International Energy Conservation Code
Consensus Committee-Commercial

Meeting Agenda (Draft 6/1)

June 8, 2022
2:00 PM Eastern to 5:00 PM Eastern (3 hours)
Webex Link

Committee Chair: Duane Jonlin
Committee Vice Chair: Emily Hoffman

1. Call to order.

2. Meeting Conduct. Staff
    a. Identification of Representation/Conflict of Interest
    b. ICC Council Policy 7 Committees: Section 5.1.10 Representation of Interests
    c. ICC Code of Ethics: 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.
    d. ICC Antitrust Compliance Guideline

3. Roll Call – Hoffman

4. Approval of Agenda

5. Approval of Minutes

6. Administrative issues.
    a. Progress indicators

7. Action Items.
    a. Code Change Proposals

CEPI-7-21 (Energy Storage Ready)	(Elec as modified 9-5-2)
CEPI-133-21 (Lighting general scope)	(Elec as modified 17-0-1)
CEPI-146-21 Part I (EV Infrastructure)	(Elec disapprove 13-0-2)
CEPI-162-21 (Daylight responsive controls)	(Elec disapprove 10-7-1)
CEPI-164-21 (Daylighting Controls)	(Elec as modified 11-4-4)
CEPI-167-21 (Daylight Zones and Envel Sections)	(Elec approve 10-4-3)
CEPI-192-21 (Transformers)	(Elec approve 13-0-3)
CEPI-230-21 (Lighting for alterations)	(Elec disapprove 8-2-4)
CEPI-231-21 (Alt lighting control upgrades)	(Elec disapprove 11-3-1)
CEPI-233-21 (Solar Ready storage removed)	(Elec disapprove 14-0-1)
CEPI-16-21 Part I(Fenestration Orientation)	(Envelope as modified 16-0-2)

CEPI-20-21 (Project size U-factors)	(Envelope disapprove 10-5-2)
CEPI-53-21 (Multi-family alignment)	(Envelope disapprove 15-0-3)
CEPI-54-21 (Fenestration Orientation)	(Envelope as modified 12-2-3)
CEPI-221-21 (Alterations building envelope)	(Envelope as modified 12-0-4)
CEPI-129-21 (Service WH for R-1 and R-2)	(HVACR disapprove 8-7-2)
CEPI-64-21 (HVAC operable opening exception)	(HVACR disapprove 17-0-0)
CEPI-65-21 (Operable opening interlocking)	(HVACR as modified 16-0-1)
CEPI-123-21 (Bathroom Intermittent Exhaust Cont)	(HVACR as modified 10-0-1)
CEPI-82-21 Part I (Roof gutter de-icing)	(HVACR as modified 10-0-1)
CEPI-120-21 (Central Fan Integrated efficacy)	(HVACR as modified 10-0-1)
CEPI-128-21 (Water Heater Efficiency High Capcity)	(HVACR as modified 11-0-1)
CEPI-80-21 (Pipe insulation protection)	(HVACR as modified 10-0-1)
CEPI-79-21 (Min. pipe insulation thickness)	(HVACR as modified 12-0-0)
CEPI-125-21 (Grid integrated water heating)	(HVACR as modified 8-0-4)
CEPI-131-21 (Service WH Pump)	(HVACR as modified 9-1-1)

9. Subcommittee & Temporary Work Group reports
    a. Envelope and Embodied Energy- Culp
    b. Electrical Power, Lighting, and Renewables-Jouaneh
    c. HVACR & Water Heating-Bade
    d. Modeling, Whole-Building Metrics, Zero Energy-Eades

10. Other business.
    a. Public comment on any matters discussed at the meeting (Please limit comments to 2 minutes. Further comments can be directed to the Secretariat following the meeting to be considered at a future meeting.)

11. “3 Minutes of Fame.” Speakers TBD

12. Upcoming meetings. June 15, 2022 2:00 Eastern

13. Adjourn.

FOR FURTHER INFORMATION BE SURE TO VISIT THE ICC WEBSITE:
IECC Commercial Consensus Committee Webpage
https://www.iccsafe.org/products-and-services/i-codes/code-development/cs/iecc-commercial-consensus-committee/
ICC Energy webpage
https://www.iccsafe.org/products-and-services/codes-standards/energy/
Code Change Proposal Submittals
https://energy.cdpaccess.com/login/
Energy Complete Monograph
Monograph

FOR ADDITIONAL INFORMATION, PLEASE CONTACT:
Kristopher Stenger, AIA, Director of Energy Programs
International Code Council
kstenger@iccsafe.org

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-007-21 Energy Storage Ready
CDP ID #	302
Code	IECC CE
Code Section(s)	C103.2, C105.2.5, C405.15 (New), C405.15.1 (New) New Section y
Location	base
Proponent	Kim Cheslak kim@newbuildings.org
Proposal Status	SC rev
Subcommittee	CE Elec, Light
Subcommittee Notes	Reason: This proposal will reduce the future cost of installing ESS by requiring ESS-ready criteria.
Recommendation	AS MODIFIED Modifications are found in the file "CEPI-7 with all mods final" located at the link below:
Vote	9 - 5 - 2
Recommendation Date	May 20, 2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-7 Consensus Proposal: Mandatory Storage Ready

Add new definition as follows:

ENERGY STORAGE SYSTEM (ESS). One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time.

Revise text as follows:

C103.2 Information on construction documents. Construction documents shall be drawn to scale on suitable material… Details shall include, but are not limited to, the following as applicable:

1. ….

14. Location reserved for inverters, metering equipment, ESS, and a pathway reserved for routing of raceways or conduit from the renewable energy system to the point of interconnection with the electrical service and the ESS.

15. Location and layout of a designated area for ESS.

16. Rated energy capacity and rated power capacity of the installed or planned ESS.

Add new text as follows:

C405.15 Electrical energy storage system. Buildings shall comply with one of C405.15.1 or C405.15.2.

C405.15.1 Electrical energy storage energy capacity. Each building shall have an ESS with rated energy capacity and rated storage capacity as follows:

1. ESS rated energy capacity (kWh) ≥ 1.0 x Installed PV System Rated Power (kW_{DC})
2. ESS rated power capacity (kW) ≥ 0.25 x Installed PV System Rated Power (kW_{DC})

Exception: DC-coupled battery systems shall comply with energy capacity only.

C405.15.2 Electrical energy storage system ready. Each building shall have a reserved ESS-ready area to accommodate future electrical storage meeting the following electrical criteria:

1.Energy storage system rated energy capacity (kWh) ≥ Area of three largest stories (ft^2) x 0.0008 kWh/ft^2
2. Energy storage system rated power capacity (kW) ≥ Area of three largest stories (ft^2) x 0.0002 kW/ft^2

C405.15.2.1 ESS-ready location. Each ESS-ready area shall be located in accordance with Section 1207 of the *International Fire Code*.

C405.15.2.2 ESS-ready minimum area requirements. Each ESS-ready area shall be sized in accordance with the designated rating of the planned system UL9540 or UL9540a. Where rated to UL9540a, the spacing shall be per the manufacturer's instructions.

C405.15.2.3 Electrical distribution equipment

The onsite electrical distribution equipment shall have sufficient capacity, rating, and space to allow installation of overcurrent devices and circuit wiring in accordance with NFPA 70 for future electrical ESS installation meeting the criteria of Section C405.15.2.

Add new standard(s) as follows

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

9540-2020	Standard for Energy Storage Systems and Equipment C405.15.2.2
9540A-2019	Standard for Safety Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems C405.15.2.2

Reason:

This proposal will reduce the future cost of installing ESS by adding ESS-ready criteria for buildings.

Revise as follows:

CB103.6 Interconnection pathway.
Construction documents shall indicate pathways for routing of conduit or piping from the solar-ready zone to the electrical service panel ~~and electrical energy storage system area~~ or service hot water system.

~~**CB103.7 Electrical energy storage system-ready area.**~~
~~The floor area of the electrical energy storage system-ready area shall be not less than 2 feet (610 mm) in one dimension and 4 feet (1219 mm) in another dimension, and located in accordance with Section 1207 of the International Fire Code. The location and layout diagram of the electrical energy storage system-ready area shall be indicated on the construction documents.~~

~~**CB103.8**~~ **CB103.7 Electrical service reserved space.**
The main electrical service panel shall have a reserved space to allow installation of a dual-pole circuit breaker for future solar electric and ~~a dual-pole circuit breaker for future electrical energy storage system installation. These spaces~~ shall be labeled "For Future Solar Electric ~~and Storage~~." The reserved ~~spaces~~ space shall be positioned at the end of the panel that is opposite from the panel supply conductor connection.

~~**CB103.9**~~ **CB103.8 Construction documentation certificate.**
A permanent certificate, indicating the solar-ready zone and other requirements of this section, shall be posted near the electrical distribution panel, water heater or other conspicuous location by the builder or registered design professional.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-133-21 Lighting general scope
CDP ID #	379
Code	IECC CE
Code Section(s)	C405.1 New Section n
Location	base
Proponent	Jack Bailey jbailey@oneluxstudio.com
Proposal Status	SC rev
Subcommittee	CE Elec, Light
Subcommittee Notes	Reason: Provides clarity to scope of C405
Recommendation	AS MODIFIED: C405.1 General Electrical power and lighting systems ~~controls, the maximum lighting power for interior and exterior applications, vertical and horizontal transportation systems, data centers, receptacle controls, electrical system efficiency, and metering and monitoring of electrical energy use and electrical energy consumption~~ shall comply with this section. *Sleeping units* shall comply with Section C405.2.5 and with ~~either~~ Section C405.1.1 ~~or C405.3~~. *General lighting* shall consist of all lighting included when calculating the total connected interior lighting power in accordance with Section C405.3.1 and which does not require specific application controls in accordance with Section C405.2.5. Red text incorporates prior revisions from CEPI-135.
Vote	17 - 0 - 1
Recommendation Date	May 23, 2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____X_____
Consensus Committee	

Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-146-21 Part I EV Infastructure
CDP ID #	429
Code	IECC CE
Code Section(s)	C405.14 New Section y
Location	base
Proponent	Sharon Bonesteel sharon.bonesteel@srpnet.com
Proposal Status	SC rev
Subcommittee	CE Elec, Light
Subcommittee Notes	Reason: Based on the actions already taken on the consensus proposal CECPI-001-21.
Recommendation	DISAPPROVE
Vote	13 - 0 - 2
Recommendation Date	May 20, 2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-162-21 Daylight responsive controls
CDP ID #	222
Code	IECC CE
Code Section(s)	C405.2.4 New Section n
Location	base
Proponent	Emily Toto etoto@ashrae.org
Proposal Status	SC rev
Subcommittee	CE Elec, Light
Subcommittee Notes	Reason: Proposed wattage limits are not demonstrated to be cost effective and concerns exist related to the current exceptions.
Recommendation	DISAPPROVE
Vote	10 - 7 - 1
Recommendation Date	May 23, 2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-164-21 Daylighting Controls
CDP ID #	153
Code	IECC CE
Code Section(s)	C405.2.4 New Section n
Location	base
Proponent	Megan Hayes Megan.Hayes@nema.org
Proposal Status	SC rev
Subcommittee	CE Elec, Light
Subcommittee Notes	Reason: The revised proposal more closely matches the daylighting requirements in ANSI/ASHRAE/IES Standard 90.1 and leads to more energy savings in IECC.
Recommendation	AS MODIFIED C405.2.4 Daylight-responsive controls. … Exceptions: Daylight responsive controls are not required for the following: … <u>3. Enclosed office spaces less than 250 ft2</u>
Vote	11 - 4 - 4
Recommendation Date	May 23, 3033
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-167-21 Daylight Zones and Envelop Sections
CDP ID #	382
Code	IECC CE
Code Section(s)	C405.2.4.2, C402.4.1.1 New Section n
Location	base
Proponent	Jack Bailey jbailey@oneluxstudio.com
Proposal Status	SC rev
Subcommittee	CE Elec, Light
Subcommittee Notes	Makes necessary editorial corrections in this section.
Recommendation	As Submitted – recommend review by envelope subcommittee.
Vote	10 - 4 - 3
Recommendation Date	February 28, 2022
Next Step	To Subcommittee_____ENVELOPE_____ To Advisory Group_____ To Consensus Committee_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-192-21 Transformers
CDP ID #	115
Code	IECC CE
Code Section(s)	C405.7, Table C405.7 New Section n
Location	base
Proponent	Emily Toto etoto@ashrae.org
Proposal Status	SC rev
Subcommittee	CE Elec, Light
Subcommittee Notes	Reason: This will update the language for transformers to align with ASHRAE 90.1 and includes a footnote to clarify efficiency requirements for other transformers.
Recommendation	APPROVED AS SUBMITTED
Vote	13 - 0 - 3
Recommendation Date	May 20, 2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-230-21 Lighting for alterations
CDP ID #	91
Code	IECC CE
Code Section(s)	C503.5 New Section y
Location	base
Proponent	Glenn Heinmiller glenn@lampartners.com
Proposal Status	SC rev
Subcommittee	CE Elec, Light
Subcommittee Notes	Reason: Does not bring many spaces with lighting alterations up to base code efficiency requirements.
Recommendation	DISAPPROVED
Vote	8 - 2 - 4
Recommendation Date	May 20, 2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-231-21 Alterations lighting control upgrades
CDP ID #	418
Code	IECC CE
Code Section(s)	C503.5.1 New Section y
Location	base
Proponent	Sean Denniston sean@newbuildings.org
Proposal Status	SC rev
Subcommittee	CE Elec, Light
Subcommittee Notes	Reason: There are issues with the clarity of the provisions in terms of interpretation and enforcement.
Recommendation	DISAPPROVED
Vote	11 - 1 - 3
Recommendation Date	May 20, 2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-233-21 Solar Ready Storage Ready removed
CDP ID #	481
Code	IECC CE
Code Section(s)	CB103.6, CB103.7, CB103.8, CB103.9 New Section n
Location	appendix
Proponent	Joe Cain JoeCainPE@gmail.com
Proposal Status	SC rev
Subcommittee	CE Elec, Light
Subcommittee Notes	Reason: Based on prior action on CEPI-007.
Recommendation	DISAPPROVE
Vote	14 - 0 - 1
Recommendation Date	May 20, 2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-016-21 Part I Fenestration definition
CDP ID #	569
Code	IECC CE
Code Section(s)	C202 New Section n
Location	base
Proponent	SEHPCAC sehpcac@iccsafe.org
Proposal Status	SC rev
Subcommittee	CE Envelope
Subcommittee Notes	**Reason Statement**: To provide consistency between the definitions of fenestration used in the IECC and ASHRAE 90.1. Modification makes sure the air leakage requirement still applies to opaque doors.
Recommendation	**Approve as modified.** Filename: "Mod to CEPI-16 Pt 1.docx"
Vote	**Approve as modified:** 16-0-2 (CNV)
Recommendation Date	5/19/22
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

Modification for CEPI-16 Pt 1:

Original proposal:

Vertical fenestration. Windows that are fixed or operable, ~~opaque doors, glazed~~ doors that are more than half glazed, glazed block and combination opaque and glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of not less than 60 degrees (1.05 rad) from horizontal.

Add the following to the current proposal:

C402.5.4 Air leakage of fenestration and opaque doors.

The air leakage of fenestration and opaque door assemblies shall meet the provisions of Table C402.5.4. Testing shall be in accordance with the applicable reference test standard in Table C402.5.4 by an accredited, independent testing laboratory and *labeled* by the manufacturer.

Reason: Making the SEHPCAC's change in the definition of fenestration would exclude air leakage requirements for "opaque doors". This would rectify the void created by the definition change.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-020-21 Project size U factors
CDP ID #	361
Code	IECC CE
Code Section(s)	C303.1.3 New Section n
Location	base
Proponent	Helen Sanders helen.sanders@Technoform.com
Proposal Status	SC rev
Subcommittee	CE Envelope
Subcommittee Notes	**Reason Statement**: The language lacks clarity in application and will potentially confuse users. It needs better correlation with C407.
Recommendation	**Disapproval**
Vote	**Disapproved:** 10-5-2 (CNV)
Recommendation Date	5/19/22
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

Modified version reviewed by the subcommittee

CEPI-20-21

IECC®: C303.1.3

Proponents: Helen Sanders, Facade Tectonics Institute/Technoform North America, representing Facade Tectonics Institute

2021 International Energy Conservation Code

Revise as follows:

C303.1.3 Fenestration product rating. *U*-factors, *solar heat gain coefficient* (SHGC), and *visible transmittance* (VT) of fenestration products shall be determined as follows:

1. For windows, doors and skylights, *U*-factor, SHGC, and VT ratings shall be determined in accordance with NFRC 100 and NFRC 200. For the ~~total performance path~~ Total Building Performance option in Section C407, the U-factor, SHGC, and VT modeled in the ~~whole building simulation~~ *proposed design* shall be based on either the proposed project specific size(s) and configurations ~~calculated according to NFRC 100. When using the area-weighted average U-factor, U-factors for project specific sizes shall be calculated~~ for all *fenestration* representing 5% or more of the total *fenestration* area, or the NFRC 100 standard sizes and configurations for all *fenestration*. Physical testing of *fenestration* at the project size and configuration ~~fenestration~~ to verify U-factor is not required.
2. Where required for garage doors and rolling doors, *U*-factor ratings shall be determined in accordance with either NFRC 100 or ANSI/DASMA 105.

U-factors, SHGC, and VT shall be determined by an accredited, independent laboratory, and *labeled* and certified by the manufacturer.

Products lacking such a *labeled U*-factor shall be assigned a default *U*-factor from Table C303.1.3(1) or Table C303.1.3(2). ~~The *solar heat gain coefficient* (SHGC) and *visible transmittance* (VT) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and *labeled* and certified by the manufacturer.~~ Products lacking such a *labeled* SHGC or VT shall be assigned a default SHGC or VT from Table C303.1.3(3). For Tubular Daylighting Devices, VT_{annual} shall be measured and rated in accordance with NFRC 203.

Reason: The purpose of this submission is to prevent project teams, when using the total performance path (not the prescriptive path), from taking advantage of using U-factors for NFRC standard sizes when using fenestration of smaller size(s) than these NFRC standard sizes in projects. Members of the Façade Tectonics Institute have observed that project teams are already taking advantage of using U-factors calculated for project specific sizes when the fenestration is of a larger size than the NFRC standard size (since this is to their advantage), however, project teams can “play the system” by using U-factors for the NFRC 100 standard size for smaller units.

In addition, the proposed language will help clarify the confusion among design teams on whether to consider NFRC sizes or the project specific size and configurations, streamlining the design process. It also clarifies that the project size U-factor shall be calculated according to the NFRC 100 standard and does not require separate physical testing.

The proposal does not change the fact that the NFRC 100 methodology remains the standard, and prescriptive U-factors for fenestration remain based on the standard NFRC size.

Clause C402.4.3.4 Area-weighted U-factor listed below would still allow for using an area-weighted average of the different project size.

We have suggested this section of the code for this clarification to be inserted, but the committee may find a more appropriate place for it. Either way, FTI believes that this loophole should be removed.

Cost Impact: The code change proposal will neither increase nor decrease the cost of construction. This proposal aims to close a loophole and clarifies the way U-factor is defined in the total energy compliance path. There should be no impact in the cost of construction. Some designs may be changed to increase fenestration size (less frame, more glass) in order to improve U-factor to the NFRC 100 value. In the case of curtainwall, some project teams simulate and submit both project size and NFRC size because of lack of clarity, so clarifying this point could actually reduce the cost of the design process.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-053-21 Fenestration U-Factors in Group R
CDP ID #	
Code	IECC CE
Code Section(s)	Section 202 (new), C402.4 table, C402.4.3, C405.1.1
Location	base
Proponent	Kimberly Newcomer kim@newbuildings.org
Proposal Status	SC rev
Subcommittee	CE Envelope
Subcommittee Notes	**Reason Statement**: The proposal does not align with the IECC-R values and provides no cost justification for changes in requirements.
Recommendation	**Disapproval.**
Vote	**Disapproved:** 15-0-3 (CNV)
Recommendation Date	5/19/22
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-054-21 Fenestration Orientation
CDP ID #	207
Code	IECC CE
Code Section(s)	C402.4.3 New Section y
Location	base
Proponent	Emily Toto etoto@ashrae.org
Proposal Status	SC rev
Subcommittee	CE Envelope
Subcommittee Notes	**Reason Statement**: Orientation is proven to be a low cost strategy to save significant energy.
Recommendation	**Approve as modified.** Modification: Change exception 2 from "does not exceed" to "is not greater than"
Vote	**Approve as modified:** 12-2-3 (CNV)
Recommendation Date	5/19/22
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-221-21 Alterations building envelope
CDP ID #	422
Code	IECC CE
Code Section(s)	C503, C503.1, C503.2, C503.2.1, C503.2.2, C503.2.3, C503.2.4 (New), C503.2.5 (New), C503.2.6 (New), C503.2.7 (New) New Section y
Location	base
Proponent	Jay Crandell jcrandell@aresconsulting.biz
Proposal Status	SC rev
Subcommittee	CE Envelope
Subcommittee Notes	**Reason Statement**: Provides improved clarity and application of existing building envelope alteration requirements with flexibility.
Recommendation	**Approve as modified.** Filename: "CEPI-221_Replacement Modification 05-19-2022 as voted.docx"
Vote	**Approve as modified:** 12-0-4 (CNV)
Recommendation Date	5/19/22
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee_____X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-221-21 (Replacement 5/9/2022)

IECC®: SECTION C503, C503.1, C503.2, C503.2.1, C503.2.2, C503.2.3, C503.2.4 (New), C503.2.5 (New), C503.2.6 (New), C503.2.7 (New)

Proponents: Jay Crandell, P.E., ABTG/ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council (jcrandell@aresconsulting.biz)

2021 International Energy Conservation Code

Add new definitions as follows:

APPROVED SOURCE. An independent person, firm or corporation, approved by the *code official*, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses.

CONSTRUCTION DOCUMENTS. Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building *permit*.

Revise as follows:

C503.1 General. *Alterations* to any *building* or structure shall comply with the requirements of Section C503. *Alterations* shall be such that the existing *building* or structure is not less conforming to the provisions of this code than the existing *building* or structure was prior to the *alteration*. *Alterations* to an existing *building*, *building* system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction without requiring the unaltered portions of the existing *building* or *building* system to comply with this code. *Alterations* shall not create an unsafe or hazardous condition or overload existing *building* systems.

Exception: The following *alterations* need not comply with the requirements for new construction, provided that the energy use of the building is not increased:

1. Storm windows installed over existing *fenestration*.
2. Surface-applied window film installed on existing single-pane *fenestration* assemblies reducing solar heat gain, provided that the code does not require the glazing or *fenestration* to be replaced.
3. ~~Existing ceiling, wall or floor cavities exposed during construction, provided that these cavities are filled with insulation.~~
4. ~~Construction where the existing roof, wall or floor cavity is not exposed.~~

3.~~5.~~ *Roof recover*.

4. *Roof replacement* where roof assembly insulation is integral to or located below the structural roof deck.

5.~~6.~~ *Air barriers* shall not be required for *roof recover* and roof replacement where the *alterations* or renovations to the building do not include *alterations*, renovations or *repairs* to the remainder of the building envelope.

6. An existing building undergoing alterations that complies with Section C407.

C503.2 Building thermal envelope. Alterations of existing *building thermal envelope* assemblies shall comply with this section. New *building thermal envelope* assemblies that are part of the *alteration* shall comply with Section~~s~~ C402 ~~C402.1 through~~

~~C402.5~~. An area-weighted average U-factor for new and altered portions of the *building thermal envelope* shall be permitted to satisfy the U-factor requirements in Table C402.1.4. The existing *R*-value of insulation shall not be reduced or the *U*-factor of a *building thermal envelope* assembly be increased as part of a *building thermal envelope* alteration except where complying with Section C407.

Exception: Where the existing building exceeds the fenestration area limitations of Section C402.4.1 prior to alteration, the building is exempt from Section C402.4.1 provided that there is no ~~not an~~ increase in fenestration area.

C503.2.1 Roof alterations ~~replacement~~. Insulation complying ~~*Roof replacements* shall comply~~ with Section~~s~~ C402.1 ~~C402.1.3, C402.1.4, C402.1.5 or C407~~ and Section C402.2.1, or an *approved* design that minimizes deviation from the insulation requirements, shall be provided for the following roof alterations: ~~where the existing roof assembly is part of the *building thermal envelope* and contains insulation entirely above the roof deck. In no case shall the *R* value of the roof insulation be reduced or the *U* factor of the roof assembly be increased as part of the *roof replacement*~~.

1. An *alteration* to roof-ceiling construction where there is no insulation above *conditioned space*,
2. *Roof replacement* for roofs with insulation entirely above deck,

   Exception: Where compliance with Section C402.1 cannot be met due to limiting conditions on an existing roof, an *approved* design shall be submitted with the following:

   1. *Construction documents* that include a report by a *registered design professional* or other *approved source* documenting details of the limiting conditions affecting compliance with the insulation requirements.
   2. *Construction documents* that include a roof design by a *registered design professional* or other *approved source* that minimizes deviation from the insulation requirements.
3. Conversion of unconditioned attic space into *conditioned space*.
4. Replacement of ceiling finishes exposing cavities or surfaces of the roof-ceiling construction.

C503.2.2 Vertical fenestration. ***(Section unchanged)***

C503.2.3 Skylight area. ***(Section unchanged)***

Add new text as follows:

C503.2.4 Above-grade wall alterations. *Above-grade wall* alterations shall comply with the following:

1. Where wall cavities are exposed, the cavity shall be filled with *cavity insulation* complying with Section C303.1.4. New cavities created shall be insulated in accordance with Section C402.1 or an *approved* design that minimizes deviation from the insulation requirements.
2. Where exterior wall coverings and fenestration are added or replaced for the full extent of any exterior wall assembly on one or more elevations of the building, insulation shall be provided where required in accordance with one of the following:
   a. An R-value of *continuous insulation* not less than that designated in Table C402.1.3 for the applicable above-grade wall type and existing cavity insulation R-value, if any;
   b. An R-value of not less than that required to bring the *above-grade wall* into compliance with Table C402.1.4; or,

c. An *approved* design that minimizes deviation from the insulation requirements of Section C402.1.

3. Where Items 1 and 2 apply, the insulation shall be provided in accordance with Section C402.1.

Where any of the above requirements are applicable, the *above-grade wall* alteration shall comply with Sections 1402.2 and 1404.3 of the *International Building Code*.

C503.2.5 Floor alterations. Where an alteration to a floor or floor overhang exposes cavities or surfaces to which insulation can be applied, and the floor or floor overhang is part of the *building thermal envelope*, the floor or floor overhang shall be brought into compliance with Section C402.1 or an *approved* design that minimizes deviation from the insulation requirements. This requirement applies to floor alterations where the floor cavities or surfaces are exposed and accessible prior to construction.

C503.2.6 Below-grade wall alterations. Where unconditioned below-grade space is changed to *conditioned space*, walls enclosing such conditioned space shall be insulated where required in accordance with Section C402.1. Where the below-grade space is *conditioned space* and where walls enclosing such space are altered, they shall be insulated where required in accordance with Section C402.1.

C503.2.7 Air barrier. Altered b*uilding thermal envelope* assemblies shall be provided with an *air barrier* in accordance with Section C402.5.1. Such *air barrier* need not be continuous with unaltered portions of the *building thermal envelope*. Testing requirements of Section C402.5.1.2 shall not be required.

MODIFICATIONS TO ORIGINAL CEPI-221-21 RESULTING IN THE ABOVE REPLACEMENT PROPOSAL

(FOR INFORMATION ONLY)

Original Proposal (underline & ~~strike-out~~)

Text modifying original proposal for correlation with prior proposal actions (double underlined & ~~strike-out~~)

Work group modifications (double underlined & ~~strike-out~~)

Add new definitions as follows:

APPROVED SOURCE. An independent person, firm or corporation, approved by the *building official*, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses.

CONSTRUCTION DOCUMENTS. Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building *permit*.

Revise as follows:

C503.1 General. *Alterations* to any *building* or structure shall comply with the requirements of Section C503. *Alterations* shall be such that the existing *building* or structure is not less conforming to the provisions of this code than the existing *building* or structure was prior to the *alteration*. *Alterations* to an existing *building*, *building*

system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction without requiring the unaltered portions of the existing *building* or *building* system to comply with this code. *Alterations* shall not create an unsafe or hazardous condition or overload existing *building* systems.

Exception: The following *alterations* need not comply with the requirements for new construction, provided that the energy use of the building is not increased:

1. Storm windows installed over existing *fenestration*.
2. Surface-applied window film installed on existing single-pane *fenestration* assemblies reducing solar heat gain, provided that the code does not require the glazing or *fenestration* to be replaced.
3. ~~Existing ceiling, wall or floor cavities exposed during construction, provided that these cavities are filled with insulation.~~
4. ~~Construction where the existing roof, wall or floor cavity is not exposed.~~

3.~~5.~~ *Roof recover*.

4. *Roof replacement* where roof assembly insulation is integral to or located below the structural roof deck.

5.~~6.~~ *Air barriers* shall not be required for *roof recover* and roof replacement where the *alterations* or renovations to the building do not include *alterations*, renovations or *repairs* to the remainder of the building envelope.

6. An existing building undergoing alterations that complies with Section C407.

C503.2 Building thermal envelope. Alterations of existing *building thermal envelope* assemblies shall comply with this section. New *building thermal envelope* assemblies that are part of the *alteration* shall comply with Sections ~~C402.1 through C402.5~~. An area-weighted average U-factor for new and altered portions of the *building thermal envelope* shall be permitted to satisfy the U-factor requirements in Table C402.1.4. ~~In no case shall the~~ The existing *R*-value of insulation shall not be reduced or the *U*-factor of a *building thermal envelope* assembly be increased as part of a *building thermal envelope* alteration except where complying with Section C407.

Exception: Where the existing building exceeds the fenestration area limitations of Section C402.4.1 prior to alteration, the building is exempt from Section C402.4.1 provided that there is no ~~not an~~ increase in fenestration area.

C503.2.1 Roof alterations ~~replacement~~. ~~Roof~~ Insulation complying ~~*Roof replacements* shall comply~~ with Section C402.1 ~~C402.1.3, C402.1.4, C402.1.5 or C407~~ and Section C402.2.1, or an *approved* design that minimizes deviation from the insulation requirements, shall be provided for the following roof alterations ~~conditions as applicable~~: ~~where the existing roof assembly is part of the *building thermal envelope* and contains insulation entirely above the roof deck. In no case shall the *R* value of the roof insulation be reduced or the *U* factor of the roof assembly be increased as part of the *roof replacement*.~~

1. An *alteration* to roof-ceiling construction where there is no insulation above *conditioned space*.
2. *Roof replacements* for roofs with insulation entirely above deck.

   Exception: Where compliance with Section C402.1 cannot be met due to limiting conditions on an existing roof, an *approved* design ~~the following~~ shall ~~be permitted to demonstrate compliance~~ comply with the following ~~insulation requirements~~:

   3. *Construction documents* that include a report by a *registered design professional* or other *approved source* documenting details of the limiting conditions affecting compliance with the insulation requirements.
   4. *Construction documents* that include a roof design by a *registered design professional* or other *approved source* that minimizes deviation from the insulation requirements.

3. Conversion of unconditioned attic space into *conditioned space*~~, and~~
4. Replacement of ceiling finishes exposing cavities or surfaces of the roof-ceiling construction. ~~assembly to which insulation can be applied.~~

C503.2.2 Vertical fenestration. ***(Section unchanged)***

C503.2.3 Skylight area. ***(Section unchanged)***

Add new text as follows:

C503.2.4 Above-grade wall alterations. *Above-grade wall* alterations shall comply with the following ~~requirements as applicable~~:

1. Where ~~interior finishes are removed exposing~~ wall cavities are exposed, the cavity shall be filled with ~~existing or new~~ *cavity insulation* complying with Section C303.1.4. New cavities created shall be insulated in accordance with Section C402.1 or an *approved* design that minimizes deviation from the insulation requirements.
2. Where exterior wall coverings and fenestration are added or ~~removed and~~ replaced for the full extent of any exterior wall assembly on one or more elevations of the building, ~~*continuous*~~ *insulation* shall be provided where

required in accordance with one of the following: ~~Sections C402.1.3, C402.1.4, C402.1.5, or an *approved* design.~~

a. An R-value of *continuous insulation* not less than that designated in Table C402.1.3 for the applicable above-grade wall type and existing cavity insulation R-value, if any.

b. An R-value of not less than that required to bring the above-grade wall into compliance with Table C402.1.4, or

c. An *approved* design that minimizes deviation from the insulation requirements of Section C402.1

3. Where Items 1 and 2 apply, the insulation shall be provided in accordance with Section C402.1 ~~C402.1.3, C402.1.4, C402.1.5, or C407~~.

~~**4.** Where new interior finishes or exterior wall coverings are applied to the full extent of any exterior wall assembly of mass construction, insulation shall be provided where required in accordance with Sections C402.1.3, C402.1.4, C402.1.5, or an *approved* design.~~

Where any of the above requirements are applicable, the *above-grade wall* alteration shall comply with Sections 1402.2 and 1404.3 of the *International Building Code*. ~~with the insulation and water vapor retarder requirements of Section 1404.3 of the *International Building Code*. Where the exterior wall coverings are removed and replaced, the above-grade wall alteration shall comply with the weather protection requirements of Section 1402.2 of the *International Building Code*.~~

C503.2.5 Floor alterations. Where an alteration to a floor or floor overhang exposes cavities or surfaces to which insulation can be applied, and the floor or floor overhang is part of the *building thermal envelope*, the floor or floor overhang shall be brought into compliance with Section C402.1 ~~C402.1.3, C402.1.4, C402.1.5,~~ or an *approved* design that minimizes deviation from the insulation requirements. This requirement ~~shall apply~~ applies to floor alterations where the floor cavities or surfaces are exposed and accessible prior to construction.

C503.2.6 Below-grade wall alterations. Where ~~an unfinished~~ unconditioned below-grade space is changed to *conditioned space*, walls enclosing such conditioned space ~~the *below-grade walls*~~ shall be insulated where required in accordance with Section C402.1 ~~C402.1.3, C402.1.4, or C402.1.5~~. Where the below-grade space is *conditioned space* and ~~a *below-grade wall* is~~ where walls enclosing such space are altered ~~by removing or adding interior finishes, it~~ they shall be insulated where required in accordance with Section C402.1 ~~C402.1.3, C402.1.4, or C402.1.5~~.

C503.2.7 Air barrier. Altered b~~B~~*uilding thermal envelope* assemblies ~~altered in accordance with Section C503.2~~ shall be provided with an *air barrier* in accordance with Section C402.5.1. ~~and the~~ Such *air barrier* ~~shall~~ need not be ~~required to be made~~ continuous with unaltered portions of the *building thermal envelope*. Testing requirements of Section C402.5.1.2 shall not be required.

Reason (for AS MODIFIED): This modified proposal updates CEPI-221 to correlate with CEPI-225 (AM) already approved. It also makes a minor editorial change to correlate with CEPI-226 (AM). In addition, a number of editorial changes and a couple of technical improvements are made to correlate with action on REPI-150 (similar to CEPI-221) for the residential provisions by the Residential Main Committee (vote 30-13-1). Finally, several comments received have been considered as noted in the comment bar. In general, the original objective and reason for CEPI-221 (shown below) is unchanged.

Cost Impact (MODIFICATIONS ONLY): The modification will reduce the cost of construction compared to the original proposal.
The exception language for roof alterations creates a reasonable process (use of an approved source with expertise in roofing design) to allow flexibility in conducting a roof replacement for existing roofs with insulation entirely above deck where limiting conditions may not reasonably permit full compliance with insulation requirements for new roofs with insulating entirely above deck. Provisions for other types of alterations retain the flexibility of allowing an approved design for similar reasons.

Reason (ORIGINAL PROPOSAL): Existing building alterations are perhaps one of the primary opportunities to reduce national energy consumption, yet Chapter 5 misses many opportunities to effectively address this need. There are many opportunities to cost-effectively improve energy efficiency of the existing building stock by use of reasonable criteria to trigger (or avoid) requirements for alterations with flexibility in the manner or extent of compliance where needed. This proposal attempts to strike that balance in a practical and cost-effective manner for building envelope assemblies of existing building that are undergoing specific types of alterations. Consequently, this proposal will help to address the 40% of national energy use that is attributed to the existing building stock and will only apply where alterations are proposed that provide opportunity to improve the performance of the existing building stock. A similar coordinated proposal was also submitted for the IECC-R committee.

Key changes made in this proposal are summarized as follows:

1. Exceptions 3 and 4 of Section C503.1 are deleted as they are now addressed and preserved within requirements in new Section C503.2.4 for above-grade walls.

2. New exception 4 is added to Section C503.1 for roof replacements for roof assemblies that do not have insulation entirely above deck (which is addressed separately in Section C503.2.1).

3. A clause to prevent reduction of insulation levels in existing thermal envelope assemblies is moved from Section C503.2.1 to Section C503.2 to apply to all building thermal envelope alterations.

4. Section C503.2.1 is revised to address multiple types of roof alterations, including roof replacements for roofs with insulation entirely above deck.

5. A new Section C503.2.4 is provided for above-grade wall alterations which identifies conditions where it is appropriate and practical to provide insulation (if not already present). Language is also provided to ensure coordination with building code moisture control requirements which require integration with and can influence the method of complying with the insulation requirements.

6. A new Section C503.2.5 is provided for floor alterations and takes an approach similar to that done for above-grade walls (although with fewer conditional requirements).

7. A new Section C503.2.6 is provided for below-grade wall alterations. This captures the cases where a below-grade space is being converted to conditioned space and where below-grade wall alterations allow addition of insulation if the below grade space is already conditioned space.

8. Finally, new Section C503.2.7 is provided to address air barrier installation in building thermal envelope assemblies that are altered within the scope of Section C503.2. However, it is made clear that continuity of the air barrier with unaltered portions of the building thermal envelope is not required. This avoids causing an alteration to extend beyond its intended scope and extent. This is also consistent with the intent behind existing exception #6 to Section C503.1 dealing with air barriers in roof replacements.

Cost Impact: The code change proposal will increase the cost of construction.

Where requirements are triggered and where upgrades in energy efficiency were not already planned for an alteration, this proposal will increase cost for a limited set of envelope alteration activities for existing buildings. Some existing requirements such as roof replacements and filling of exposed stud cavities remain unchanged. For those existing buildings with deficient insulation levels (or no insulation) and where planned alterations allow that deficiency to be addressed efficiently, the cost-benefits are expected to closely align with that for new buildings. However, it is not possible to conduct a simple cost-benefit analysis for existing buildings because of the multitude of variables involved and the flexibility provided in this proposal that make it nearly impossible to quantify with any reasonable level of certainty. Thus, we consider these proposed provisions to be cost-effective by judgment as these types of existing building thermal envelope upgrades are currently being used in the existing building/remodeling/renovation market, although not consistently or in an enforceable manner.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-129-21 Service WH for R-1 and R-2
CDP ID #	403
Code	IECC CE
Code Section(s)	C404.2.1, C404.2.2, C404.2.2.1, C404.2.2.2, C406.7.4 New Section y
Location	base
Proponent	Evan Green evan@ecotope.com
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Proponent presented that the proposal is meant to encourage heat pump water heaters in multifamily. It is modeled after the city of Seattle code that is set to also go into effect in WA soon. The proposal is strongly discouraging electric heating with efficiencies/COP =< 1. Gas HPWH are allowed via exception. • Proponent stated that this applies to central systems. It is meant to encourage heat pump water heaters because there are other paths, but the easiest path is to use a heat pump water heater. Proposal applies to > 55 gallon systems. • Per proponent, the proposal is only meant to apply to central systems in Group R1 and R2 occupancies. However, per subcommittee discussion, this is not the way the language is actually written and structured in the proposal. Section 404.2.1 (which includes a 1,000,000 btu/hr threshold) is separate than 404.2.2 (which does not have a minimum application threshold). • Subcommittee discussion that the intent of the proposal is understood, but the proposal would disallow a number of legal products and equipment types and would likely lead to federal preemption issues. • Subcommittee discussion that there are significant issues with the proposal as presented and it needs work. • Subcommittee discussion about how this is a useful opportunity to parse issues with the proposal, Some members preferred tabling the proposal and taking the opportunity to work on it and amend it before the next meeting. • A motion was made and seconded to disapprove the proposal.

Recommendation	Disapprove Reason: This proposal has language issues and leads to federal preemption issues.
Vote	Disapprove 8-7-3
Recommendation Date	5/12/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee __X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-064-21 HVAC operable opening exception
CDP ID #	158
Code	IECC CE
Code Section(s)	C402.5.11 New Section n
Location	base
Proponent	Glory O'Brien glory.obrien@westernmechanicalsolutions.com
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Proponent not present • Addresses same code section as CEPI – 65. • John Bade – proposal would add exception for evaporative cooling. • Subcommittee action on CEPI-65 covers what this proposal would have done. No longer needed.
Recommendation	Disapprove Reason: this proposal is no longer needed since intent has been covered already in previous committee action of CEPI-65 approval as modified.
Vote	Motion to Disapprove passed 17-0-0
Recommendation Date	4/14/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee __X_____
Consensus Committee	
Committee Response	

Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-065-21 Operable opening interlocking
CDP ID #	509
Code	IECC CE
Code Section(s)	C402.5.11, C402.5.11.1, C403.14 New Section n
Location	base
Proponent	Lisa Rosenow lrosenow@evergreen-tech.net
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
• Subcommittee Notes	• HVACR SC worked with the proponent to expand and improve the proposal. The Envelope Subcommittee reviewed it, and changes were incorporated. The As Modified proposal is a reorganization of the original proposal but keeps the same intent. The proposal also meets the intent of CEPI-64. • 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 • Committee discussion around the term “overhead door” in the exception language and the need to use a different term to expand application, with subsequent revision to “operable openings”. • This is an expansion of scope, since current code only has requirements for openings > 40ft2 and this proposal would pull in other openings /doors. Main application is to doors in hotels and residential occupancies, private patios, etc. • Committee discussion around how heating shutoff in northern climates could be an issue for freeze protection. Committee clarification that code proposal does not require turning off heating and there is an option to reset temperature to 55F. This requirement has been in 90.1 for a while, have engaged with cold climate engineers and this hasn’t been a concern • Committee support for inclusion of doors with air curtains in the exception, subsequent language revisions to reflect this exception

	• 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.
Recommendation	Approve as modified, see attached modification Reason: proposal supports increased energy efficiency around the building envelope though operable openings
Vote	Motion to Approve As Modified passed 16-0-1
Recommendation Date	4/14/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee___X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

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 90ºF (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 m^2) 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 operable openings 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 radiant heating and cooling systems
8. *Alterations* where walls would have to be opened solely for the purpose of meeting this requirement and where approved.
9. Doors served by *air curtains* meeting the requirements of Section C402.5.9

Revise as follows:

TABLE C407.2
REQUIREMENTS FOR TOTAL BUILDING PERFORMANCE

SECTION[a]	TITLE
Envelope	
C402.5	Air leakage—thermal envelope
Mechanical	
C403.1.1	Calculation of heating and cooling loads
C403.1.2	Data centers
C403.2	System design
C403.3	Heating and cooling equipment efficiencies
C403.4.1~~, except C403.4.3, C403.4.4 and C403.4.5~~	~~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	Economizer fault detection and diagnostics
C403.7, except C403.7.4.1	Ventilation and exhaust systems
C403.8, except C403.8.6	Fan and fan controls
C403.9	Large-diameter ceiling fans
C403.11, except C403.11.3	Refrigeration equipment performance
C403.12	Construction of HVAC system elements
C403.13	Mechanical systems located outside of the building thermal envelope
C404	Service water heating
C405, except C405.3	Electrical power and lighting systems
C408	Maintenance information and system commisioning

a. 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. This will allow evaporative cooling to continue to operate.

Stringency is increased by adding doors, though many doors will fall under the exceptions, 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..

Reviewers should note that many doors are excepted, including building entrances for the public with automatic closers, the exterior doors of a vestibule system, doors that are alarmed, and doors served by an air curtain system.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-123-21 Bathroom Intermittent Exhaust Control
CDP ID #	161
Code	IECC CE
Code Section(s)	C403.8.6.2 New Section y
Location	base
Proponent	Glory O'Brien glory.obrien@westernmechanicalsolutions.com
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Proposal was modified and members of the public worked with the proponent ahead of the subcommittee meeting to modify and provide more options for compliance, towards the same goal/intent of limiting runtime of exhaust fans. Options are meant to align with the most common control methods. • Subcommittee discussion around the residential committee actions and concern for mold issues for bathrooms without windows. The provider of the modified language mentioned that modified language was developed in response to the residential committee's concerns. • Subcommittee question on application of the exception language, with subsequent modification to add "shall not be required to provide additional controls other than manual on capability" • Questions about exactly what is meant by "component of an outdoor air ventilation system" – if an exhaust fan is part of the same building as OA brought in through a separate air handler, then wouldn't it still be part of an "outdoor air ventilation system". Response that this is really a proposal to address multifamily buildings. Added Group R-2, R-3, R-4 to the exception language to clarify. • Question about if it would be possible for residential committee to review and provide feedback before HVACR SC votes. Response from subcommittee member with inclination to vote on this, let other interested parties (residential committee) make a public comment if needed • Question on application to continuous ventilation. IMC allows for intermittent (higher cfm) and continuous (lower cfm) options, how does this apply to both. Clarification that this only applies to exhaust fans designed for intermittent operation, as specified in the charging language.

	• Question about how someone might know if a fan is on, if it uses option 1. Response that some people can hear it, could interlock with light or have a visible light, or you can see the time remaining on a dial, etc. Not specified in this proposal, but could be addressed if needed.
Recommendation	Approve As Modified (see attached modification) Reason: This proposal will reduce energy consumption in buildings.
Vote	Motion to approve as modified passed 17-2-0
Recommendation Date	4/28/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee _X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-123-21 As Modified

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 for Bathrooms and Toilet Rooms.

~~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.~~

Where an exhaust system serving a bathroom or toilet room is designed for intermittent operation, the exhaust system shall be provided with manual-on capability and one or more of the following controls:

1. Timer control that has a minimum set point of no greater than 20 minutes.
2. Occupancy control that automatically turns off exhaust fans within 30 minutes after all occupants have left the space.
3. Humidity control capable of manual or automatic adjustment between a relative humidity range of ≤ 50% to a maximum of 80%.
4. Contaminant control that responds to particle or gaseous concentration.

Exception: Bathroom and toilet room exhaust systems serving as a component of an outdoor air ventilation system in Group R-2, R-3 and R-4 occupancies shall not be required to provide additional controls other than manual on capa

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-082-21 Part I Roof Gutter de-icing
CDP ID #	437
Code	IECC CE
Code Section(s)	C403.13.2, C403.13.3 (New), C403.13.3 New Section y
Location	base
Proponent	Nick Thompson nick.thompson@cityofaspen.com
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Proponent introduced proposal, including editorial modifications. Also added a daylight sensor as an option for shutting off at night. • Subcommittee discussion about need and issues with shutting off systems at night. Option 1 provides another option to address this (moisture sensors).
Recommendation	Approve As Modified Reason (referenced from As Modified proposal): The intent of roof and gutter deicing is to prevent ice dams from causing water damage to the building. Ice dams occur when roof eaves, valleys, and gutters get ice buildup from a combination of flowing water and freezing conditions. Ice on a roof or gutter is not a problem in and of itself. The problem is when liquid water flow occurs and is blocked from draining properly by ice. Water flow during freezing conditions occurs chiefly from the sun, thus the provision for controls to shut off the system at night. A moisture sensor is provided as an option for the designer if there is concern for free water flow during nighttime hours. If there is no water flow (moisture), there is no need to keep drainage pathways clear as there is no water to drain. To clarify the original reason statement, ice damming can occur even on new buildings built to current code provisions, such as warm roofs that are unvented. Modifications were made by the Commercial HVACR Subcommittee.
Vote	Motion to approve as modified passes 10-0-1
Recommendation Date	5/26/2022
Next Step	To Subcommittee_____ To Advisory Group_____

	To Consensus Committee __X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-82-21 Part I AS MODIFIED

IECC®: C403.13.2, C403.13.3 (New), C403.13.3

Proponents:
Nick Thompson, City of Aspen, representing Colorado Chapter of the ICC (nick.thompson@cityofaspen.com)

THIS IS A 2 PART PROPOSAL. PART I WILL BE HEARD BY THE IECC-COMMERCIAL COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL COMMITTEE.

2021 International Energy Conservation Code

C403.13.2 Snow- and ice-melt system controls.
Snow- and ice-melting systems shall include automatic controls configured to shut off the system when the pavement temperature is above 50°F (10°C) and precipitation is not falling, and an automatic or manual control that is configured to shut off when the outdoor temperature is above 40°F (4°C).

Add new text as follows:

C403.13.3 Roof and gutter deicing controls.

Roof and gutter deicing systems, including but not limited to self-regulating cable, shall include automatic controls that are configured to shut off the system when the outdoor temperature is above 40°F (4.8°C) ~~maximum~~ and ~~shall~~ that include one of the following:

1. A moisture sensor configured to shut off the system in the absence of moisture, or
2. ~~A programmable timer configured to shut off the system for 8 hours minimum at night.~~
2. A daylight sensor or other means configured to shut off the system between sunset and sunrise.

Revise as follows:

~~C403.13.3~~ C403.13.4 Freeze protection system controls.

Freeze protection systems, such as heat tracing of outdoor piping and heat exchangers, including self-regulating heat tracing, shall include automatic controls configured to shut off the systems when outdoor air temperatures are above 40°F (4°C) or when the conditions of the protected fluid will prevent freezing.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-123-21 Bathroom Intermittent Exhaust Control
CDP ID #	161
Code	IECC CE
Code Section(s)	C403.8.6.2 New Section y
Location	base
Proponent	Glory O'Brien glory.obrien@westernmechanicalsolutions.com
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	HVACR Subcommittee Notes from 4/28/22 Meeting: • Proposal was modified and members of the public worked with the proponent ahead of the subcommittee meeting to modify and provide more options for compliance, towards the same goal/intent of limiting runtime of exhaust fans. Options are meant to align with the most common control methods. • Subcommittee discussion around the residential committee actions and concern for mold issues for bathrooms without windows. The provider of the modified language mentioned that modified language was developed in response to the residential committee's concerns. • Subcommittee question on application of the exception language, with subsequent modification to add "shall not be required to provide additional controls other than manual on capability" • Questions about exactly what is meant by "component of an outdoor air ventilation system" – if an exhaust fan is part of the same building as OA brought in through a separate air handler, then wouldn't it still be part of an "outdoor air ventilation system". Response that this is really a proposal to address multifamily buildings. Added Group R-2, R-3, R-4 to the exception language to clarify. • Question about if it would be possible for residential committee to review and provide feedback before HVACR SC votes. Response from subcommittee member with inclination to vote on this, let other interested parties (residential committee) make a public comment if needed • Question on application to continuous ventilation. IMC allows for intermittent (higher cfm) and continuous (lower cfm) options, how does this apply to both. Clarification that this only applies to exhaust fans designed for intermittent operation, as specified in the charging language.

	• Question about how someone might know if a fan is on, if it uses option 1. Response that some people can hear it, could interlock with light or have a visible light, or you can see the time remaining on a dial, etc. Not specified in this proposal, but could be addressed if needed. <u>HVACR Subcommittee Notes from 5/26/22 Meeting:</u> • HVACR SC voted this out at a previous meeting. There were issues with the language, so it was sent back to the SC. • Editorial modifications have been made to clean up the language. Also, changes to the timer limits in the proposed language to match at 30 minutes (rather than one at 20 and one at 30)
Recommendation	Approve As Modified Reason: To reduce energy consumption and unnecessary infiltration in buildings
Vote	Motion to approve as modified on 5/26/22 passed 10-0-1
Recommendation Date	4/28/2022 original subcommittee recommendation, 5/26/2022 revision
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee _X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

C403.8.6.2 ~~Bathroom~~ Intermittent Exhaust Control for Bathrooms and Toilet Rooms.

~~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~~.

Where an exhaust system serving a bathroom or toilet room is designed for intermittent operation, the exhaust system shall be provided with *manual*-on capability and one or more of the following controls.

1. A timer control that has a minimum setpoint not greater than 30 minutes.

2. An *occupant sensor control* that automatically turns off exhaust fans within 30 minutes after all occupants have left the space.

3. A humidity control capable of manual or *automatic* adjustment from a minimum setpoint not greater than 50% to a maximum setpoint not greater than 80% relative humidity.

4. A contaminant control that responds to a particle or gaseous concentration.

Exception: Bathroom and toilet room exhaust systems serving as an integral component of an outdoor air ventilation system in Group R-2, R-3, and R-4 occupancies shall not be required to provide controls other than manual on capability.

An off setpoint shall not be used to comply with a minimum setpoint requirement.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-120-21 Central Fan Integraged efficacy
CDP ID #	317
Code	IECC CE
Code Section(s)	C403.8.4 New Section n
Location	base
Proponent	Mike Moore mmoore@statorllc.com
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Modifications made to original proposal to put the language in a different place that makes more sense • The proposal is a crosswalk with IECC residential requirement for fan efficacy dealing with the central fan integrated system. • Covers applications with an outdoor air duct in the return trunk of a central air handler that use the central air handler motor to introduce outdoor air continuously to the dwelling unit (central fan integrated systems). This can be a very expensive way to deliver outdoor air because it is using a very large fan to deliver a small quantity of air. • The efficacy of 1.2 cfm/watt was also approved in the ICC residential based on basically the worst efficacy of any option provided in that table. The intention of this is to save the energy associated with these systems. • 1.2 cfm/W is applicable to the outdoor percentage of the flow (not the total flow). If OA is a portion of total flow, then overall fan efficiency cfm/W would need to be proportionally higher.
Recommendation	Approve As Modified Reason (referenced from original proposal): This proposal crosswalks the 2021 IECC-R Table R403.6.2 dwelling unit outdoor air fan efficacy requirements to the IECC-C (specifically as related to air handlers; other efficacy requirements are coordinated through other proposals). When space conditioning air handlers are used as the primary supply fan to provide outdoor air to dwelling units, the energy penalty can be significant. Such systems are commonly referred to as "central fan integrated" or CFI systems. The typical energy penalty associated with using a CFI system instead of a dedicated outdoor air supply fan is about 1148 kWh annually per dwelling unit1 – an enormous penalty that is comparable to adding ~3

	refrigerators2 to a dwelling unit. This proposal would ensure that, where specified, a CFI system's outdoor air fan efficacy requirements would align with the 2021 IECC-R requirements and would comply with at least the minimum fan efficacy requirement of the alternatives provided in Table C403.8.5.
Vote	Motion to Approve as Modified Passed 10-0-1
Recommendation Date	5/26/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee __X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-120-21 AS MODIFIED

IECC®: C403.8.4

Proponents:

Mike Moore, Stator LLC, representing Broan-NuTone (mmoore@statorllc.com)

2021 International Energy Conservation Code

Revise as follows:
C403.8.4 Fractional hp fan motors.

Motors for fans that are not less than $^{1}/_{12}$ hp (0.062 kW) and are less than 1 hp (0.746 kW) shall be electronically commutated motors or shall have a minimum motor efficiency of 70 percent, rated in accordance with DOE 10 CFR 431. These motors shall have the means to adjust motor speed for either balancing or remote control. The use of belt-driven fans to sheave adjustments for airflow balancing instead of a varying motor speed shall be permitted. ~~Where an air handler integrated with a space conditioning appliance is the only supply fan providing outdoor air to a dwelling unit, the efficacy of the air handler powered by the motor shall be no less than 1.2 cfm of design outdoor airflow rate per watt of power consumed.~~

Exceptions: The following motors are not required to comply with this section

1. Motors in the airstream within fan coils and terminal units that only provide heating to the space served.
2. Motors in space-conditioning equipment that comply with Section C403.3.2 or Sections C403.8.1. through C403.8.3.
3. Motors that comply with Section C405.8.

403.7.8 Dwelling unit ventilation systems. A fan that is the air mover for a heating or cooling system that serves an individual *dwelling unit* shall not be used to provide outdoor air.

Exception: Where the fan efficacy is not less than 1.2 cfm of outdoor airflow per watt when there is no demand for heating or cooling.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-128-21 Water Heater Efficiency High Capacity
CDP ID #	116
Code	IECC CE
Code Section(s)	C404.2.1 New Section n
Location	base
Proponent	Emily Toto etoto@ashrae.org
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Proposal intent is to make language more precise and more enforceable. • Minor modification from 100,000 Btu/hr to 105,000 Btu/hr in Exception 3
Recommendation	Approve as modified Reason: (reference original reason statement from proposal) Addendum ah to 90.1-2019. This addendum makes a slight modification the to requirements for high-capacity water heaters. Currently, the 92% Et requirement applies if there is just one water heater in the entire building. The change requires that the 92% Et apply for any individual system that is high-capacity. Where multiple water heaters are connected to the same system, the average thermal efficiency is still 90%, but now at least 30% of the capacity must have a thermal efficiency of 92% or better. Recognizes that water heaters up to 105,000 Btu/h are rated using the UEF metric, so the exemption was raised from 100,000 Btu/h. Clear criteria have been established for high-capacity water heaters. Commercial water heaters in the United States are regulated by the US Department of Energy (US DOE) under 10 CFR Part 431. These are the definitions of the products from the regulation: Gas-fired instantaneous water heaters with a rated input both greater than 200,000 Btu/h and not less than 4,000 Btu/h per gallon of stored water; or, Gas-fired storage water heaters with a rated input both greater than 105,000 Btu/h and less than 4,000 Btu/h per gallon of stored water.

	These definitions are used to describe "high-capacity gas-fired service water heating equipment." Service water heaters that are not included are consumer products regulated under 10 CFR Part 430 and "residential-duty commercial water heaters" as defined in 10 CFR Part 431. These products are rated using the Uniform Energy Factor, which cannot be readily compared to Et. Other changes: The exception for buildings that use site-solar or on-site recovered energy has been deleted since there are now general provisions covering renewables in other parts of the code.
Vote	Motion to approve as modified passed 18-0-0
Recommendation Date	4/28/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee _X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-128-21, as modified

IECC®: C404.2.1

Proponents:

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

2021 International Energy Conservation Code

Revise as follows:
C404.2.1 High input service water-heating systems.

Gas-fired service water-heating equipment in new buildings where the total input capacity provided by high-capacity service water- heating equipment is 1,000,000 Btu/h (293 W) or greater shall be in compliance with either or both of the following requirements:~~this section.~~

1. Where a singular piece of high-capacity gas-fired service water-heating equipment is installed ~~serves the entire building and the input rating of the equipment is 1,000,000 Btu/h (293 kW) or greater~~, such equipment shall have a thermal efficiency, Et, of not less than 92 percent.
2. ~~Where multiple~~ Multiple pieces of high-capacity gas-fired service water-heating equipment connected to the same service water- heating system ~~serve the building and the combined input rating of the water-heating equipment is 1,000,000 Btu/h (293 kW) or greater~~, the combined input-capacity-weighted-average thermal efficiency, Et, shall be not less than 90 percent and a minimum of 30% of the input to the gas-fired equipment in the service water-heating system shall have a thermal efficiency of not less than 92 percent.

High-capacity gas-fired service water-heating equipment is comprised of gas-fired instantaneous water heaters with a rated input both greater than 200,000 Btu/h (58.6 kW) and not less than 4,000 Btu/h per gallon (310 W per litre) of stored water, and gas-fired storage water heaters with a rated input both greater than 105,000 Btu/h (30.8 kW) and less than 4,000 Btu/h per gallon (310 W per litre) of stored water.

Exceptions:

1. ~~Where not less than 25 percent of the annual service water-heating requirement is provided by on-site renewable energy or site-recovered energy, the minimum thermal efficiency requirements of this section shall not apply.~~

~~2~~1. The input rating of water heaters installed in individual dwelling units shall not be required to be included in the total input rating of service water-heating equipment for a building.

~~3~~2. The input rating of water heaters with an input rating of not greater than 10~~50~~,000 Btu/h (~~29.3~~30.8 kW) shall not be required to be included in the total input rating of service water-heating equipment for a building.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-080-21 Pipe insulation protection
CDP ID #	32
Code	IECC CE
Code Section(s)	C403.12.3.1 New Section n
Location	base
Proponent	Howard Ahern howard.ahern@airexmfg.com
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Proposal was originally discussed at 5/12/22 meeting, and the subcommittee had a few issues with the proposal. A working group was formed to review and revise the proposal to bring it back to the HVACR subcommittee. • The language was modified to better clarify the requirement for removable protection. The protection can be removable and reusable for not less than 6 inches from the connection to the equipment piping. A new connection can be put in to change out equipment without destroying the insulation that is in there and to make that readily usable. Adhesive tape shall not be permitted as a means of insulation protection.
Recommendation	Approve As Modified Reason (referenced from original proposal): This proposal will clarify the intent of Section C403.12.3. The intent of these sections is not only protection of pipe insulation from weather but to insure the insulations thermal conductivity energy savings integrity lasts the life of the mechanical system asper the intent of the code.
Vote	Motion to Approve As Modified Passed 10-0-1
Recommendation Date	5/26/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee _X_____
Consensus Committee	

Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-80-21 AS MODIFIED

IECC®: C403.12.3.1

Proponents:

Howard Ahern, representing Airex Manufacturing (howard.ahern@airexmfg.com)

2021 International Energy Conservation Code

Revise as follows:

C403.12.3.1 Protection of piping insulation.
Piping insulation exposed to the weather shall be protected from physical damage, including that caused by sunlight, moisture, equipment maintenance and wind. The ~~P~~protection ~~, and~~ shall provide shielding from solar radiation that can cause degradation of the material. ~~and~~ The protection shall be removable and reusable for not less than 6 inches (150 mm) from the connection to the equipment piping. ~~the first 6 feet (4876 mm) from the equipment~~ for maintenance. Adhesive tape shall not be permitted as a means of insulation protection.

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-079-21 Minimum Pipe Insulation thickness
CDP ID #	34
Code	IECC CE
Code Section(s)	C403.12.3 Table New Section n
Location	base
Proponent	Howard Ahern howard.ahern@airexmfg.com
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Proponent described how the minimum pipe installation chart is currently all in thickness levels. This is simply an alternative, doesn't take away from anyone wanting to use thickness levels but offers a performance path to use R-values instead of thickness. Regardless of pipe insulation material, R value would be the same. • California accepts R-value and it's worked out well. • Discussion about how R-values were calculated according to ASTM standard C680 and are in alignment with ASHRAE TC 1.08. • R-values are performance based, not dependent on thermal conductivity. The current code tables (with insulation thickness requirements) are based on fiberglass. For other materials you would need to go to the equation in the code to account for different thermal conductivity. There are new insulation materials that can meet R-values without needing to be at the thickness listed in the table. • Subcommittee discussed potential modifications to as-submitted version: o Add R-value equation (not just a published R-value of insulation from manufacturer, depends on pipe thickness and thermal conductivity) o Fix existing ">=" symbol issue for 8" pipe o Potentially separate into two tables • Comments that it is a good change from an enforcement standpoint • Proponents prefer 2 table version. Subcommittee discussed a preference for the 2 table version (rather than one combined table with insulation thickness and R-value alternatives in the same table).
Recommendation	Approve As Modified Reason (referenced from original proposal): All materials having the same R-value, regardless of type; thickness; or weight, are equal in insulating strength. Where a specific R-value is required all insulation materials can be compared equally. This proposal seeks to harmonize the selection of pipe insulation requirements by allowing either thickness or R Value. The Chart has been changed to set minimum R valves required as an option to pipe insulation thickness . Optional R Values allows for materials with the same or

	higher R Values but lower thickness. “Since 2010, there have been a number of new mechanical insulation products and systems developed in North America. Some are modifications to previously commercially available materials, and some are completely new. Additionally, ASTM has developed several new specifications and revised a number of others. New materials for Pipe insulation are readily available and comply with the minimum R values required but can have lower thicknesses. This proposal offers the option of using either R values or pipe insulation thickness to achieve desired energy savings.
Vote	Motion to Approve As Modified Passed 12-0-0
Recommendation Date	5/26/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee __X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-79-21 AS MODIFIED

IECC®: TABLE C403.12.3

Proponents: Howard Ahern, representing Airex Manufacturing (howard.ahern@airexmfg.com)

2021 International Energy Conservation Code

Revise as follows:

C403.12.3Piping insulation.

P

Piping serving as part of a heating or cooling system shall be thermally insulated in accordance with Table C403.12.3(1) or Table C403.12.3(2)..

Exceptions:

1. Factory-installed piping within HVAC equipment tested and rated in accordance with a test procedure referenced by this code.
2. Factory-installed piping within room fan-coils and unit ventilators tested and rated according to AHRI 440 (except that the sampling and variation provisions of Section 6.5 shall not apply) and AHRI 840, respectively.
3. Piping that conveys fluids that have a design operating temperature range between 60°F (15°C) and 105°F (41°C).
4. Piping that conveys fluids that have not been heated or cooled through the use of fossil fuels or electric power.
5. Strainers, control valves, and balancing valves associated with piping 1 inch (25 mm) or less in diameter.
6. Direct buried piping that conveys fluids at or below 60°F (15°C).
7. In radiant heating systems, sections of piping intended by design to radiate heat.

TABLE C403.12.3(1) MINIMUM PIPE INSULATION THICKNESS (in inches)[a, c]

Portions of table not shown remain unchanged.

FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (inches)				
	Conductivity Btu x in./(h x ft² x°F)[b]	Mean Rating Temperature, °F	< 1	1 to <1 1/2	1 1/2 to <4	4 to <8	≥8
			Minimum Insulation Thickness (inches)				
> 350	0.32-0.34	250	4.5	5.0	5.0	5.0	5.0
251-350	0.29-0.32	200	3.0	4.0	4.5	4.5	4.5
201-250	0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
105-140	0.21-0.28	100	1.0	1.0	1.5	1.5	1.5
40-60	0.21-0.27	75	0.5	0.5	1.0	1.0	1.0
< 40	0.20-0.26	50	0.5	1.0	1.0	1.0	1.5

For SI: 1 inch = 25.4 mm, °C = [(°F) - 32]/1.8.

a. For piping smaller than 1 1/2 inches and located in partitions within conditioned spaces, reduction of these thicknesses by 1 inch shall be permitted (before thickness adjustment required in Note b) but not to a thickness less than 1 inch.

b. For insulation outside the stated conductivity range, the minimum thickness (T) shall be determined as follows:

$$T = r\left[(1 + t/r)^{K/k} - 1\right]$$

where:

T = Minimum insulation thickness in inches.

r = Actual outside radius of pipe in inches.

t = Insulation thickness listed in the table for applicable fluid temperature and pipe size.

K = Conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu x in/h x ft² x °F).

k = The upper value of the conductivity range listed in the table for the applicable fluid temperature.

c. For direct-buried heating and hot water system piping, reduction of these thicknesses by 1 1/2 inches (38 mm) shall be permitted (before thickness adjustment required in Note b but not to thicknesses less than 1 inch

TABLE C403.12.3(2) MINIMUM PIPE INSULATION R-Value[a]

FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	NOMINAL PIPE OR TUBE SIZE (inches)				
	< 1	1 to <1 1/2	1 1/2 to <4	4 to <8	≥8
	Minimum Insulation R-Value				
> 350	R32	R36	R34	R26	R21
251-350	R20	R29	R32	R24	R20
201-250	R17	R17	R17	R15	R13

141-200	R9	R9	R11	R10	R9
105-140	R5	R9	R8	R8	R7
40-60	R2	R2	R5	R5	R4
< 40	R 6	R9	R9	R8	R7

For SI: R-1 = RSI-0.176228, °C = [(°F) - 32]/1.8.

a. The *R-value* of cylindrical piping insulation shall be determined as follows:

$$R = \frac{r_o \left(ln \frac{r_o}{r_i} \right)}{k}$$

where:

R = the *R-value* of the cylindrical piping insulation in Btu x ft^2 x °F/h

r_o = the outer radius of the piping insulation in inches

r_i = the inner radius of the piping insulation in inches

k = the thermal conductivity of the insulation material in Btu x in/h x ft^2 x °F

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-125-21 Grid Integrated Water Heating
CDP ID #	182
Code	IECC CE
Code Section(s)	C404.11 New Section y
Location	base
Proponent	Kim Cheslak kim@newbuildings.org
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Proponents provided overview. Modifications are the result of a long negotiation between NBI and AHRI • In A/M, moved from "grid integrated" to "demand response", industry hasn't yet settled on a term and "demand response" is more known and understood at this point. • Only applies to certain scope – electric storage water heaters of certain size and capacity. High temperature water heaters are exempted or basically considered commercial heavy duty water heaters that are used for commercial loads in commercial buildings. The range of storage tank sizes subject to the requirement been aligned with water heaters on which manufacturers are installing controls that comply with these requirements. • The exception for health care facilities was removed since the relevant water heating loads in those settings is covered by the other exceptions. • Included an allowance for "equivalent as approved". There is another standard in development by AHRI that is a robust standard but it not yet ready. Leaving this open for future equivalents. AHRI 1430P is the demand response standard that AHRI is developing. Lots of participation from manufacturers, energy efficiency advocates. Big committee, getting very close to voting it out for public review. AHRI 1430 is being designed with CTA 2045 in mind. CTA 2045 seems to be what everyone is settling on. CTA 2045 is a flexible standard, essentially the water heater manufacturer needs to provide the port. • Provided overview of exceptions and date-based standard requirements (to be based on date of manufacture). • Comments about date of manufacturer vs. date of sale. Manufacturers and AHRI are supportive of a date-of-manufacture-based requirement.

	• DOE is supportive of this proposal • Questions around cost for this communication platform, and guarantees that this platform will be used down the road? What happens if it changes and if utilities want to use something different? Clarifications that it is not a communications platform, but a communications standard. New communications platforms are being designed to match with existing CTA 2045. CTA 2045 is similar to a USB. It describes the physical interface and the connection in a standardized way. • Comments about taking a residential approach and applying it to a commercial building. Responses that this standard applies to residential-style water heaters that may also be used in commercial buildings. A lot of commercial water heating needs are so small they're just going down to the local supply house and buying the same water heaters that people buy for houses. Larger commercial water heaters that get integrated into a BMS wouldn't be part of this scope. • To that point: this is why it is limited to water heater size and type that are typically residential-sized water heaters that might also be used in commercial buildings. Larger commercial building water heaters are outside of the scope. • Discussion around if a BMS can also meet the standard. There is language allowing for equivalent standards. • This is not a requirement on how water heaters have to be controlled. It is basically just saying that the manufacturer has to supply the CTA port. • Some comments around loopholes in exceptions (for example, a water heater that can provide 181F water or 3-phase to single-phase conversions).
Recommendation	Approve As Modified Reason (reference from original proposal, see original proposal for full text of reason statement): Grid-interactive end uses present an opportunity to help homes manage their bills, participate in programs, and support efficient grid operations. Water heaters can provide many services to the grid, including generation, transmission, and distribution capacity, energy arbitrage, and ancillary services.
Vote	Motion to Approve As Modified Passed 8-0-4
Recommendation Date	5/26/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee _X_____
Consensus Committee	

Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-125-21 AS MODIFIED

IECC®: SECTION 202 (New), C404.11 (New), ANSI Chapter 06 (New)

Proponents:

Kimberly Cheslak, NBI, representing NBI (kim@newbuildings.org); Josh Keeling, representing Cadeo Group (jkeeling@cadeogroup.com); Ben Rabe, representing Fresh Energy (rabe@fresh-energy.org); Bryan Bomer, representing Department of Permitting Services (bryan.bomer@montgomerycountymd.gov); Lauren Urbanek, representing Natural Resources Defense Council (lurbanek@nrdc.org); Howard Wiig, representing Hawaii State Energy Office (howard.c.wiig@hawaii.gov); Kim Burke, representing Colorado Energy Office (kim.burke@state.co.us); Matt Tidwell, representing Portland General Electric (matthew.tidwell@pgn.com); Chris Castro, representing City of Orlando (chris.castro@orlando.gov); Brad Smith, representing City of Fort Collins (brsmith@fcgov.com); Amber Wood, representing ACEEE (awood@aceee.org)

2021 International Energy Conservation Code

Add new definition as follows:
~~C202 GRID-INTEGRATED CONTROL.~~

~~An automatic control that can receive, automatically respond to demand response requests from and send information back to a utility, electrical system operator, or third-party demand response program provider.~~

DEMAND RESPONSE SIGNAL. A signal that indicates a price or a request to modify electricity consumption for a limited time period.

DEMAND RESPONSIVE CONTROL. A control capable of receiving and automatically responding to a demand response signal.

Add new text as follows:
C404.11 ~~Grid-integrated~~ Demand responsive water heating.

Electric storage water heaters with a ~~storage tank capacity between 37 and 120 gallons~~ rated water storage volume of 40 gallons (150L) to 120 gallons (450L) and a nameplate input rating equal to or less than 12kW shall be provided with ~~*grid-integrated*~~ *demand responsive controls* ~~that comply with ANSI/CTA-2045-B Level 2~~ in accordance with Table C404.11 or another equivalent *approved* standard.

Exceptions:

1. Water heaters that provide a hot water delivery temperature of 180°F (82°C) or greater
2. ~~Water heaters serving health care occupancies.~~
2. Water heaters that comply with Section IV, Part HLW or Section X of the ASME Boiler and Pressure Vessel Code
3. Water heaters that use 3-phase electric power

TABLE C404.11
DEMAND RESPONSIVE CONTROLS FOR WATER HEATING

Equipment Type	Controls	
	Before 7/1/2025	On or after 7/1/2025
Electric Storage Water heaters	ANSI/CTA-2045-B Level 1 and also capable of initiating water heating to meet the temperature set point in response to a *demand response signal.*	ANSI/CTA-2045-B Level 2, except "Price Stream Communication" functionality as defined in the standard.

Add new standard(s) as follows:
Add new standard(s) as follows:

ASME

ASME
Two Park Avenue
New York, NY 10016-5990
(800) 843-2763; https://www.asme.org

CTA

Consumer Technology Association
1919 S. Eads Street
Arlington, VA 22202

Standard reference number	*Title*	*Referenced in code section number*
ANSI/CTA-2045-B	*Modular Communications Interface for Energy Management . . . . .*	*. R403.5.4*
ASME BPVC	*Boiler and Pressure Vessel Code*	*. R403.5.4*

International Energy Conservation Code
Code Change Proposal Tracking Sheet

Proposal #	CEPI-131-21 Service water heating pump
CDP ID #	547
Code	IECC CE
Code Section(s)	C404.6.1 New Section n
Location	base
Proponent	Lisa Rosenow lrosenow@evergreen-tech.net
Proposal Status	SC rev
Subcommittee	CE HVACR & WH
Subcommittee Notes	• Proponent introduced proposal. This was reviewed at the 5/12/22 HVACR SC meeting, tabled, worked on by a working group to address issues identified at the earlier SC meeting. • ECM requirement in original proposal has been removed due to US DOE activity that addresses it. • Dedicated return pipe is required and no longer allow a cold-water supply pipe to be used as the return. Some guidance here for a requirement with regards to how controls shall be handled for multiple risers. • Similar language was approved for the Washington 2021 state energy code • Discussion about cold water return / recirculation systems, and how this applies to common systems where you push a button and (cold) water in a hot water pipe is returned via cold water pipe until hot water reaches the fixture, then the circulation shuts off. This proposal would seem to disallow this sort of setup. • Some concerns around requirement to turn off circulation pump “during extended periods”. This is undefined and there are issues with HW temperature maintenance and legionella. Discussion about concerns for the system being shut off and going against requirements in ASHRAE Guideline 12 Minimizing the Risk of Legionellosis. Guideline 12 says the water at no point ever shall be less than 120 degrees. A modification was made to delete the last sentence to address this issue.

Recommendation	Approve As Modified Reason (referenced from original proposal): The use of thermostatic balancing valves optimizes hot water flow to each zone in multiple zone or multiple riser systems and reduces waste of heated water.
Vote	Motion to Approve As Modified Passed 9-1-1
Recommendation Date	5/26/2022
Next Step	To Subcommittee_____ To Advisory Group_____ To Consensus Committee _X_____
Consensus Committee	
Committee Response	
Vote	Affirmative_____ Negative_____ Table_____ To Subcommittee_____
Date	

CEPI-131-21 AS MODIFIED

IECC®: C404.6.1

Proponents:

Lisa Rosenow, representing Self (lrosenow@evergreen-tech.net); Kevin Rose, representing Northwest Energy Efficiency Alliance (NEEA) (krose@neea.org)

2021 International Energy Conservation Code

Revise as follows:
C404.6.1 Circulation systems.

Heated-water circulation systems shall be provided with a circulation pump. ~~The pump shall have an electronically commutated motor with a means of adjusting motor speed for system balancing~~. Gravity and thermo-syphon circulation systems are prohibited. The system return pipe shall be a dedicated return pipe. ~~or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Controls for circulating hot water system pumps~~ Controls shall be configured to automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is not a demand for hot water. ~~The controls shall limit the temperature of the water entering the cold water piping to not greater than 104QF (40°C).~~ Where ~~the~~a circulation

~~system~~pump serves multiple risers or piping zones, controls shall include self-actuating thermostatic balancing valves or another means of flow control to automatically balance the flow rate through each riser or piping zone. ~~For single or multiple riser systems, cControls shall be configured with a means to turn off the circulation pump during extended periods when hot water is not required.~~