from 40 ft2 to 8 ft2 and reducing the time allowed for execution from ten minutes to five minutes. The requirement is made mandatory by adding a reference in Table C407.2 *Requirements for Total Building Performance*.

The three existing exceptions have been kept, and new ones added. The exceptions for Building entrances with automatic closing devices, operable openings serving enclosed spaces without a thermostat or temperature sensor, and alterations where walls would have to be opened solely for the purpose of adding the controls and where approved by the code official are found in ASHRAE 90.1, but have been modified to improve the text or stringency.

# Cost Impact:

The code change proposal will increase the cost of construction. Requirements for interlocking door controls were added to ASHRAE 90.1 in the 2013 edition with addendum ba.. The foreword to the first public review of the addendum stated:

When a space with operable windows has non-integrated mechanical heating and cooling, it is likely that annual HVAC energy will be increased when compared to the same space without operable windows. This can be attributed to operable windows being left open when conditions are not favorable, resulting in high infiltration loads on the HVAC system. There are many reasons why windows are opened when conditions are not favorable:

1. Occupant wants more fresh air and is inconsiderate or unaware of the energy penalty of opening the window when indoor/outdoor conditions are not favorable. This is particularly likely when the HVAC system has sufficient capacity to maintain the space indoor temperature at setpoint despite the increased infiltration load.
2. Occupant does not have sufficient information regarding the indoor air temperature, outdoor air temperature, or HVAC mode of operation to properly determine if opening the window will reduce or increase energy use.
3. Occupant opened the window during favorable conditions but left the room while the window was open. During their time away from the space, the conditions transitioned to unfavorable

Public commenters to the first public review of addendum ba were concerned that the cost of controls, estimated to be $250 to $500 per opening, would discourage the use of operable windows and suggested the requirement be limited to doors. This proposal does cover all operable openings, but only those larger than 10 square feet when fully open. The minimum size would exempt typical windows used by occupants, but would include very large windows, which are not likely to be numerous on a given building.

Reviewers should note that many doors are excepted, including those with automatic closers and the exterior doors of a vestibule system.

**CEPI-74-21, Modification (**language modified in red and highlighted)

**IECC: Section C403, ~~C403.15~~ C403.12.5 (New), Table ~~C403.15~~ C403.12.5 (New), C503.3.2 (New)**

**Proponents:**

Justin Koscher, Polyisocyanurate Insulation Manufacturers Association, representing Polyisocyanurate Insulation Manufacturers Association (jkoscher@pima.org); Marcin Pazera, representing PIMA (mpazera@pima.org); Jeff Mang, representing Polyisocyanurate Insulation Manufacturers Association (jeff@jcmangconsulting.com)

**2021 International Energy Conservation Code**

SECTION C403 Building Mechanical Systems

**Add new text as follows:**

~~C403.15~~ C403.12.5 Roof mounted mechanical equipment.

For *low-sloped roofs* where the roof assembly is part of the *building thermal envelope* and contains insulation entirely above the roof deck, roof mounted mechanical equipment shall be installed with roof curbs that meet or exceed the minimum height requirements of Table ~~C403.15~~ C403.12.5.

~~TABLE C403.15~~ C403.12.5 ROOF MOUNTED MECHNICAL EQUIPMENT CURB HEIGHTS

|  |  |
| --- | --- |
| Climate Zone | Curb Height, Minimuma |
| 0 and 1 | 15.0 inches (381 mm) |
| 2 and 3 | 16.0 inches (406.4 mm) |
| 4, 5 and 6 | 17.0 inches (431.8 mm) |
| 7 and 8 | 18.0 inches (457.2 mm) |

1. Curb height shall be the distance measured from the top of the curb to the roof deck.

C503.3.2 Replacement of roof mounted mechanical equipment.

For *low-sloped roofs* where the existing *roof assembly* is part of the *building thermal envelope* and contains insulation entirely above the roof deck, curb heights for new roof mounted mechanical equipment that are part of the *alteration* shall comply with Section ~~C403.15~~ C403.12.5.

**Reason:**

Rooftop mechanical equipment with low curbs can create challenges for reroofing work. This is especially true for roof replacements that are required to increase existing levels of above deck roof insulation in order to comply with the IECC’s opaque thermal envelope requirements. This code change proposal is intended to help mitigate these challenges by requiring, at a relatively low (or no) cost, the installation of higher curbs when rooftop mechanical equipment is replaced even if the replacement work does not occur at the same time as the roof replacement project.

The intent of the IECC is to move existing buildings toward compliance as alterations occur, which results in continual improvements to building energy efficiency. Modifying existing roof curbs during equipment replacement work adds minimal upfront costs and reduces or eliminates cost barriers related to complying with the IECC during future building alterations (i.e., roof replacement).

This proposal creates two complementary provisions in the IECC to address the opportunity created by rooftop equipment replacement work. Section ~~C403.15~~ C403.12.5 is added as an anchor requirement in Section 403 – the section that is most likely referenced by a code user during mechanical equipment work. Section C503.3.2 is added to ensure that code users have a reference to the requirement if using Chapter 5 to understand the IECC’s requirements applicable to existing buildings.

This code change proposal would require the installation of curbs with minimum heights calculated to accommodate the amount of insulation and other roof materials needed for each climate zone. The intent of this approach is to help ensure enforceability, contractor understanding and product availability. The required minimum heights would accommodate: (1) the 10 inches of curb height that is above the roof membrane/covering specified under the AHRI/SMACNA Guideline B-1997, “Guidelines for Roof Mounted Outdoor Air-Conditioner Installations”; (2) the amount of insulation necessary to comply with the prescriptive R-value requirements for each climate zone under the IECC; and (3) other materials that are typically part of the roof assembly, such as cover boards, slip sheets and membranes. While this proposal would require heights of between 15 to 18 inches depending on the specific climate zone, the Committee may decide to simply require 18 inches as the minimum curb height for all climate zones if that approach makes it easier for purposes of product supply and inventory.

**Bibliography:**

*Guidelines for Roof Mounted Outdoor Air-Conditioner Installations* (Guideline B-1997), Air-Conditioning, Heating, and Refrigeration Institute (AHRI) and Sheet Meal and Air-Conditioning Contractors National Association (SMACNA). Available at: https://www.ahrinet.org/App\_Content/ahri/files/Guidelines/AHRI\_Guideline\_B\_1997.pdf.

**Cost Impact:**

The code change proposal will increase the cost of construction.

A small increase in cost related to the purchase and installation of a new curb may be incurred. However, over the service life of the curb and mechanical equipment, this code change proposal is life-cycle cost effective due to decreased compliance costs for future reroofing work that is common for all buildings to undergo during the building service life as well as reduced energy costs resulting from the installation of a future, IECC-compliant replacement roof system.

CEPI-81-21

# IECC®: C403.12.4 (New)

**Proponents:**

Glory O'Brien, representing Western Mechanical Solutions (glory.obrien@westernmechanicalsolutions.com)

**2021 International Energy Conservation Code**

# Add new text as follows:

C403.12.4 Equipment curbs and supports shall not act as a plenum. Exceptions:

1. When the curb plenum is for return air only
2. The curb plenum may be leak tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual and shown to have a rate of air leakage (CL) less than or equal to 4.0 as determined in accordance with Equation 4-8.

CL=F/P0.65

(Equation 4-8)

where:

F = The measured leakage rate in cfm per 100 square feet (9.3m2) of duct surface

P = The static pressure of the test

Documentation shall be furnished demonstrating that representative sections totaling not less than 25 percent of the duct area have been tested and that all tested sections comply with the requirements of this section.

# Reason Statement:

Plenum curbs leak a lot of air. When a plenum curb is used for supply airflow there is typically a decent amount of duct static pressure meaning air is more likely to leak out of the plenum curb. Plenum curbs can still be used, but only if a leakage test is performed.

# Cost Impact:

The code change proposal will increase the cost of construction.

Duct configurations may require cost impact solutions. If a supply plenum curb is used, a leakage test would add cost as well. CEPI-81-21

ANSI/SMACNA 016

**2021 PUBLIC INPUT TO THE 2021 IECC, IRC CH. 11, AND ICCPC CH. 15 CE256**

CEPI-103-21

# IECC®: C403.5

**Proponents:**

John Bade, representing California Investor Owned Utilities (johnbade@2050partners.com)

**2021 International Energy Conservation Code**

# Revise as follows:

C403.5 Economizers.

Economizers shall comply with Sections C403.5.1 through C403.5.5.

An air or water economizer shall be provided for the following cooling systems:

1. Chilled water systems with a total cooling capacity, less cooling capacity provided with air economizers, as specified in Table 403.5(1).
2. Individual fan systems with cooling capacity greater than or equal to 54,000 Btu/h (15.8 kW) in buildings having other than a Group R occupancy,The total supply capacity of all fan cooling units not provided with economizers shall not exceed 20 percent of the total supply capacity of all fan cooling units in the building or 300,000 Btu/h (88 kW), whichever is greater.
3. Individual fan systems with cooling capacity greater than or equal to 270,000 Btu/h (79.1 kW) in buildings having a Group R occupancy.The total supply capacity of all fan cooling units not provided with economizers shall not exceed 20 percent of the total supply capacity of all fan cooling units in the building or 1,500,000 Btu/h (440 kW), whichever is greater.

**Exceptions:** Economizers are not required for the following systems.

1. Individual fan systems not served by chilled water for buildings located in Climate Zones 0A, 0B, 1A and 1B.
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7°C) dew-point temperature to satisfy process needs.
3. Systems expected to operate less than 20 hours per week.
4. Systems serving supermarket areas with open refrigerated casework.
5. Where the cooling efficiency is greater than or equal to the efficiency requirements in Table C403.5(2).
6. Systems that include a heat recovery system in accordance with Section C403.10.5.
7. ~~VRF systems~~ Direct-expansion fan coils with a capacity less than 54,000 Btu/h and at least three stages of compressor capacity installed with a dedicated outdoor air system.

# Reason Statement:

The exemption from economizer requirements for variable refrigerant flow (VRF) systems employed with a dedicated outdoor air system added in IECC 2021 was reasonable. However, limiting the exception to only VRF systems created an unfair advantage in the market for those systems. Other zone-level DX fan coil systems with multi-stage compressors, such as water-source heat pumps, provide equal or better energy savings. This proposal levels the playing field and eliminates the need to provide water coils in those products.

The limit to fan coils with a capacity of less than 54,000 Btu/h aligns the exception with the requirements in the body. VRF systems tested under AHRI 1230 do not include fan coils with a capacity of 54,000 Btu/h or more, and engineering analysis indicates that VRF systems that employ such fan coils very likely do not operate at the same level of efficiency as those that employ smaller capacity coils.

# Cost Impact:

The code change proposal will decrease the cost of construction for water-source heat pump and single-split variable capacity systems and increase it where VRF fan coils with a capacity of greater than 54,000 Btu/h are employed.

This proposal will eliminate the need to provide economizer water coils in DX fan coils in non-VRF systems. Since the market share of VRF fan coils with a capacity of 54,000 Btu/h or greater is very small, the net change in cost to builders will be negative.

CEPI-103-21

**VARIABLE REFRIGERANT FLOW SYSTEM.** An engineered direct-expansion (DX) refrigerant system that incorporates a common condensing unit, at least one variable-capacity compressor, a distributed refrigerant piping network to multiple indoor fan heating and cooling units each capable of individual zone temperature control, through integral zone temperature control devices and a common communications network. Variable refrigerant flow utilizes three or more steps of control on common interconnecting piping.

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**International Energy Conservation Code**

**Code Change Proposal Tracking Sheet**

|  |  |
| --- | --- |
| Proposal # | CEPI-111-21  Parking Garage Ventilation |
| CDP ID # | 54  |
| Code | IECC CE  |
| Code Section(s) | C403.7.2 New Section n |
| Location | base |
| Proponent | Emily Toto  etoto@ashrae.org |
| Proposal Status |  SC rev |
| Subcommittee | CE HVACR & WH |
| Subcommittee Notes | The proposal was modified in the subcommittee to include a direct reference to the International Mechanical Code. The proposal was also modified to include a 4th numbered provision that lists a requirement for a specific contaminant (carbon monoxide) control, with applicable acceptable thresholds. This language was referenced from California regulation. Some committee members expressed opposition to specific contaminant level requirements in the energy code and preferred that these remain as the scope of the IMC.See attachment below for language as-modified by the subcommittee. |
| Recommendation | Approve as modifiedReason statement: The current requirements for garage ventilation are lenient. The changes to C403.7.2 including the new definition for parking garage section are based on addendum d to ASHRAE 90.1-2019 forparking garage ventilation. This proposal increases stringency for these systems, with additional requirements for pollutant sensorsand fan variable speed drives that SSPC 90.1 has determined to be cost-effective. |
| Vote |  Approved as modified 13-4-1 |
| Recommendation Date |  1/27/2022 |
| Next Step | To Subcommittee\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_To Advisory Group\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_To Consensus Committee\_\_\_\_X\_\_\_\_\_\_\_\_\_\_ |
| Consensus Committee |  |
| Committee Response |   |
| Vote | Affirmative\_\_\_\_\_\_\_\_\_\_ Negative\_\_\_\_\_\_\_\_\_\_\_ Table\_\_\_\_\_\_\_\_\_\_\_\_ To Subcommittee\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Date |  |

Proposal As-Modified by HVACR Subcommittee 1/27/22

**CEPI-111-21**

IECC®: C202 (New), C403.7.2

Proponents: Emily Toto, representing ASHRAE (etoto@ashrae.org)

**2021 International Energy Conservation Code**

Add new definition as follows:

PARKING GARAGE SECTION. A part of a parking garage where airflow is restricted from other parts of the garage by solid walls.

Revise as follows:

C403.7.2 ~~Enclosed p~~ Parking garage ventilation systems ~~controls~~. ~~Enclosed~~ Ventilation systems employed in parking garages used for storing or handling automobiles operating under their own power shall ~~employ~~ meet all of the following: ~~carbon monoxide detectors applied in conjunction with nitrogen dioxide detectors and automatic controls configured to stage fans or modulate fan~~ ~~average airflow rates to 50 percent or less of design capacity, or intermittently operate fans less than 20 percent of the occupied time or as required~~ ~~to maintain acceptable contaminant levels in accordance with International Mechanical Code provisions. Failure of contamination-sensing devices~~ ~~shall cause the exhaust fans to operate continuously at design airflow.~~

1. **Separate ventilation systems and control systems shall be provided for each *parking garage section*.**
2. **Control systems for each *parking garage section* shall automatically detect and control contaminant levels in accordance with the International Mechanical Code, and shall be capable of and configured to reduce fan airflow to 20% or less of design capacity.**
3. **The ventilation system for each *parking garage section* shall have controls and devices that result in fan motor demand of no more than 30% of design wattage at 50% of the design**

airflow.

1. [Approved](https://up.codes/viewer/california/ca-mechanical-code-2019/chapter/2/definitions#approved) [automatic](https://up.codes/viewer/california/ca-mechanical-code-2019/chapter/2/definitions#automatic) carbon monoxide sensing devices shall be employed to modulate the [ventilation system](https://up.codes/viewer/california/ca-mechanical-code-2019/chapter/2/definitions#ventilation_system) to not exceed a maximum average concentration of carbon monoxide of 50 parts per million during an eight-hour period, with a concentration of not more than 200 parts per million for a period not exceeding one hour.

Exception ~~Exceptions~~:

* 1. **~~Garages with a total exhaust capacity less than 8,000 cfm ( 3,755 L/s) with ventilation systems that do not utilize heating or mechanica~~l ~~cooling.~~ Garage ventilation systems serving a single *parking garage section* having a total ventilation system motor nameplate horsepower (ventilation system motor nameplate kilowatt) not exceeding 5 hp (3.7 kW) at fan system design conditions and where the *parking garage section* has no mechanical cooling or mechanical heating.**
	2. **~~Garages that have a garage area to ventilation system motor nameplate power ratio that exceeds 1,125 cfm/hp (710 L/s/kW) and do not utilize heating or mechanical cooling.~~**

CEPI-104-21

# IECC®: C403.5

**Proponents:**

Glory O'Brien, representing Western Mechanical Solutions (glory.obrien@westernmechanicalsolutions.com)

**2021 International Energy Conservation Code**

# Revise as follows:

C403.5 Economizers.

Economizers shall comply with Sections C403.5.1 through C403.5.5.

An air or water economizer shall be provided for the following cooling systems:

Chilled water systems with a total cooling capacity, less cooling capacity provided with air economizers, as specified in Table 1 C403.5(1).

Individual fan systems with cooling capacity greater than or equal to 54,000 Btu/h (15.8 kW) in buildings having other than a *Group R* occupancy,

2.

The total supply capacity of all fan cooling units not provided with economizers shall not exceed 20 percent of the total supply capacity of all fan cooling units in the building or 300,000 Btu/h (88 kW), whichever is greater.

Individual fan systems with cooling capacity greater than or equal to 270,000 Btu/h (79.1 kW) in buildings having a *Group R*

occupancy.

3.

The total supply capacity of all fan cooling units not provided with economizers shall not exceed 20 percent of the total supply capacity of all fan cooling units in the building or 1,500,000 Btu/h (440 kW), whichever is greater.

**Exceptions:** Economizers are not required for the following systems.

1. Individual fan systems not served by chilled water for buildings located in *Climate Zones* 0A, 0B, 1A and 1B.

Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above

1. 35°F (1.7°C) dew-point temperature to satisfy process needs.
2. Systems expected to operate less than 20 hours per week.
3. Systems serving supermarket areas with open refrigerated casework.
4. Where the cooling efficiency is greater than or equal to the efficiency requirements in Table C403.5(2).
5. Systems that include a heat recovery system in accordance with Section C403.10.5.
6. VRF and Water Source Heat Pump systems installed with a dedicated outdoor air system.

# Reason Statement:

If VRF systems are exempted when their energy recovery abilities are limited to 35 ton blocks, a WSHP system with no restriction on tonnage or energy recovery sharing capabilities should be exempted as well. VRF is often not designed to take advantage of energy recovery, therefore the projected energy recovery is not realized.

# Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction. This will lower the cost of construction in some areas, while leaving others neutral.

CEPI-104-21

CEPI-115-21

# IECC®: C403.7.4.2

**Proponents:**

Glory O'Brien, representing Western Mechanical Solutions (glory.obrien@westernmechanicalsolutions.com)

**2021 International Energy Conservation Code**

# Revise as follows:

C403.7.4.2 Spaces other than nontransient dwelling units.

Where the supply airflow rate of a fan system serving a space other than a nontransient dwelling unit exceeds the values specified in Tables C403.7.4.2(1) and C403.7.4.2(2), the system shall include an energy recovery system. The energy recovery system shall provide an *enthalpy recovery ratio* of not less than 50 percent at design conditions. Where an air economizer is required, the energy recovery system shall include a bypass or controls that permit operation of the economizer as required by Section C403.5.

**Exception:** An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the *International Mechanical Code* .

Laboratory fume hood systems that include not fewer than one of the following features:

Variable-air-volume hood exhaust and room supply systems configured to reduce exhaust and makeup air volume to 50

* 1. percent or less of design values.

2.

Direct makeup (auxiliary) air supply equal to or greater than 75 percent of the exhaust rate, heated not warmer than 2°F

* 1. (1.1°C) above room setpoint, cooled to not cooler than 3°F (1.7°C) below room setpoint, with no humidification added, and no simultaneous heating and cooling used for dehumidification control.
1. Systems serving spaces that are heated to less than 60°F (15.5°C) and that are not cooled.
2. Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site-solar energy.

*Enthalpy recovery ratio* requirements at heating design condition in *Climate Zones* 0, 1 and 2, cooling enthalpy heating enthalpy

5.

recovery applies.

*Enthalpy recovery ratio* requirements at cooling design condition in *Climate Zones* 3C, 4C, 5B, 5C, 6B, 7 and 8, heating enthalpy

1. recovery applies.
2. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.

Where the largest source of air exhausted at a single location at the building exterior is less than 75 percent of the design *outdoor*

1. *air* flow rate.
2. Systems expected to operate less than 20 hours per week at the *outdoor air* percentage covered by Table C403.7.4.2(1).
3. Systems exhausting toxic, flammable, paint or corrosive fumes or dust.
4. Commercial kitchen hoods used for collecting and removing grease vapors and smoke.

# Reason Statement:

In Denver's climate zone, there is an exception for doing cooling energy recovery. However, some engineers confuse the exception and interpret it to mean energy recovery in general, so we want to clarify that the exception for cooling does not apply to heating.

# Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction. This is only meant to act as a clarification that will not change the cost of construction. CEPI-115-21

CEPI-116-21

# IECC®: SECTION 202 (New), C403.7.4.2

**Proponents:**

Emily Toto, representing ASHRAE (etoto@ashrae.org)

**2021 International Energy Conservation Code**

# Add new definition as follows:

C202 Energy recovery, series. A three-step process in which the first step is to remove energy from a single airstream without the use of mechanical cooling. In the second step, the air stream is mechanically cooled for the purpose of dehumidification. In the third step, the energy removed in step one is reintroduced to the air stream.

C202 Energy recovery ratio, series (SERR). The difference between the dry bulb air temperatures leaving the series energy recovery unit and leaving the dehumidifying coil divided by the difference between 75'F (24'C) and the dry bulb temperature of the air leaving the dehumidifying cooling coil.

# Revise as follows:

C403.7.4.2 Spaces other than nontransient dwelling units.

Where the supply airflow rate of a fan system serving a space other than a nontransient dwelling unit exceeds the values specified in Tables C403.7.4.2(1) and C403.7.4.2(2), the system shall include an energy recovery system. The energy recovery system shall provide an *enthalpy recovery ratio* of not less than 50 percent at design conditions. Where an air economizer is required, the energy recovery system shall include a bypass or controls that permit operation of the economizer as required by Section C403.5.

**Exception:** An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the *International Mechanical Code*.

1. Laboratory fume hood systems that include not fewer than one of the following features:
	1. Variable-air-volume hood exhaust and room supply systems configured to reduce exhaust and makeup air volume to 50 percent or less of design values.
	2. Direct makeup (auxiliary) air supply equal to or greater than 75 percent of the exhaust rate, heated not warmer than 2°F (1.1°C) above room setpoint, cooled to not cooler than 3°F (1.7°C) below room setpoint, with no humidification added, and no simultaneous heating and cooling used for dehumidification control.
2. Systems serving spaces that are heated to less than 60°F (15.5°C) and that are not cooled.
3. Heating energy recovery where ~~Where~~ more than 60 percent of the outdoor heating energy is provided from site-recovered or site- solar energy in Climate Zones 5 through 8.
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.

7. Systems in Climate Zones 0 through 4 requiring dehumidification that employ *series energy recovery* ~~in series with the cooling coil~~

and have a minimum SERR of 0.40.

Where the largest source of air exhausted at a single location at the building exterior is less than 75 percent of the design *outdoor*

1. *air* flow rate.
2. Systems expected to operate less than 20 hours per week at the *outdoor air* percentage covered by Table C403.7.4.2(1).
3. Systems exhausting toxic, flammable, paint or corrosive fumes or dust.
4. Commercial kitchen hoods used for collecting and removing grease vapors and smoke.

# Reason Statement:

This proposal revises two exceptions to the requirement to use energy recovery. One change limits the exception for solar heating to cooler climates. The second clarifies the exemption for the use of "energy recovery in series with the cooling coil" by creating a new definition for series energy recovery. This definition is required because some users of the standard have confused condenser heat recovery and site-recovered energy with series energy recovery. They are quite different.

There is also a new definition that defines the performance of series energy recovery. The purpose is to ensure that the series energy recovery system performs well enough to justify allowing it to be used in lieu of conventional energy recovery. The format of the

code does not allow formulas to be used in a definition, so the series energy recovery ratio is described in the text. For clarity, the formula is shown here:

SERR = (TL - TC)/(TE - TC)

Where

SERR = Series energy recovery ratio

TL = Rated dry bulb temperature of the air leaving the device.

TC = Dry bulb temperature of the air leaving the dehumidifying cooling coil TE = Dry bulb temperature of the air entering the first step of 75°F In addition, the exemption for series energy recovery has been limited to warmer climate zones.

# Bibliography:

ANSI/ASHRAE/IES Standard 90.1-2019 Energy Standard for Buildings Except Low-Rise Residential Buildings

# Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction. The changes only clarify the intent of the code.

CEPI-116-21

CEPI-117-21

# IECC®: C403.7.4.2, TABLE C403.7.4.2(1), TABLE C403.7.4.2(2)

**Proponents:**

Glory O'Brien, representing Western Mechanical Solutions (glory.obrien@westernmechanicalsolutions.com)

**2021 International Energy Conservation Code**

# Revise as follows:

C403.7.4.2 Spaces other than nontransient dwelling units.

Where the ~~supply~~ outside or exhaust airflow rate of a ~~fan~~ system serving a space other than a nontransient dwelling unit exceeds the values specified in modified Tables C403.7.4.2(1) and C403.7.4.2(2), the system shall include an energy recovery system. The energy recovery system shall provide an *enthalpy recovery ratio* of not less than ~~50~~ 60 percent at design conditions. Where an air economizer is required, the energy recovery system shall include a bypass on supply and exhaust air or controls that permit operation of the economizer as required by Section C403.5. Maximum energy recovery device pressure drop shall be no greater than 0.6 in. w.c. at sea level and standard air density at 100% outside airflow. Energy recovery device air pressure drops above 0.6 in. w.c. shall include bypass dampers that are open during air side economizer operation. Energy recovery device maximum allowable pressure drop is 1.2 in w.c.. Supply and exhaust fans static efficiency must be 65% or greater.

Projects where exhaust air is rated as class 3 or class 4 will require an enthalpy recovery ratio of not less than 50 percent at design conditions.

When the exhaust flow in table C403.7.4.2(1) and (2) are exceeded, but exhaust to supply ratios are below 60 percent, supply bypass can be utilized to reduce the pressure drop through the OA side of the energy recovery device to 0.6 w.c. at sea level and standard air density.

**Exception:** An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the *International Mechanical Code*.

Laboratory fume hood systems that include not fewer than one of the following features:

Variable-air-volume hood exhaust and room supply systems configured to reduce exhaust and makeup air volume to 50

* 1. percent or less of design values.

2.

Direct makeup (auxiliary) air supply equal to or greater than 75 percent of the exhaust rate, heated not warmer than 2°F

* 1. (1.1°C) above room setpoint, cooled to not cooler than 3°F (1.7°C) below room setpoint, with no humidification added, and no simultaneous heating and cooling used for dehumidification control.
1. Systems serving spaces that are heated to less than 60°F (15.5°C) and that are not cooled.
2. Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site-solar energy.
3. *Enthalpy recovery ratio* requirements at heating design condition in *Climate Zones* 0, 1 and 2.
4. *Enthalpy recovery ratio* requirements at cooling design condition in *Climate Zones* 3C, 4C, 5B, 5C, 6B, 7 and 8.
5. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.

Where the largest source of air exhausted at a single location at the building exterior is less than 75 percent, but greater than 60

1. percent of the design outdoor air flow rate, provide an enthalpy recovery ratio of not less than 50 percent at design

conditions. ~~percent of the design~~ *~~outdoor air~~* ~~flow rate.~~

1. Systems expected to operate less than 20 hours per week at the *outdoor air* percentage covered by Table C403.7.4.2(1).
2. Systems exhausting toxic, flammable, paint or corrosive fumes or dust.
3. Commercial kitchen hoods used for collecting and removing grease vapors and smoke.

TABLE C403.7.4.2(1) ENERGY RECOVERY REQUIREMENT (Ventilation systems operating less than 8,000 hours per year)

|  |  |
| --- | --- |
| **CLIMATE ZONE** | **PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE** |
| **� 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~~ Outside or Exhaust Airflow Rate (cfm)** |
| 3B, 3C, 4B, 4C, ~~5B~~ | NR | NR | NR | NR | NR | NR | NR | NR |
| 0B, 1B, 2B, 5C | NR | NR | NR | NR | :: 26,000 | :: 12,000 | :: 5,000 | ::4,000 |
| 5B Supply | NR | NR | NR | NR | :: 6,000 | :: 5,500 | :: 5,000 | ::4,000 |
| 5B Exhaust | NR | NR | NR | NR | :: 4,500 | :: 4,125 | :: 3,750 | ::3,000 |
| 6B | :: 28,000 | :: 26,5000 | :: 11,000 | :: 5,500 | :: 4,500 | :: 3,500 | :: 2,500 | ::1,500 |
| 0A, 1A, 2A, 3A, 4A,5A, 6A | :: 26,000 | :: 16,000 | :: 5,500 | :: 4,500 | :: 3,500 | :: 2,000 | :: 1,000 | > 120 |
| 7, 8 | :: 4,500 | :: 4,000 | :: 2,500 | :: 1,000 | > 140 | > 120 | > 100 | > 80 |

For SI: 1 cfm = 0.4719 L s. NR = Not Required.

TABLE C403.7.4.2(2) ENERGY RECOVERY REQUIREMENT (Ventilation systems operating not less than 8,000 hours per year)

|  |  |
| --- | --- |
| **CLIMATE ZONE** | **PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE** |
| **� 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~~ Outside or Exhaust Airflow Rate (cfm)** |
| 3C | NR | NR | NR | NR | NR | NR | NR | NR |
| 0B, 1B, 2B, 3B,4C, 5C | NR | :: 19,500 | :: 9,000 | :: 5,000 | :: 4,000 | :: 3,000 | :: 1,500 | ::120 |
| 0A, 1A, 2A, 3A,4B, ~~5B~~ | :: 2,500 | :: 2,000 | :: 1,000 | :: 500 | :: 140 | :: 120 | :: 100 | :: 80 |
| 5B Outside | :: 500 | :: 400 | :: 300 | :: 200 | :: 84 | :: 84 | :: 80 | :: 80 |
| 5B Exhaust | ::1,500 | :: 1,200 | :: 900 | :: 600 | :: 252 | :: 252 | :: 240 | ::240 |
| 4A, 5A, 6A, 6B,7, 8 | :: 200 | :: 130 | :: 100 | :: 80 | :: 70 | :: 60 | :: 50 | :: 40 |

For SI: 1 cfm = 0.4719 L s. NR = Not Required.

# Reason Statement:

Purpose: To clarify a previously submitted and approved Denver 2018 code amendment a row was added to table 1 for exhaust. Note that table 2 was not changed from 2018 code amendment.

Reasons: Most heat recovery (90%) is accomplished with heat wheels as they are the most economical form of heat recovery. Normally heat wheels provide enthalpy recovery ratio (ERR) of approximately 70% or higher, depending on exhaust to supply ratio. At a 75% exhaust to supply ratio, 60% ERR is achievable. Increasing the minimum heat recovery from 50% to 60% therefore does not have cost implications and closes a current loophole. Since plate heat exchangers can meet 60% they would not be excluded.

The 60% energy recovery values increase energy savings therefore paybacks are quicker. This has the effect of extending economical energy recovery at lower airflows. Modified values in Table 1 for supply are based on typical Xcel Energy rates in Colorado for electric and gas, 12 hours a day, 5 days a week (typical office building) with a 10 year payback threshold. Note an electric heat base in lieu of gas would result in even lower airflows being economical. Back up available on request.

Some heat recovery devices have higher pressure drop than 0.6 in. w.c.. If the heat recovery has a higher pressure drop than 0.6 in. w.c., bypass dampers that open during economizer provide equal energy as a lower pressure drop heat wheel with no bypass dampers.

Partial energy recover where the exhaust airflow is high enough to be economically feasible is to be allowed, but the exhaust to supply ratio would result in an uneconomical oversized recovery device.

Exception 8 is modified to allow for lower ERR with other heat recovery such as 1) lower exhaust ratio to 60%, 2) other heat recovery devices such as plate heat exchangers, heat pipes and run around coils.

Substantiation: We were involved in a project where a MAU at 17,000 cfm was initially designed, code officials caught that heat recovery was required, the design and construction team revised the project to include energy recovery and the change was cost neutral.

# Cost Impact:

The code change proposal will increase the cost of construction.

Saving energy and drastically reducing carbon emissions compared to no energy recovery (in the 60 - 70% range) with a payback below 10 years.

CEPI-117-21

CEPI-118-21

# IECC®: C403.7.7

**Proponents:**

Emily Toto, representing ASHRAE (etoto@ashrae.org)

**2021 International Energy Conservation Code**

# Revise as follows:

C403.7.7 Shutoff dampers.

Outdoor air intake and exhaust openings and stairway and shaft vents shall be provided with Class I motorized dampers. The dampers shall have an air leakage rate not greater than 4 cfm/ft2 (20.3 L/s x m2) of damper surface area at 1.0 inch water gauge (249 Pa) and shall be labeled by an *approved agency* when tested in accordance with AMCA 500D for such purpose.

Outdoor air intake and exhaust dampers shall be installed with automatic controls configured to close when the systems or spaces served are not in use or during unoccupied period warm-up and setback operation, unless the systems served require outdoor or exhaust air in accordance with the International Mechanical Code or the dampers are opened to provide intentional economizer cooling.

Stairway and elevator shaft vent dampers shall be installed with automatic controls configured to open upon the activation of any fire alarm initiating device of the building's fire alarm system, ~~or~~ the interruption of power to the damper, or by thermostatic control systems.

**Exception:** Nonmotorized gravity dampers shall be an alternative to motorized dampers for exhaust and relief openings as follows:

1. In buildings less than three stories in height above grade plane.
2. In buildings of any height located in *Climate Zones* 0, 1, 2 or 3.
3. Where the design exhaust capacity is not greater than 300 cfm (142 L/s).

Nonmotorized gravity dampers shall have an air leakage rate not greater than 20 cfm/ft2 (101.6 L/s x m2) where not less than 24 inches (610 mm) in either dimension and 40 cfm/ft2 (203.2 L/s x m2) where less than 24 inches (610 mm) in either dimension. The rate of air leakage shall be determined at 1.0 inch water gauge (249 Pa) when tested in accordance with AMCA 500D for such purpose.

The dampers shall be labeled by an *approved agency*.

# Reason Statement:

Based on ASHRAE 90.1-2019 Addendum m.

Elevator shaft vents are no longer required by most model codes, but many machine-room-less elevator manufacturers insist on a vent to help maintain shaft temperatures that may rise due to heat produced by the cab-mounted elevator machinery. These vents are not likely necessary or even useful for temperature control in most applications due to the heat losses to the conditioned spaces adjacent to the elevator shaft that should result in acceptable shaft temperatures. However, they are being used nonetheless.

These vents are typically open year-round. This proposal requires that if such vents are installed, they are controlled to only open based on a thermostatic setting.

# Bibliography:

ANSI/ASHRAE/IES Standard 90.1-2019 Energy Standard for Buildings Except Low-Rise Residential Buildings, Addendum m https://[www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda/addenda-to-standard-90-1-2019](http://www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda/addenda-to-standard-90-1-2019)

# Cost Impact:

The code change proposal will increase the cost of construction.

The cost of construction is increased in cases where elevator manufacturers require a vent in the elevator shaft. CEPI-118-21

CEPI-123-21

# IECC®: C403.8.6.2 (New)

**Proponents:**

Glory O'Brien, representing Western Mechanical Solutions (glory.obrien@westernmechanicalsolutions.com)

**2021 International Energy Conservation Code**

# Add new text as follows:

C403.8.6.2 Bathroom Intermittent Exhaust Control.

When a bathroom exhaust system is designed for intermittent operation, the power shall be provided through an automatic shutoff timer switch with a maximum time limit of 30 minutes.

# Reason Statement:

To reduce energy consumption and unnecessary infiltration in buildings.

Substantiation: Bin analysis was run on a 50 cfm bath exhaust fan in Denver. It was assumed the fan would run 2 hours a day with a manual switch vs. 5 minutes with a timer. Only heating energy and fan energy was reviewed, savings was $ 27 per year based on 10¢/KWH.

Assuming $ 100 installed cost, the payback is 4 years . Added benefit is that occupants no longer need to remember to go back and shutoff the bathroom exhaust fan.

# Cost Impact:

The code change proposal will increase the cost of construction.

A small increase in cost can significantly reduce the time a bathroom fan is on. CEPI-123-21

**2021 PUBLIC INPUT TO THE 2021 IECC, IRC CH. 11, AND ICCPC CH. 15 CE359**

**Modification to CEPI 169**

**C403.7.6 Automatic control of HVAC systems serving guestrooms.**

In Group R-1 buildings containing more than 50 guestrooms, each guestroom shall be provided with controls complying with the provisions of Sections C403.7.6.1 and C403.7.6.2. ~~Card key controls comply with these requirements.~~

**C405.2.5 Specific application**

2. *Sleeping units* shall have control devices or systems that are configured to automatically switch off all ~~permanently~~ installed luminaires and switched receptacles within 20 minutes after all occupants have left the unit.

**Exceptions:**

1. Lighting and switched receptacles controlled by card key controls in buildings containing fewer than 50 *sleeping units*.

2. Spaces where patient care is directly provided.

**Reason for modification**: Alignment with 90.1-2022.

Hotel card power switch hacks:

<https://youtu.be/2J3jX8NMoBA>

<https://pearlsoftravelwisdom.boardingarea.com/2013/03/tips-and-tricks-for-hotel-room-key-card-wall-slots/>